

Chapter NR 214

LAND APPLICATION AND DISPOSAL OF LIQUID INDUSTRIAL WASTES AND BY-PRODUCTS

NR 214.01	Purpose (p. 85)	NR 214.09	Conditions required for specific type of land disposal systems (p. 92)
NR 214.02	Applicability (p. 85)	NR 214.10	Conditions for the application of whey and its by-products onto land (p. 97)
NR 214.03	Definitions (p. 86)	NR 214.11	Conditions for the application of industrial sludges onto land (p. 101)
NR 214.04	Severability (p. 89)	NR 214.12	Conditions required for groundwater monitoring well systems (p. 105)
NR 214.05	Compliance with discharge limitations, monitoring requirements, and design and construction criteria (p. 89)	NR 214.13	Additional limitations (p. 109)
NR 214.06	Modification procedure (p. 89)	NR 214.14	Sampling and analytical methods (p. 110)
NR 214.07	Application of discharge limitations and design and construction criteria (p. 90)		
NR 214.08	General conditions required for all land disposal systems (p. 90)		

Note: Chapter NR 214 as it existed on January 31, 1983 was repealed and a new chapter NR 214 was created effective February 1, 1983.

NR 214.01 Purpose. The purpose of this chapter is to establish design and construction criteria for new or modified land disposal systems which receive industrial liquid wastes or sludges and which require department approval of plans and specifications under s. 144.04, Stats. The purpose is also to establish effluent limitations and monitoring requirements applicable in permits for all such discharges as required by ch. 147, Stats. Section 147.02, Stats., requires a permit for the lawful discharge of any pollutant into the waters of the state, which include groundwaters by the definition set forth in s. 147.015 (13), Stats. It is the intent of the department through this chapter to restore, protect and maintain the physical, chemical and biological integrity of the groundwater of the state and to allow no detrimental effects to this resource.

Note: The department recognizes the benefit of whey and whey by-products as a food and encourages the use of these materials in such a manner. Where this is not possible by the industry, the disposal of whey and whey by-products to the land will be regulated under this administrative code.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.02 Applicability. (1) This chapter is applicable to discharges to land disposal systems for liquid wastes, cleaning wastewaters and industrial sludges not regulated under s. NR 180.14, including but not limited to, wastes of or sludges resulting from canned, frozen and preserved fruit and vegetable processing; dairy products processing, including process wastewater, whey and whey related by-products; meat and poultry products processing; and commercial laundry and laundromat and motor vehicle cleaning wastewaters. The generator of the whey and whey related by-products shall be responsible for land disposal of such materials. In the event the generator employs an independent hauler, the generator and the independent hauler shall be severally and jointly responsible for land disposal of such materials.

(2) The provisions of this chapter are not applicable to discharges:

(a) Of effluent from publicly owned sewage treatment works.

- (b) Of sludge from publicly owned sewage treatment works.
- (c) Of wet and semi-liquid wastes at a disposal site licensed under ch. NR 180, 181 or 182, except runoff, leachate, decantate or other wastewaters collected for disposal outside of the licensed disposal site.
- (d) Of mining wastes backfilled or otherwise disposed of in an underground working in accordance with a mining permit issued under ch. NR 132, except runoff, leachate, decantate or other wastewater collected for disposal outside the permitted mine disposal site.
- (e) Of domestic waste handled and disposed of in accordance with ch. NR 113.
- (f) Of domestic sewage from systems defined as "private sewerage systems" in s. 145.01 (14), Stats.
- (g) From alcohol fuel production systems defined as "private alcohol fuel production systems" under ss. 144.438 (1) and 147.017 (1), Stats., which are operated in accordance with ss. 144.438 (2) and 147.017 (2), Stats.
- (h) To sites and facilities used solely for research purposes under the direction of a Wisconsin registered professional engineer, soil scientist, geologist or a scientist employed by a university located within this state provided the following requirements are met:

1. The net site area, excluding site borders and buffer strips, does not exceed 4 acres.
2. The site is developed, operated and maintained in such a manner that no pollutants enter waters of the state.
3. Copies of the research proposal in advance of its initiation and any reports and publications on the research are provided to the department.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.03 Definitions. The following definitions are applicable to terms used in this chapter. Definitions of other terms and the meanings of abbreviations are set forth in ch. NR 205.

(1) "Bedrock" means the rocks that underlie soil material or are at the earth's surface which is encountered when the weathered in-place consolidated material, larger than 2 mm in size, is greater than 50% by volume.

(2) "Cation-exchange capacity" means the sum of exchangeable cations absorbed by a soil, expressed in milliequivalents per 100 grams of oven dry soil.

(3) "Composting facility" means a facility which processes organic material at thermophilic temperatures and biologically degrades the material until a stable end product has been produced.

(4) "Detailed soil map" means a map prepared by or for a state or federal agency participating in the national cooperative soil survey showing soil series, type and phases at a scale of not more than 2,000 feet to the inch.

(5) "Detrimental effect" means having a significant damaging impact on groundwater for any present or future consumptive or nonconsumptive uses.

(6) "Environmental pollution" has the meaning specified under s. 144.01 (3), Stats.

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

(8) "Groundwater" means the portion of subsurface water which is within the zone of saturation, and includes but is not limited to perched water tables, shallow regional groundwater tables, and aquifers or zones that are seasonally, periodically or permanently saturated.

(9) "Groundwater monitoring" means measuring the groundwater level and analyzing samples of water taken from the ground.

(10) "Hazardous wastes" has the meaning specified under s. NR 181.04 (44).

(11) "High groundwater level" means the higher of 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.

(12) "Hydraulic loading rate" means the average daily volume of effluent discharged to a land disposal system during a calendar month or other period of time specified in a WPDES permit for the discharge. The average is calculated by dividing the total discharge volume for the month or period of time by the number of days in the month or period of time.

(13) "Incinerator" has the meaning specified under s. NR 180.04 (28).

(14) "Infiltration rate" means the rate of liquid movement through the soil surface into the soil.

(15) "Injection" means the subsurface emplacement of a fluid or waste.

(16) "Land disposal system" means a facility for disposing of liquid wastes consisting of:

- (a) An absorption or seepage pond system,
- (b) A ridge and furrow system,
- (c) A spray irrigation system,
- (d) An overland flow system,
- (e) A subsurface field absorption system,
- (f) A land spreading system, or
- (g) Any other land area receiving liquid waste discharges.

(17) "Landfill" has the meaning specified under s. NR 180.04 (30).

(18) "Land spreading site or system" means a facility or system where a controlled quantity of sludge or liquid waste or by-product is uniformly discharged, deposited, placed or injected in thin layers onto a designated land surface or is incorporated into the top several inches of the surface soil for agricultural or silvicultural purposes from a vehicle such as a truck or liquid waste applicator.

(19) "Liquid waste" means process wastewater from food processing, product manufacturing, or other industrial sources, whey and whey by-product material, and contaminated water removed from the underground or open pit workings of a mine. This definition does not include noncontact cooling water which does not contain chemical additives, nor does it include liquid manure or other farm originated wastes applied to the land in accordance with agriculturally sound practices.

(20) "Nested well system" means a group of 2 or more wells installed within 10 feet of each other at the ground surface and constructed to varying depths.

(21) "Nitrogen loading rate" means the average number of pounds of total nitrogen applied per acre of land per day during a calendar month or other period of time specified in a WPDES permit for the discharge. The average is calculated by dividing the total number of pounds of nitrogen discharged for the month or period of time by the number of days in the month or period of time and the acres used.

(22) "Organic loading rate" means the average number of pounds of BOD₅ applied per acre of land per day during a calendar month or other period of time specified in a WPDES permit for the discharge. The average is calculated by dividing the total number of pounds of BOD₅ discharged for the month or period of time by the number of days in the month or period of time and the acres used.

(23) "Overland flow system" means a land disposal system having a planned discharge of some portion of the applied liquid waste to a wastewater retention basin or to surface waters.

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

(25) "Sludge" means the accumulated solids generated during the chemical treatment, coagulation or sedimentation of water or wastewater, and the solid or semi-solid waste generated at an air pollution control facility.

(26) "Sludge management plan" means a written program developed by a WPDES permittee for the disposal of sludge which contains:

- (a) Information concerning the method by which sludge is generated,
- (b) A description of specific sludge characteristics,
- (c) Description of the site to be used for the disposal of the sludge, and
- (d) A method of recording the operation of the site.

(27) "Soil" means the unconsolidated material that has been physically and chemically derived from the bedrock by nature.

(28) "Solids loading rate" means the average number of pounds of total suspended solids applied per acre of land per day during a calendar month or other period of time specified in a WPDES permit for the discharge. The average is calculated by dividing the total number of pounds of total suspended solids discharged for the month or period of time by the number of days in the month or period of time and the acres used.

(29) "Subsurface field absorption system" means a system of buried tile or perforated pipe for distributing liquid wastes below the soil surface.

(30) "Surface watercourse" means all waters of the state except back furrows, grassed waterways, diversions, terraces, hollows and drainage swales which contain only water from rain or snow melt.

(31) "Toxic pollutants" means those pollutants listed in s. NR 215.03.

(32) "Well" means a bored, drilled or driven shaft or a dug hole where the depth of the dug hole is greater than the largest surface dimension, and which is terminated above, within or below an aquifer. This does not include holes or openings in the land surface such as those made with normal agricultural equipment for tilling the soil or crop production.

(33) "Wetlands" has the meaning specified under s. 23.32, Stats.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.04 Severability. Should any section, paragraph, phrase, sentence or clause of this chapter be declared invalid or unconstitutional for any reason, the remainder of this chapter shall not be affected thereby.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.05 Compliance with discharge limitations, monitoring requirements, and design and construction criteria. (1) Discharges to a land disposal system of liquid wastes from sources subject to the provisions of this chapter shall comply with the discharge limitations and monitoring requirements found in ss. NR 214.08 and 214.09, applicable to the particular type of system.

(2) All new or modified land disposal systems which require submission of plans and specifications shall comply with the applicable design and construction criteria contained in ss. NR 214.08 and 214.09.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.06 Modification procedure. (1) The discharge limitations, monitoring requirements, and design and construction criteria, of ss. NR 214.08 through 214.12, except s. NR 214.08 (3) (b), may be modified by the department for a discharge subject to the provisions of this chapter if the owner or operator having the discharge can demonstrate that such limitations and requirements are more stringent than necessary to avoid a detrimental effect on groundwater quality. This demonstration may be made:

(a) By submitting facts to the department during the 30 day public comment period following public notice by the department of intent to issue or modify a WPDES permit under s. 147.09, Stats., or during the 90-day time period as specified in s. 144.04, Stats., or

NR 214

(b) By submitting facts at a public hearing held under s. 147.13, Stats., and subch. II of ch. NR 3, or

(c) By submitting facts to the department at a public hearing held under s. 144.836, Stats.

(2) A decision made by the department under sub. (1) (a) or (b) may be reviewed under s. 147.20, Stats., and subch. III of ch. NR 3.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.07 Application of discharge limitations and design and construction criteria. The discharge limitations and design and construction criteria set forth in this chapter shall be used to establish the volume and quality of liquid waste and the quantity of pollutants which may be discharged to a land disposal system and to ensure that a system conforms to accepted engineering design standards and other applicable codes and regulations, except as they may be:

(1) Modified in accordance with s. NR 214.06,

(2) Superseded by more stringent limitations necessary to achieve any groundwater quality standards or meet other legal requirements, or

(3) Supplemented or superseded by standards or prohibitions for toxic pollutants or hazardous wastes or by additional limitations required to protect groundwater quality.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.08 General conditions required for all land disposal systems. The provisions of this section apply to all land disposal systems except those specified in s. NR 214.10.

(1) **DESIGN AND CONSTRUCTION CRITERIA.** (a) A land disposal system may not be located closer than 500 feet from the nearest inhabited dwelling except that this distance may be reduced with the dwelling owner's written consent. For large high pressure spray irrigation and spray runoff systems, the department may require a greater distance depending on the size of the system, type of system and potential for aesthetic and public health impacts.

(b) A land disposal system may not be located closer than 1,000 feet from a public water supply well or 250 feet from a private water supply well unless exempted in ss. NR 214.09 through 214.11. Greater distances may be required when wells are located directly downgradient from the proposed system and when required to protect groundwater quality.

(c) No land disposal system may be located in the floodway. Any disposal system located in the floodplain must:

1. Conform to ch. NR 116.
2. Not be operated when the floodplain is flooded.

Note: The construction of a disposal system in the floodplain will not usually be possible due to unsatisfactory soil conditions. Construction in the floodplain may be provided to allow utilization of certain sites where soil conditions are suitable and where adequate precautions can be taken.

(d) All precautions shall be taken during construction of a land disposal system to minimize compaction of absorption areas to prevent

reduction in soil infiltration rate. Project specifications shall detail the specific precautions which shall be taken.

(e) Erosion control measures shall be practiced during the construction of the land disposal system where necessary to avoid erosion of soil into a surface water.

(2) MONITORING REQUIREMENTS AND DISCHARGE LIMITATIONS. (a) No discharge may exceed the hydraulic loading rate, the organic loading rate, the solids loading rate, the nitrogen loading rate or any other loading rate specified in the WPDES permit. In determining the loading rates for a land disposal system, the department shall consider the past operating performance, site conditions including permeability and infiltration rate of the soil and other soil and geologic characteristics, the concentrations and characteristics of pollutants in the discharge, and other relevant information.

(b) No discharge to the system may have physical or chemical characteristics which prevent the proper operation of the land disposal system.

(c) A method shall be provided for measuring the volume of discharge to the land disposal system and for collecting wastewater samples. The method provided must be in accordance with the requirements of ch. NR 218.

(d) The discharge to the land disposal system shall be monitored for total daily flow as specified in the WPDES permit.

(e) The department may require the discharge to a land disposal system to be monitored for BOD₅, total suspended solids, total nitrogen, heavy metals, or any other pollutant that may be present in the discharge. The selection of pollutants to be monitored and the required frequency of monitoring shall be determined by the department on a case-by-case basis. In determining the pollutants to be monitored and the frequency of monitoring, the department will consider the potential public health impacts, probable environmental impact, soil and geologic conditions, past operating performance, concentrations and characteristics of pollutants in the discharge, and other relevant information.

(3) PROHIBITIONS. (a) The discharge of toxic pollutants or hazardous wastes to land disposal systems shall be prohibited unless the applicant can demonstrate and the department determines that the discharge of such pollutants will be in such small quantities that no environmental pollution will result. The criteria used shall include but not be limited to the toxicity of the pollutant or waste, degradability, the usual or potential presence of the pollutant or waste in the existing environment, and other relevant factors.

(b) The underground injection of any pollutant, surface drainage or clearwater waste through a well is prohibited.

(c) Commercial laundry, laundromat, and motor vehicle cleaning wastewaters may be disposed of onto the land only by the use of a land spreading system in accordance with the provision of this chapter unless the applicant can demonstrate and the department determines that specific factors exist which will allow the wastewater to be adequately treated in a different type of land disposal system.

NR 214.09 Conditions required for specific type of land disposal systems. (1) **ABSORPTION POND SYSTEMS.** (a) *Design and construction criteria for absorption pond systems.* 1. The absorption pond system shall consist of either 2 or more cells of approximately equal size which can be alternately loaded, or one cell preceded by an effluent storage pond or a stabilization pond system. Where only one cell is provided, the storage or stabilization pond shall be operated on a fill and draw basis and have sufficient capacity to allow intermittent loading of the absorption pond.

2. The shape of each cell within an absorption pond system shall be such that there are no narrow or elongated portions and no islands, peninsulas or coves.

3. The minimum top width of an embankment or dike shall be 8 feet. Outside embankment and dike slopes may not be steeper than 3 horizontal to one vertical and shall be properly seeded with a mixture of grasses to prevent erosion. Inside embankments and dikes may not be steeper than 2 horizontal to one vertical and shall be properly graveled or riprapped to prevent erosion.

4. The absorption pond bottom shall be as level as possible at all locations.

5. The wastewater inlet line shall discharge either horizontally on a concrete pad or by means of an upturned elbow in order to prevent erosion of the bottom of the absorption pond.

6. In systems with more than one cell, the wastewater distribution system shall be arranged so that individual cells within the absorption pond system can be taken out of service for resting without interrupting the discharge to the remaining cells.

7. The bottom of the absorption pond may not be closer than 10 feet to the bedrock and the high groundwater level. If hydrogeologic factors such as soil permeability, texture, cation-exchange capacity, depth, topography, and depth to groundwater and bedrock and waste characteristics indicate a high risk of groundwater contamination, additional pretreatment of the wastewater may be required by the department.

(b) *Discharge limitations for absorption pond systems.* 1. Discharge to an absorption pond system shall be limited so that the discharge and precipitation from a 10-year rainfall event which falls within the boundary of the disposal system during such discharge does not overflow the boundary of the system.

2. In systems with more than one cell, the discharge shall be alternately distributed to individual sections of the disposal system in a manner to allow sufficient resting periods to maintain the absorptive capacity of the soil.

3. For all new or modified systems which require submission of plans and specifications the monthly average organic loading rate to an absorption pond system may not exceed 25 pounds of BOD₅ per acre per day. In addition, the department may further limit the concentration of BOD₅ in the discharge if necessary to reduce odor problems.

(2) **RIDGE AND FURROW SYSTEMS.** (a) *Design and construction criteria for ridge and furrow systems.* 1. The ridge and furrow system shall consist

of at least 2 cells of approximately equal size which can be alternately loaded and rested.

2. The shape of each cell within the ridge and furrow system shall be such that a minimum of soil disturbance is necessary to form the system.

3. Each interior cell within a ridge and furrow system which is not accessible from the outside boundary of the system shall have at least one embankment or dike which has a minimum top width of 8 feet to permit access of maintenance equipment.

4. All outside embankments and dikes may not be steeper than 3 horizontal to one vertical. Inside embankments and dikes may not be steeper than 2 horizontal to one vertical. All embankments and dikes shall be properly seeded with a mixture of grasses to prevent erosion.

5. The furrows of the ridge and furrow system shall be one foot deep and one foot wide at the furrow bottom.

6. Furrow side slopes may not be steeper than one horizontal to 2 vertical for all soil types except those which pass less than 30% by weight through a number 200 sieve. For those soils which pass less than 30% by weight through a number 200 sieve, side slopes shall have a minimum slope of one horizontal to one vertical.

7. The furrow bottoms shall be as level as possible from end to end to provide equal liquid distribution throughout the entire length of the furrow.

8. The ridges shall be seeded with a perennial grass or mixture of grasses which are suited to wet soil conditions. In addition, the grass cover shall be established to at least a 2 inch length before the system is placed in use.

9. The wastewater distribution system shall be arranged so that individual cells within the ridge and furrow system can be taken out of service for resting without interrupting the discharge to the remaining cells.

10. The bottom of the ridge and furrow system may not be closer than 5 feet to the bedrock and the seasonally high groundwater level. The department may on a case-by-case basis allow this distance to be reduced if the permittee can show, based on hydrogeologic and other relevant site factors that the groundwater will be adequately protected. If such a variance is approved or if the risk of groundwater contamination is otherwise high, the department may require additional pretreatment of the wastewaters.

(b) *Discharge limitations for ridge and furrow systems.* 1. Discharge to a ridge and furrow system shall be limited so that the discharge and precipitation from a 10-year rainfall event which falls within the boundary of the disposal system during such discharge does not overflow the boundary of the system.

2. The discharge shall be alternately distributed to individual sections of the disposal system in a manner to allow sufficient resting periods to maintain the absorptive capacity of the soil.

3. The volume of discharge shall be limited to prevent inundation of the ridges except for temporary conditions following precipitation events.

4. The department shall determine the monthly average hydraulic loading rate for each system based on hydrogeologic and other relevant site conditions such as soil permeability, texture, cation-exchange capacity, depth, topography, depth to groundwater and bedrock and the wastewater characteristics. However, the monthly average hydraulic loading rate may not exceed 10,000 gallons per acre per day (2.5 inches per week).

5. For all new or modified systems which require submission of plans and specifications, the monthly average organic loading rate may not exceed 100 pounds of BOD₅ per acre per day.

(3) SPRAY IRRIGATION SYSTEMS. (a) *Design and construction criteria for spray irrigation systems.* 1. The spray irrigation system shall consist of at least 2 cells of approximately equal size which can be alternately loaded and rested. Where self-propelled equipment which operates on a continuous basis is installed and division into identifiable cells is impossible, the movement of the equipment shall be regulated to provide alternate effluent loading and resting of the soil.

2. The department may require additional measures such as screening of the wastewater prior to application to the spray irrigation field in order to prevent interference with the operation of the spray nozzles or orifices.

3. The department may, on a case-by-case basis, deny spray irrigation of wastewater during winter or require additional measures such as pre-treatment and storage of wastewater to prevent nuisances and runoff during thawing.

4. Large diameter spray nozzles which do not plug easily and which provide good distribution shall be installed. In addition, the spray nozzles shall be located at or near ground level. Where center pivot distribution systems are used, the spray nozzles shall direct wastewater in a downward direction to minimize drifting of wastewater aerosols.

5. The spray nozzles shall be arranged so that the wastewater will be evenly distributed over the entire area of the irrigation field.

6. The spray irrigation system shall be arranged so that individual cells within the system can be taken out of service for resting without interrupting the discharge to the remaining cells.

7. The spray irrigation field shall be seeded with a mixture of perennial grasses except as provided below. The grass cover crop shall be maintained by cutting and removing the grass a minimum of 2 times per year. A portion of the spray irrigation field may be seeded to any type of row crop provided there is sufficient land area with a grass cover crop to handle wastewater flow rates during wet weather conditions. In addition, a grassed buffer zone surrounding the row crop shall be required to help prevent any surface runoff problems.

8. A minimum separation distance of 5 feet shall be maintained between the land surface elevation of the spray irrigation field and the sea-

sonally high groundwater level and bedrock. The department may on a case-by-case basis allow this distance to be reduced if the permittee can show based on hydrogeologic and other relevant site factors that the groundwater will be adequately protected. If such a variance is approved or if the risk of groundwater contamination is otherwise high, the department may require additional pretreatment of the wastewaters.

(b) *Discharge limitations for spray irrigation systems.* 1. Discharge shall be limited so that during irrigation all of the discharge and the precipitation from a 10-year rainfall event falling or flowing onto the irrigation field during such discharge does not overflow the boundary of the system.

2. The discharge shall be alternately distributed to individual sections of the disposal system in a manner to allow sufficient resting periods to maintain the absorptive capacity of the soil.

3. The volume of discharge shall be limited to prevent ponding, except for temporary conditions following rainfall events.

4. For meat and poultry processing wastewater, the department may limit the fecal coliform bacteria in the discharge based on the potential for public hazards.

5. The department shall determine the monthly average hydraulic loading rate for each system based on hydrogeologic and other relevant site conditions such as soil permeability, texture, cation-exchange capacity, depth, topography, depth to groundwater and bedrock, and the wastewater characteristics. However, the monthly average hydraulic loading rate may not exceed 10,000 gallons per day per acre (2.5 inches per week).

6. For all new or modified systems which require submission of plans and specifications, the monthly average organic loading rate may not exceed 100 pounds of BOD₅ per acre per day.

(4) **OVERLAND FLOW SYSTEMS.** (a) *Design and construction criteria for overland flow systems.* 1. The overland flow system shall consist of at least 2 cells of approximately equal size which can be alternately loaded and rested. Where self-propelled equipment which operates on a continuous basis is installed and division into identifiable cells is impossible, its movement shall be regulated to provide alternate effluent loading and resting of the soil.

2. The department may require additional measures such as screening of the wastewater prior to application to the overland flow field in order to prevent interference with the operation of the distribution equipment.

3. The wastewater distribution equipment shall be located at or near ground level. Where center pivot distribution systems are used, the equipment shall direct wastewater in a downward direction to prevent drifting of wastewater aerosols.

4. The distribution equipment shall be arranged so that the wastewater will be evenly distributed over the entire area of the overland flow field.

5. The overland flow system shall be arranged so that individual cells within the system can be taken out of service for resting without interrupting the discharge to the remaining cells.

6. The soil types used for an overland flow system shall be heavier textured soils such as clays or clay loams.

7. A means shall be provided for collecting runoff from the overland flow field. The means of collection shall be able to contain, without overflowing, the runoff of effluent plus the runoff from a 5-year rainfall event.

8. The overland flow field shall be seeded with a mixture of perennial grasses. The grass cover crop shall be maintained by cutting and removing the grass a minimum of 2 times per year.

9. The land surface elevation of the overland flow field shall be no closer than 5 feet to the seasonally high groundwater level and bedrock. The department may on a case-by-case basis allow this distance to be reduced if the permittee can show based on hydrogeologic and other relevant site factors that the groundwater will be adequately protected. If such a variance is approved or if the risk of groundwater contamination is otherwise high, the department may require additional pretreatment of the wastewaters.

(b) *Discharge limitations for overland flow systems.* 1. The discharge to the overland flow system shall be alternately distributed to individual sections of the system in a manner that allows sufficient resting periods to maintain a grass cover.

2. The discharge to the overland flow system shall be limited so that the discharge and precipitation from a 5-year rainfall event which falls within the area of the system is retained within the system except for any runoff which may be collected and discharged to a surface water in accordance with a WPDES permit for such discharge.

(5) **SUBSURFACE ABSORPTION SYSTEMS.** (a) *Design and construction criteria for subsurface absorption systems.* 1. The design and installation of a subsurface absorption field system shall be based on the criteria set forth in ch. H 63. Where no applicable design criteria are found in that chapter, design and installation shall be based upon the department's determination after considering hydrogeologic and other relevant site conditions such as soil permeability, texture, depth, topography, and depth to groundwater and bedrock, and the wastewater characteristics.

(b) *Discharge limitations for subsurface absorption systems.* 1. Prior to discharge to a subsurface absorption field, all wastewater shall be pretreated in a system approved by the department.

2. The volume of discharge to the land disposal system shall be limited to prevent the discharge of liquid wastes to the ground surface, to a drain tile, to any waters of the state, or back up of the wastes into the structure served by the system.

(6) **LAND SPREADING SYSTEMS.** (a) *Design and construction criteria for land spreading systems.* 1. The surface spreading system shall consist of sufficient land area to allow proper wastewater loading and resting of the soil.

2. Vehicles used for transporting and spreading the liquid wastes shall be designed to be kept tightly closed to prevent spillage or escape of odors while in transit or storage.

3. Liquid wastes may not be land spread on land with a slope greater than 12%. During the period from December 15 through March 31 liquid waste may not be land spread on land with a slope greater than 6% unless the wastes are injected immediately into the soil.

4. Liquid waste may not be land spread within 200 feet of any surface water unless a vegetative buffer strip is maintained between the surface watercourse and the land spreading system, in which case a minimum separation distance of at least 100 feet is required between the system and the surface watercourse.

5. The land surface elevation of the surface spreading system may be no closer than 3 feet to groundwater and bedrock.

(b) *Discharge limitations for surface spreading systems.* 1. The vehicle used for land spreading the liquid waste shall be moving forward at all times when discharge is occurring unless the vehicle is equipped with a high pressure spray nozzle which is used to evenly distribute the wastes over the land. In addition the vehicle shall be equipped with a distribution system having the ability to spread the waste evenly over a width of 5 feet or greater.

2. The volume of discharge shall be limited to prevent ponding except for temporary conditions following rainfall events.

3. Discharge to the land spreading system shall be limited so that during land spreading all of the liquid waste and any precipitation falling or flowing onto the disposal field does not overflow the boundary of the system. Discharge during winter may require more stringent limitations than other seasons of the year to prevent runoff during thawing, dependent on slope, soil type, application method, wastewater characteristics and other relevant factors.

4. The department shall determine the monthly average hydraulic loading rate for each system based on hydrogeologic and other relevant site conditions such as soil permeability, texture, cation-exchange capacity, depth, topography, and depth to groundwater and bedrock, and the wastewater characteristics. However, the monthly average hydraulic loading rate may not exceed 10,000 gallons per day per acre (2.5 inches per week).

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.10 Conditions for the application of whey and its by-products onto land. (1) **GENERAL.** Liquid whey and its by-products may be disposed of onto land only by use of land spreading or spray irrigation systems in accordance with the provisions of this section and the terms of a WPDES permit issued by the department. Whey and its by-products mixed with liquid manure for land application as a fertilizer is exempt from the requirements of this section. The department may restrict the use of specific liquid manure storage and spreading systems where the potential for environmental pollution exists. Sites and facilities used solely for research purposes in accordance with s. NR 214.02 (2) (h) are exempt from the requirements of this section.

(2) **PERMITS AND APPLICATIONS FOR PERMITS.** (a) *Individual permits.* Any person who disposes of whey or whey by-products onto the land

must obtain an individual WPDES permit, unless that person is covered by a general WPDES permit issued under par. (b).

(b) *General permits.* Under s. 147.023, Stats., and this section, the department may issue a general WPDES permit to persons disposing of whey and whey by-products onto the land. A person disposing of whey or whey by-products onto the land in accordance with the terms and conditions of a general WPDES permit does not need to obtain an individual WPDES permit for disposal of whey and whey by-products onto the land unless the department notifies the person in writing that an individual WPDES permit is required. Any person who has an individual WPDES permit for the disposal of whey or its by-products is not covered by a general WPDES permit. The department may withdraw any person from the coverage of a general WPDES permit as specified in s. 147.023 (3), Stats. The department may withdraw a point source from the coverage of a general WPDES permit and issue an individual WPDES permit for that source pursuant to s. 147.023, Stats., on its own motion, or upon the petition of any general permittee, affected state, or 5 or more persons affected by the disposal practices of a general permittee. A petition filed by 5 or more persons affected by the disposal practices of a general permittee may be granted if the conditions of s. 147.023 (3) (a) or (b) are found to exist. A decision made by the department under s. 147.023 (3), Stats., may be reviewed pursuant to s. 147.20, Stats.

(c) *Applications.* Applications for an individual WPDES permit shall be made on forms provided by the department at least 180 days prior to discharge. If a person is covered by a general WPDES permit, no application is required. If the department determines pursuant to par. (b) that a person covered by a general WPDES permit must obtain an individual WPDES permit, it shall notify the affected person in writing of the need to apply and shall provide the person with an application form. Any person so notified shall submit an application for a WPDES permit within 60 days of receipt of the notice.

(3) **SEPARATION DISTANCES AND SITE CRITERIA REQUIREMENTS.** (a) *Separation distances.* The permittee shall maintain adequate separation distances from inhabited dwellings, water supply wells, and surface watercourses to minimize public nuisances and to protect against surface and groundwater from pollution.

(b) The following separation distance and location requirements are applicable when disposing of whey or whey by-products onto the land.

1. Five hundred feet from inhabited dwellings unless the resident of the affected dwelling agrees in writing to a lesser distance.

2. Two hundred feet from a water supply well unless the owner of the affected well agrees in writing to a lesser distance. However, the distance may not be reduced to less than 50 feet.

3. One hundred feet from a surface watercourse unless a vegetative buffer strip is maintained between the disposal site and the surface watercourse in which case at least 50 feet is required.

(c) The department may impose more stringent distance requirements in individual WPDES permits if the department determines such requirements are necessary to control any of the following:

1. Public nuisance conditions.
2. Surface water pollution.
3. Groundwater pollution.

(d) *Site criteria requirements.* Land sites receiving whey or whey by-products shall meet the following criteria:

1. During the period from December 15 through March 31 no whey or whey by-products may be disposed of on sites with slopes greater than 6%, except that whey or whey by-products may be injected into the soil on sites whose slopes exceed 6% but do not exceed 12%. The department may establish in an individual permit specific limitations on the slopes of sites used from April 1 through December 14 for the disposal of whey or whey by-products.

2. Whey or whey by-products shall be disposed of only on cultivated cropland, tree plantations, pasture, renovated pasture or hayland.

(4) **WHEY AND WHEY BY-PRODUCT APPLICATION RATE CRITERIA FOR INDIVIDUAL PERMITS.** (a) The department shall determine the volume of whey or whey by-products disposed of onto the land based on hydrogeologic and other relevant site conditions such as depth to high groundwater level and bedrock, soil type, permeability, water holding capacity, texture, cation-exchange capacity and land slope. Additional factors such as crop type and presence of unusual types or concentrations of pollutants will also be considered.

(b) Whey or whey by-products may not be disposed of onto the land from April 1 through December 14 at a rate which exceeds one-half inch per acre (13,600 gallons per acre) per day.

(c) Whey or whey by-products may not be disposed of onto the land from December 15 through March 31 at a rate which exceeds one-quarter of an inch per acre (6,800 gallons per acre) per day.

(d) The disposal of salt whey or whey by-products such as ultrafiltration or reverse osmosis permeates may be further limited by the department on a case-by-case basis based on the nutrient value, chloride concentration, the presence of unusual concentrations or types of other pollutants and site restrictions.

(5) **GENERAL OPERATIONAL REQUIREMENTS.** (a) The volume disposed of shall be such that the pH, organic, suspended solids, and salt content of the whey and whey by-products will not alter the characteristics and structure of the soil to such an extent that the crops are adversely affected or that erosion or permeability problems occur.

(b) The volume shall be limited to prevent ponding of the whey or whey by-product except for temporary conditions following precipitation events.

(c) The volume shall be limited so that during discharge all of the whey or whey by-product and any precipitation falling or flowing onto the disposal site does not overflow the boundary of the site. If ponding or runoff results during disposal, all spreading shall be ceased immediately.

(d) Any storage system used solely for the storage of whey or whey by-products shall be designed and constructed in a manner which will prevent groundwater or surface water pollution and a public nuisance condition. The department may require on a case-by-case basis, the submittal of plans and specifications for approval of such whey or whey by-product storage systems to insure that an adequate seal is provided for the protection of groundwater.

(6) SPECIFIC LAND APPLICATION SYSTEM REQUIREMENTS. (a) *Land spreading systems.* 1. Transportation of whey and whey by-products shall be done with vehicles that are strong enough for all conditions of operation, leak proof, and designed to be kept tightly closed to prevent spillage or the escape of odors while in transit or storage.

2. The vehicle used for the land spreading of whey or whey by-products shall be moving forward at all times unless the vehicle is equipped with a high pressure spray nozzle which is used to evenly distribute the whey or whey by-products over the land. In addition, the vehicle shall be equipped with a distribution system having the ability to spread the waste evenly over a width of 5 feet or greater.

(b) *Spray irrigation systems.* 1. The spray irrigation system shall be of a type that can be readily moved from one disposal site to another. The use of permanent set spray irrigation systems for the disposal of whey or whey by-products is prohibited unless specifically approved by the department.

2. The spray irrigation system shall be operated in such a manner as to minimize drifting of aerosols.

3. The spray nozzles shall be arranged so that the whey or whey by-products will be evenly distributed over the entire area of the irrigation field.

(7) MONITORING AND REPORTING REQUIREMENTS. (a) Persons subject to an individual WPDES permit shall at a minimum monitor and report in accordance with the following requirements:

1. The volume of whey or whey by-product disposed of onto the land by a spray irrigation system shall be measured on a daily basis in accordance with s. NR 218.05 (1) and (3).

2. The volume of whey and whey by-product disposed of onto the land by a land spreading system shall be measured on a daily basis by calibration of the tank unit on the spreading vehicle or other approved method.

3. The department may on a case-by-case basis require the permittee to monitor for BOD₅, total suspended solids, nitrogen and its compounds, chlorides or any other pollutants or waste characteristics.

(b) The results of the monitoring required by par. (a) 1. and 2. shall be reported in accordance with the requirements contained in individual WPDES permits.

(c) Persons subject to a general WPDES permit shall keep a daily record of the volume, land areas, and resulting application rate in gallons per acre. These records shall be available for inspection by the department for a period of 3 years.

(8) **GENERAL PERMIT AND CONDITIONS.** Any general permit issued by the department for the disposal of whey and its by-products shall at a minimum prescribe conditions which will:

(a) Assure compliance with the requirements of subs. (3) (a) and (d), (4) (b) and (c), (5), (6) and (7) (c).

(b) Require that soil depths be greater than 18 inches to both bedrock and the high groundwater level, and require the permittee to verify these depths by checking U.S. department of agriculture soil conservation service soils maps or by conducting field soil probes to ensure that these depths are maintained.

(c) Prohibit the disposal of whey or whey by-products onto the land at a rate which exceeds one inch per acre (27,150 gallons per acre) per year. Where applications are made annually to the same areas, rates shall be reduced to three-fourths inch (20,360 gallons per acre) the second year and one-half inch (13,600 gallons per acre) the third and succeeding years.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.11 Conditions for the application of industrial sludges onto land.

(1) **APPLICABILITY.** The department may require the owner of a waterworks or wastewater treatment plant to obtain a WPDES permit or written department approval of a sludge management plan before industrial sludge may be land spread. The design, monitoring and operating criteria in this section are applicable to operations where sludges are land spread under a sludge management plan approved by the department or conditions of a WPDES permit. This section does not apply to sludges:

(a) From publicly owned treatment works,

(b) Which are classified as toxic or hazardous,

(c) Which are disposed of at a landfill, land disposal site, incinerator or composting facility licensed and operated in accordance with ch. NR 180,

(d) Which are generated in air pollution control facilities,

(e) Which are generated in metal finishing operations, or

(f) Which have been determined by the department to have no value as a soil conditioner or fertilizer.

(2) **GENERAL.** (a) The sludge management plan shall be developed by each owner of a waterworks or wastewater plant and submitted to the department in accordance with conditions of the WPDES permit or a treatment plant plan approval under s. 144.04, Stats., or 180 days prior to use of any land spreading site.

(b) The owner of the waterworks or wastewater treatment plant shall be responsible for the implementation of the approved sludge management activities. An owner of a waterworks or wastewater treatment plant may at any time amend the sludge management plan with the approval of the department. Any proposed amendment shall contain the same type of information required in the original sludge management plan. The amended plan may not be put into effect until it has received department approval.

(3) PLAN CRITERIA. The department may require that the sludge management plan include any or all of the following:

(a) A description of the waterworks or wastewater treatment processes and their operation, and the storage facilities for each sludge type proposed to be distributed at a land spreading site, to include:

1. The sources, processes and treatment systems from which the sludges originate.

2. Sludge pretreatment or processing techniques required prior to land spreading.

3. The volume or quantity of sludge generated on a daily maximum, monthly average and annual average basis.

4. The proposed mode of sludge transportation, including the transporter of the sludge, the type of vehicle used for sludge transportation, and the methods to be used to spread the sludge on the site and to incorporate it into the soil.

5. Provision for storing sludge when the land spreading sites are unavailable or inaccessible, including:

a. Description of storage facility

b. Location of storage facility

c. Capacity of the storage facility

d. A description of the property interest or contractual agreement allowing use of the storage facility

e. Any anticipated change in use of the storage facility

f. Evaluation of environmental effects resulting from use of the storage facility such as odors, spills or public health impacts.

(b) The physical, biological and chemical characteristics of the sludge obtained from representative sludge samples taken at the intervals specified by the department. The parameters to be analyzed shall be determined by the department and may include but not be limited to the following:

1. Physical characteristics such as percent solids;

2. pH;

3. Nitrogen, phosphorus and potassium;

4. Arsenic, boron, cadmium, calcium, chromium, copper, lead, magnesium, mercury, nickel, selenium, sodium and zinc;

5. Chlorides, fluorides and sulfates;

6. Total coliforms, fecal coliforms and virus if sanitary wastes are included in the treatment system;

7. Oils and greases, phenolics, pesticides, toxic substances and persistent organics;

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

(c) A description of the ultimate land spreading sites. The department may require for each site that any or all of the following information be submitted:

1. The site locations shown on either a soil map, plat map or a U.S. geological survey topographic map.

2. Soil borings taken at the land disposal site. The boring shall be analyzed for soil type, soil pH, organic matter, available phosphorus, exchangeable potassium and any other parameters deemed necessary by the department. In determining the need for soil borings, the department will consider soil conservation service maps, sludge characteristics, hydrogeologic characteristics and other relevant factors.

3. A description of contracts or agreements covering use of the land spreading site including owner's name, address and telephone number.

4. A description of current uses of the site and current uses of adjacent properties.

5. A description of the geology and hydrogeology of the site including the identification of all homes and private wells within ¼ mile of the site.

6. A description of the crops to be grown or the dominant vegetation on the land spreading site and any soil additives being used such as fertilizer.

7. An estimate of the total acreage to which the sludge will be applied.

8. Proposed maximum rates of application both annual (lbs/acre/year) and cumulative (total lbs./acre) for nitrogen, BOD₅, cadmium and other heavy metals such as lead, chromium, zinc, copper and nickel.

(4) DESIGN AND CONSTRUCTION CRITERIA FOR SLUDGE LAND SPREADING SYSTEMS. (a) Vehicles used for transporting and spreading sludge shall be designed to be kept tightly closed to prevent spillage, escape of odors or escape of dry material while in transit or storage.

(b) Sludge may not be land spread on land with a slope greater than 12%. During the period from December 15 through March 31, sludge may not be land spread on land with a slope greater than 6% unless the sludges are incorporated immediately into the soil.

(c) Sludge may not be surface spread within 200 feet of any surface watercourse unless a vegetative buffer strip is maintained between the surface watercourse and the land spreading system, in which case a minimum separation distance of at least 100 feet is required between the system and the surface watercourse.

(d) The land surface elevation of the surface spreading system may be no closer than 3 feet to groundwater and bedrock.

(e) The land spreading site may not be located in a wetland.

(5) OPERATING REQUIREMENTS FOR SLUDGE LAND SPREADING SYSTEMS. (a) Where a sludge management plan is required, only sludges identified in the plan shall be disposed of at the land spreading site.

(b) The sludge shall be plowed, disked, injected or otherwise incorporated into the surface soil layer at appropriate intervals as specified in the sludge management plan to prevent surface runoff and leaching and to control objectionable odors.

(c) The sludge may not be spread in areas containing ponded or standing water.

(d) The application rates for sludge shall be based on the available nutrients in the soil and the nutrient needs of the crop to be grown. Application rates shall be controlled so that the available nutrients do not exceed the need of the crop for these nutrients.

(e) The pH of the sludge and soil mixture shall be 6.5 or greater at the time sludge is spread. Where the concentration of cadmium in the sludge is 2 mg/kg or less (dry weight) the pH may be less than 6.5.

(f) No more than 0.5 kg/ha of cadmium may be spread annually on land used for production of tobacco, leafy vegetables or root crops grown for 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/A
To June 30, 1984	2.0	1.8
July 1, 1984 to Dec. 31, 1986	1.25	1.12
Beginning Jan. 1, 1987	0.5	0.45

(g) 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 for a site			
	Soil pH less than 6.5		Soil pH 6.5 or greater	
	Kg/ha	lb/A	Kg/ha	lb/A
Less than 5	5	4.5	5	4.5
5-15	5	4.5	10	9
Greater than 15	5	4.5	20	18

(h) For soils with a pH of less than 6.5, the cumulative amount of cadmium may be increased to but may not exceed the values in table 2 for soils with a pH of 6.5 or greater if the following criteria are met:

1. Animal feed is the only food-chain crop grown, or the pH of the soil and sludge mixture is raised to 6.5 or greater whenever food-chain crops other than animal feeds are grown,

2. There is a management plan which describes how animal feed is distributed to preclude ingestion by humans and how the use of the land to grow food-chain crops is restricted to comply with subd. 1.,

3. Future property owners are notified by filling an affidavit with the register of deeds of the county in which the property is located that cadmium has been applied and that the production of food-chain crops is restricted. The affidavit must specifically state that tobacco, crops for human consumption, and pasture, forage and feed grain for animals whose products are consumed by humans may not be grown unless the conditions of subds. 1. and 2. are met.

(i) 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 lead, nickel, zinc, copper, phenolics, pesticides, and persistent organics based on the waste characteristics, soil cation-exchange capacity, type of crop grown, and other relevant factors.

(j) Food-chain crops grown on land spreading sites which have received applications of sludge containing pesticides or persistent organic materials may not be marketed or used for human or animal consumption unless the crops meet all applicable contaminant levels as established by the U.S. food and drug administration.

(6) **MONITORING REQUIREMENTS FOR SLUDGE DISPOSAL SITES.** The owner of a waterworks or a wastewater treatment plant who has developed an approved sludge management plan shall submit monitoring reports as required by the department. The report shall include the following information for each site utilized during the reporting period:

(a) The amount of sludge applied in tons per acre on a dry weight basis.

(b) The amount of nitrogen applied in pounds per acre on a dry weight basis.

(c) The amount of cadmium or any other metal applied in pounds per acre on a dry weight basis. The department may on a case-by-case basis exempt the owner or operator from this requirement.

(d) Other site monitoring information as specified in the sludge management plan.

(e) A description of any adverse environmental, health or social effects that occurred due to sludge spreading during the preceding reporting period.

(f) A description of any violation of the sludge management plan.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.12 Conditions required for groundwater monitoring well systems.

(1) **APPLICABILITY.** The department may require the owner of a land disposal system to design and install a groundwater monitoring well system depending upon the type of liquid waste, the volume of discharge, the type of land disposal system, the rate of discharge to the land disposal system and the geological location of the land disposal system.

(a) The owner of a land disposal system receiving any type of wastewater which has a hydraulic loading rate greater than 1.0 million gallons

per day shall install a comprehensive groundwater monitoring system by no later than July 1, 1977, which may include one or more well nests to monitor groundwater elevation and quality.

(b) The owner of a land disposal system receiving wastewater from the canned, frozen or preserved fruits and vegetable industry which has a hydraulic loading rate equal to or greater than 340,000 gallons per day shall install a single level groundwater monitoring system by no later than July 1, 1977. Any such system which has a hydraulic loading rate equal to or greater than 140,000 gallons per day shall install a single level groundwater monitoring system by no later than July 1, 1983.

(c) The owner of a land disposal system receiving wastewater from the meat and poultry processing industry which has a hydraulic loading rate equal to or greater than 100,000 gallons per day shall install a single level groundwater monitoring system by no later than July 1, 1977. Any such system which has a hydraulic loading rate equal to or greater than 30,000 gallons per day shall install a single level groundwater monitoring system by no later than July 1, 1983.

(d) The owner of a land disposal system receiving wastewater from the dairy products processing industry which has a hydraulic loading rate equal to or greater than 80,000 gallons per day shall install a single level groundwater monitoring system by no later than July 1, 1977. Any such system which has a hydraulic loading rate equal to or greater than 30,000 gallons per day shall install a single level groundwater monitoring system by no later than July 1, 1983.

(e) The department may require the owner of a land disposal system receiving any type of wastewater at any hydraulic loading rate to install a single level or a comprehensive nested well groundwater monitoring well system if the system is located in an area with a high potential for groundwater contamination, is operated at loading rates in excess of accepted land treatment practices or if the department has reason to believe contamination of groundwater may be occurring.

(2) DESIGN REQUIREMENTS AND CONSTRUCTION STANDARDS FOR A GROUNDWATER MONITORING WELL SYSTEM. (a) A map shall be submitted to the department indicating the location of the land disposal system and the location of all wells, wetlands, streams and lakes within ½ mile of the land disposal site.

(b) Sufficient soil borings shall be performed to adequately define the soil, bedrock and groundwater conditions at the site. In most cases a minimum of one soil boring shall be taken along each side of the land disposal system. If the land disposal system sides are not well defined, a minimum of 4 borings shall be taken at approximately equal distances from each other. In addition, one boring shall be taken within the boundaries of the system for each 7.5 acres of the system. The department may waive the latter requirement if it can be shown the geological conditions within the site do not vary significantly or may require additional borings if geological conditions are complex. Soil samples shall be collected and analyzed at all significant changes in soil type or lithology for particle size distribution and textural classification according to the U.S. department of agriculture classified system.

(c) Elevations of the land disposal system, the groundwater and all surface waters within ½ mile of the system shall be referenced to the U.S. geological survey or the U.S. national geodetic survey. In addition a groundwater contour map showing the direction of groundwater flow beneath the land disposal system shall be established.

(d) The groundwater monitoring well system shall consist of a minimum of 3 wells. One monitoring well shall be located upgradient from the land disposal system and the other 2 shall be downgradient in the measured direction of groundwater flow. In the event the groundwater flow is in more than one direction, a monitoring well shall be installed on each side of the land disposal system or a minimum of 4 wells shall be installed approximately equal distance from each other.

(e) Groundwater monitoring wells shall be located at least 10 feet beyond the outer edge of the waste application area.

(f) For a single level groundwater monitoring well system, the bottom of the monitoring well inlet screens shall be located not greater than 10 feet below the top of the groundwater table and the top of the inlet screen shall intersect the groundwater table. For a nested well groundwater monitoring system, the wells installed at the highest elevation shall have the bottom of the inlet screens located not more than 10 feet below the top of the groundwater table and the top of the inlet screen shall intersect the groundwater table. The wells installed at the lower elevations shall have inlet screens located at a depth that will adequately represent the groundwater quality on a 3 dimensional basis. Inlet screens shall have a length of at least 2.5 feet but not greater than 10 feet.

(g) For driven well point type construction, a 2 inch or larger inside diameter stainless steel well point shall be connected to a new schedule 40, or larger steel pipe. The well point shall be driven to the desired depth with the top of the pipe terminating at least 2 feet above the ground surface. A clay slurry or bentonite plug shall be placed around the pipe at the ground surface to prevent surface water contamination.

(h) For all other types of construction, a larger upper drillhole having a minimum inside diameter of 4 inches shall be provided to help insure adequate and proper sealing of the annular space between the outer drillhole and the monitoring well. For unstable soils, a 6 inch minimum inside diameter drillhole may be required. The monitoring well shall have a minimum inside diameter of 2 inches and shall be constructed with a minimum schedule 40 plastic pipe or other similar inert material. Stainless steel well screen is recommended, however, other screen materials may be approved. For fine grained soils, a clean silica sand pack shall be placed around the well screen to an elevation at least 12 inches above the top of the screen. Twelve inches of fine sand shall be placed on top of the clean silica sand pack. For soils that are not fine grained, a clean silica base gravel pack shall be placed around the well screen to an elevation at least 12 inches above the top of the screen. Twelve inches of coarse sand shall be placed on top of the clean silica base gravel pack. The larger outer diameter pipe must be removed during or immediately following grouting to expose the sand or gravel pack and the fine or coarse sand above the well screen. For a single level groundwater monitoring well system and for a nested well groundwater monitoring system installed in separate bore holes, a clay type soil slurry or bentonite slurry shall be placed above the fine or coarse sand and extended to the ground surface.

For a nested well groundwater monitoring system installed in one bore hole, a clay type soil slurry or bentonite slurry shall be placed above the fine or coarse sand and extended to the bottom of next highest inlet screen or to the ground surface whichever applies. Use of bentonite-cement mixture for grouting is not acceptable. Use of extender tubes for slurry grouts is not necessary but is recommended when bentonite pellets are used. The top of the monitoring well shall extend at least 2 feet above the ground surface.

(i) Well logs shall be recorded for each monitoring well. The log shall include the boring log information and the depth to the bottom of the boring, the screened interval, the well seal and a description of well construction materials.

(j) A protective steel post or an outer steel cover shall be provided for each plastic monitoring well extending above ground level.

(k) A locking well cap or a sign shall be provided for each well indicating that water from the well should not be used for drinking purposes.

(l) All unsuccessful wells, boreholes or other vertical holes shall be abandoned by filling completely with a clay type soil slurry or bentonite slurry. In addition, the well shall be broken-off or cut 5 feet below the ground surface.

(m) A bentonite drilling fluid shall be used when drilling a groundwater monitoring well. Other drilling fluids may be approved on a case-by-case basis.

(n) Immediately following installation of the groundwater monitoring well, proper well development shall be performed.

(o) The department may consider and approve any other construction methods for installing groundwater monitoring wells on a case-by-case basis.

(3) GROUNDWATER SAMPLE COLLECTION, ANALYSIS AND MONITORING REQUIREMENTS. (a) Prior to collecting a groundwater sample, the monitoring well must be adequately flushed or purged of the standing water in the well. The amount of water removed is dependent upon the rate of recharge or yield of the well. For wells with a high rate of recharge or yield, a minimum volume of water equivalent to 2 or 3 times the volume of water inside the well casing shall be removed prior to sample collection. For wells with a low rate of recharge or yield the existing volume of water inside the well casing shall be completely removed and the well be allowed to recover prior to sample collection.

(b) All groundwater samples shall be filtered prior to analysis. If the groundwater sample is to be analyzed for metals, filtering must be performed in the field immediately following sample collection. For all other types of analysis, it is preferred that filtering be performed in the field immediately following sample collection, however, laboratory filtering is acceptable. Filtering shall be performed through a standard 0.45 micron filter.

(c) Groundwater shall be monitored at wells specified in the WPDES permit, monthly for the first 3 months after the monitoring system is installed and at a minimum twice annually thereafter. For seasonal oper-

ations, groundwater monitoring shall be performed once prior to the startup of the land disposal system and 2 times during the time of use of the system. The department shall specify the month during which the groundwater monitoring is to be performed in the WPDES permit and may increase the frequency of groundwater monitoring for any land disposal system on a case-by-case basis.

(d) The department may require groundwater monitoring for any but not necessarily all of the following parameters: elevation, organic nitrogen, ammonia nitrogen, nitrate and nitrite nitrogen, chlorides, sulfates, dissolved solids, alkalinity, hardness, field pH, field specific conductance, BOD₅, COD, sodium, calcium, iron, lead, copper, zinc, chromium and cadmium.

(e) Monitoring for any other pollutant parameters may be required on a case-by-case basis dependent on waste characteristics and their potential for groundwater contamination.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.13 Additional limitations. (1) For discharges to a land disposal system of liquid wastes containing any substances or concentrations of substances normally associated with the types of discharge identified in s. NR 214.02 (1), the department may on a case-by-case basis impose one or more of the discharge limitations, monitoring requirements, and design and construction criteria set forth in ss. NR 214.08 through 214.12.

(2) For discharges to a land disposal system of liquid wastes containing substances or concentrations of substances not normally associated with the types of discharge identified in s. NR 214.02 (1), or for discharges to a land disposal system located on a site where soil, geologic or other conditions may result in more rapid than normal seepage to groundwater, where an increased possibility of groundwater contamination exists, or where the wastewaters prior to disposal may cause public nuisance, the department may on a case-by-case basis impose one or more of the discharge limitations, monitoring requirements, and design and construction criteria set forth in ss. NR 214.08 through 214.12, and:

(a) Impose limitations on the quantity or concentration of substances discharged;

(b) Require monitoring for additional parameters and at more frequent intervals than those set forth in ss. NR 214.08 and 214.09;

(c) Require groundwater monitoring at more frequent intervals than set forth in s. NR 214.12 (3) (c), and for parameters in addition to those set forth in s. NR 214.12 (3) (d); and

(d) Require treatment prior to discharge to the land disposal system and, for the purpose of evaluating such treatment, require monitoring:

1. Of the volume of flow before or after such treatment, or both,
2. Of the concentration of critical parameters in such flow before or after such treatment, or both and
3. Of groundwater in the vicinity of the system.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.

NR 214.14 Sampling and analytical methods. Unless otherwise specified in the permit for a land disposal system:

- (1) The procedures for measuring flow and taking samples of discharges shall be those set forth in ch. NR 218, and
- (2) The methods of analysis for substances contained in discharges shall be those set forth in ch. NR 219.

History: Cr. Register, January, 1983, No. 325, eff. 2-1-83.