

4-19-82

- 1 Minnesota Pollution Control Agency
- 2
- 3 Adopted Rules Governing Sewage Sludge Management (6 MCAR S
- 4 4.6101, 6 MCAR S 4.6102, 6 MCAR S 4.6103, 6 MCAR S 4.6104, 6
- 5 MCAR S 4.6105, 6 MCAR S 4.6106, 6 MCAR S 4.6107, 6 MCAR S
- 6 4.6108, 6 MCAR S 4.6111, 6 MCAR S 4.6112, 6 MCAR S 4.6121, 6
- 7 MCAR S 4.6122, 6 MCAR S 4.6131, 6 MCAR S 4.6132, 6 MCAR S
- 8 4.6133, 6 MCAR S 4.6134, 6 MCAR S 4.6135, 6 MCAR S 4.6136)
- 9
- 10 Rules as Adopted

TABLE OF CONTENTS

Chapter Five: General Provisions

- 14 6 MCAR S 4.6101 Purpose and scope.
- 15 6 MCAR S 4.6102 Permit and letter of approval
- 16 requirements.
- 17 6 MCAR S 4.6103 Definitions.
- 18 6 MCAR S 4.6104 Variance.
- 19 6 MCAR S 4.6105 Application requirements for landspreading
- 20 sites.
- 21 6 MCAR S 4.6106 Application requirements for landspreading
- 22 facilities.
- 23 6 MCAR S 4.6107 Administration of letters of approval.
- 24 6 MCAR S 4.6108 Administration of state disposal system
- 25 permits.

Chapter Six: Landspreading Sites

- 28 6 MCAR S 4.6111 Requirements and limitations.
- 29 6 MCAR S 4.6112 Record keeping and annual reporting.

Chapter Seven: Landspreading Facilities

- 32 6 MCAR S 4.6121 Requirements and limitations.
- 33 6 MCAR S 4.6122 Record keeping and annual reporting.

Chapter Eight: Appendices

- 36 6 MCAR S 4.6131 Collection and analysis of sewage sludge

- 1 samples.
- 2 6 MCAR S 4.6132 Collection and analysis of soil samples.
- 3 6 MCAR S 4.6133 Collection and analysis of vegetative
- 4 tissue samples.
- 5 6 MCAR S 4.6134 Collection and analysis of ground water
- 6 samples.
- 7 6 MCAR S 4.6135 Determination of sewage sludge application
- 8 rate based on crop nitrogen requirements.
- 9 6 MCAR S 4.6136 Pathogen reduction processes.

1 Chapter Five: General Provisions

2 6 MCAR S 4.6101 Purpose and scope. The purpose of 6 MCAR SS
3 4.6101-4.6136 is to provide for the protection of the public
4 health and the environment in the utilization or disposal of
5 sewage sludge. In accordance with the authority granted in
6 Minn. Stat. S 116.07, subd. 4, these rules establish standards
7 for the design, location, and operation of sewage sludge
8 landspreading sites and facilities.

9 6 MCAR S 4.6102 Permit and letter of approval requirements.

10 A. Landspreading.

11 1. The following persons shall comply with the
12 requirements of 6 MCAR SS 4.6101-4.6136:

13 a. political subdivisions that landspread sewage
14 sludge;

15 b. persons who own, lease, or rent landspreading
16 facilities; and

17 c. persons who are under contract to a. or b. to
18 landspread sewage sludge or to operate a landspreading facility.

19 2. The persons identified in 1. shall apply for, and be
20 copermitees of, a state disposal system permit for
21 landspreading facilities.

22 3. Political subdivisions shall apply for a letter of
23 approval for landspreading sites.

24 4. Each existing and proposed landspreading site shall
25 have a letter of approval at the time given in Exhibit 6 MCAR S
26 4.6102 A.4.-1, unless it possesses a current letter of approval.
27 Each existing landspreading facility shall have a state disposal
28 system permit at the time given in Exhibit 6 MCAR S 4.6102
29 A.4.-1, unless it possesses a current permit. Each proposed
30 landspreading facility shall have a state disposal system permit
31 prior to development and use.

Exhibit 6 MCAR S 4.6102 A.4.-1

Schedule for Obtaining Letter of Approval or Permit

| Wastewater Treatment System | Months After Rule |
|------------------------------------|-------------------|
| Design Flow in Million Gallons/Day | Effective Date |
| More than 20 | 0 |
| Sites | |
| Facilities | 3 |
| 1 - 20 | 6 |
| Sites | |
| Facilities | 12 |
| Fewer than 1 | 12 |
| Sites | |
| Facilities | 12 |

B. Incineration. Incineration of sewage sludge is governed by rule APC 28 of the Minnesota Pollution Control Agency.

C. Other facilities. Any facility for the processing, storage, or disposal of sewage sludge into or on any land by means other than regulated by 6 MCAR SS 4.6101-4.6136 is prohibited without an agency permit.

6 MCAR S 4.6103 Definitions. For the purpose of 6 MCAR SS 4.6101-4.6136, the following terms have the meanings given them.

A. Agency. "Agency" means the Minnesota Pollution Control Agency.

B. Animal feed. "Animal feed" means any crop grown for consumption by animals, such as pasture crops, forage, and grain.

C. Aquifer. "Aquifer" means a water-bearing soil horizon or bedrock formation that transmits water in sufficient quantities to supply a well.

D. Available nitrogen. "Available nitrogen" means nitrogen which is present in inorganic forms that are useable by plants, and which may be determined by procedures set out in 6 MCAR S 4.6135.

E. Available water-holding capacity. "Available water-holding capacity" means the capacity of soil to hold water against the force of gravity and available for use by most

1 plants. It is usually expressed in inches of water per inch of
2 soil. It may be found in Soil Conservation Service soil surveys
3 or Soil Conservation Service soil interpretation sheets, or it
4 may be obtained in the laboratory using the method provided in 6
5 MCAR S 4.6132 B.3.

6 F. Bedrock outcrop. "Bedrock outcrop" means any bedrock
7 that appears at the surface of the land.

8 G. Cation exchange capacity. "Cation exchange capacity"
9 means a measure of the potential quantity of readily
10 exchangeable positive ions that the soil can attract and retain,
11 expressed in milliequivalents per 100 grams of soil. Rule 6
12 MCAR S 4.6132 B.2. provides acceptable methods of determining
13 cation exchange capacity.

14 H. Cave. "Cave" means any naturally formed, subterranean
15 open area or chamber, or series of chambers.

16 I. Crops for direct human consumption. "Crops for direct
17 human consumption" means crops that are consumed by humans
18 without processing to minimize pathogens prior to distribution
19 to the consumer.

20 J. Dewatered sewage sludge. "Dewatered sewage sludge" means
21 any sewage sludge with a total solids content of 20 percent or
22 greater or which can be transported and handled as a solid
23 material.

24 K. Director. "Director" means the executive director or
25 other designated representative of the Minnesota Pollution
26 Control Agency.

27 L. Fallow land. "Fallow land" means land that is uncropped
28 and kept cultivated throughout a growing season. Vegetative
29 cover is less than 25 percent. Any land that is uncropped and
30 cultivated during the months of September through May where a
31 crop will be grown the following growing season is not
32 considered fallow land.

33 M. Food-chain crops. "Food-chain crops" means tobacco,
34 crops grown for human consumption, and feed for animals whose
35 products are consumed by humans.

36 N. Hundred-year floodplain. "Hundred-year floodplain," as

1 defined in 6 MCAR S 4.8051 for floodplain, means any area
2 adjoining a watercourse which has been or hereafter may be
3 covered by a large flood known to have occurred generally in
4 Minnesota and reasonably characteristic of what can be expected
5 to occur on an average frequency in the magnitude of the
6 100-year recurrence interval.

7 O. Immediate incorporation. "Immediate incorporation" means
8 the mixing of sewage sludge with topsoil, concurrent with
9 application or within 48 hours thereafter, by means such as
10 injection, discing, mold-board plowing, chisel plowing or
11 rototilling to a minimum depth of six inches.

12 P. Intermittent stream. "Intermittent stream" means any
13 stream which flows at certain times during the year, such as
14 after a rainstorm or during wet weather. Intermittent streams
15 receive water from surface runoff, springs, or melting snow and
16 have definable banks. Any intermittent stream mapped on Soil
17 Conservation Service soil surveys or United States Geological
18 Survey quadrangle maps may be included within this definition.
19 All Class 7 limited resource value waters listed in Supplement 1
20 of 6 MCAR SS 4.8024 and 4.8025 are included within this
21 definition.

22 Q. Lakes and ponds. "Lakes and ponds" means any water
23 basins defined as water basins and public waters in Minn. Stat.
24 S 105.37, subs. 9 and 14 respectively.

25 R. Landspreading. "Landspreading" means placement of sewage
26 sludge on or incorporated into the soil surface.

27 S. Landspreading facility. "Landspreading facility" means
28 any land that is used for sewage sludge landspreading and is
29 owned, leased, or rented by the political subdivision generating
30 the sewage sludge.

31 T. Landspreading site. "Landspreading site" means any land
32 used for sewage sludge landspreading that is not owned, leased,
33 or rented by the political subdivision generating the sewage
34 sludge.

35 U. Long-term storage. "Long-term storage" means the storage
36 of dewatered sewage sludge for a period of greater than one

1 month but not exceeding seven months at a landspreading site not
2 located at the place of sewage sludge generation.

3 V. Mine. "Mine" means any excavation for minerals.

4 W. Organic priority pollutant. "Organic priority pollutant"
5 means the organic compounds that appear in 40 Code of Federal
6 Regulations, Section 401.15 (1981).

7 X. Pasture crops. "Pasture crops" means crops such as
8 legumes, grasses, grain stubble, and stover which are consumed
9 by animals while grazing.

10 Y. Pathogens. "Pathogens" means organisms that are capable
11 of producing an infection or disease in a susceptible host.

12 Z. Person. "Person," as defined in Minn. Stat. S 116.06,
13 subd. 8, means any human being, any municipality or other
14 governmental or political subdivision or other public agency,
15 any public or private corporation, any partnership, firm,
16 association, or other organization, any receiver, trustee,
17 assignee, agent, or other legal representative of any of the
18 foregoing, or any other legal entity, but does not include the
19 Minnesota Pollution Control Agency.

20 AA. Place of habitation. "Place of habitation" means any
21 house, apartment, mobile home, dwelling, residence, or other
22 structure, occupied or intended to be occupied on a day to day
23 basis by an individual, group of individuals, family unit, or
24 group of family units.

25 BB. Political subdivision. "Political subdivision" as
26 defined in Minn. Stat. S 115A.03, subd. 24, means any municipal,
27 corporation, governmental subdivision of the state, local
28 government unit, special district, or local or regional board,
29 commission, or authority authorized by law to plan or provide
30 for waste management.

31 CC. Process to further reduce pathogens. "Process to
32 further reduce pathogens" means high temperature composting,
33 heat drying, heat treatment, thermophilic aerobic digestion, or
34 other methods which will achieve similar levels of pathogen
35 reduction. These methods are described in 6 MCAR S 4.6136.

36 DD. Process to significantly reduce pathogens. "Process to

1 significantly reduce pathogens" means aerobic digestion, air
2 drying, anaerobic digestion, low temperature composting, lime
3 stabilization, or other methods which achieve similar levels of
4 pathogen reduction. These methods are described in 6 MCAR S
5 4.6136.

6 EE. Putrescible sewage sludge. "Putrescible sewage sludge"
7 means any sewage sludge that has a volatile solids content of 70
8 percent or more of the total solids content.

9 FF. Quarry. "Quarry" means any surficial mine used for the
10 purpose of obtaining building stone, limestone, gravel, or sand.

11 GG. Recreational area. "Recreational area" means any public
12 park, trail, campground, playground, athletic field, picnic
13 ground, botanical or zoological garden, swimming beach or pool,
14 fairground, or wayside and any commercial campground, resort,
15 tourist court, amusement park, riding stable, or golf course.

16 HH. Residential development. "Residential development"
17 means ten or more places of habitation concentrated within ten
18 acres of land. The term also includes schools, churches,
19 hospitals, nursing homes, businesses, offices, and apartment
20 buildings or complexes having ten or more living units.

21 II. Rivers and streams. "Rivers and streams" means any
22 watercourses defined as natural watercourses or altered natural
23 watercourses and public waters in Minn. Stat. S 105.37, subds.
24 10, 11, and 14 respectively.

25 JJ. Road right-of-way. "Road right-of-way" means any
26 interstate, United States, state, county, municipal, or township
27 highway or road including any shoulder and drainage ditch
28 alongside the road.

29 KK. Root crops. "Root crops" means plants whose edible
30 parts are grown below the soil surface.

31 LL. Seasonal high water table. "Seasonal high water table"
32 means the highest level the water table reaches during a given
33 year. Methods of determining the seasonal high water table are
34 given in 6 MCAR S 4.6132 B.5.

35 MM. Sewage sludge. "Sewage sludge," as defined in Minn.
36 Stat. S 115A.03, subd. 29, means the solids and associated

1 liquids in municipal wastewater which are encountered and
2 concentrated by a municipal wastewater treatment plant. Sewage
3 sludge does not include incinerator residues and grit, scum, or
4 screenings removed from other solids during treatment.

5 NN. Sewage sludge solids. "Sewage sludge solids" means the
6 total solids remaining in sewage sludge after oven drying at 105
7 degrees Centigrade.

8 OO. Short-term storage. "Short-term storage" means the
9 storage of dewatered sewage sludge for a period of less than one
10 month at a landspreading site not located at the place of sewage
11 sludge generation.

12 PP. Sinkhole. "Sinkhole" means a closed depression in an
13 area of Karst topography that is formed either by solution of
14 surficial limestone or by collapse of underlying caves.

15 QQ. Soil Conservation Service. "Soil Conservation Service"
16 means the Soil Conservation Service of the United States
17 Department of Agriculture.

18 RR. Soil horizon. "Soil horizon" means a layer of soil that
19 is approximately parallel to the soil surface and has some set
20 of properties that have been produced by soil-forming processes,
21 and has some properties that are not like those of the layers
22 above and beneath it. These properties include color,
23 structure, texture, consistence, and bulk density.

24 SS. Soil pH. "Soil pH" means the soil's hydrogen-ion
25 activity or the negative logarithm of the hydrogen-ion
26 concentration. It is a measure of the acidity of soil. A soil
27 pH value of 7.0 is neutral. The value is obtained by methods
28 provided in 6 MCAR S 4.6132 B.1.

29 TT. Soil texture. "Soil texture" means the relative portion
30 of the soil separates sand, silt, and clay. It can be measured
31 using methods addressed in 6 MCAR S 4.6132 B.1. Coarse texture
32 is United States Department of Agriculture textural
33 classifications sand and loamy sand. Medium texture is United
34 States Department of Agriculture classifications sandy loam,
35 loam, silt, silt loam, and sandy clay loam. Fine texture is
36 United States Department of Agriculture classifications clay.

1 loam, silty clay loam, sandy clay, silty clay, and clay.

2 UU. Soil type. "Soil type" means a soil body having the
3 same profile characteristics and morphology. It is the lowest
4 unit in the natural system of soil classification.

5 VV. Spray application. "Spray application" means liquid
6 sewage sludge application by sprinkling devices such as center
7 pivots and stationary or movable spray irrigation mechanisms.

8 WW. Spring. "Spring" means any natural surface discharge of
9 ground water large enough to flow in a small rivulet.

10 XX. Surface application. "Surface application" means sewage
11 sludge spread on the surface of the land and not incorporated
12 into the soil within 48 hours of application.

13 YY. Surface water. "Surface water" means any lake or pond,
14 and any river or stream as defined in Q. and II., respectively.

15 ZZ. Ten-year floodplain. "Ten-year floodplain" means the
16 lowland and relatively flat areas adjoining surface waters which
17 are inundated by a flood which can be expected to occur, on an
18 average, of once in ten years; or the land area to which flood
19 waters have a ten percent chance of inundating in any given year.

20 AAA. Water table. "Water table" means the surface of the
21 ground water at which the pressure is atmospheric. Generally
22 this is the top of the saturated zone.

23 BBB. Wetland. "Wetland" means a natural marsh where water
24 stands near, at, or above the soil surface during a significant
25 portion of most years, which is eligible for classification as
26 inland fresh water wetland type 3, 4 or 5 under United States
27 Department of Interior classification, defined in United States
28 Fish and Wildlife Circular No. 39 (1971 edition), not included
29 within the definition of public waters as defined in Minn. Stat.
30 S 105.37, subd. 14, and which is ten or more acres in size in
31 unincorporated areas or 2.5 acres or more in incorporated areas.

32 6 MCAR S 4.6104 Variance. Any person may apply for a variance
33 from any requirement of 6 MCAR SS 4.6101-4.6136. Variances
34 shall be applied for and acted upon by the agency in accordance
35 with Minn. Stat. S 116.07, subd. 5 and other applicable statutes
36 and rules.

1 6 MCAR S 4.6105 Application requirements for landspreading sites.
2 Applications for letters of approval for sewage sludge
3 landspreading sites shall include the specific information given
4 in A.-E. Submittal of this information shall be made using a
5 form obtained from the director.

6 A. Sewage sludge characterization. Applications shall
7 contain sewage sludge characterization.

8 1. This shall include a description of the process to
9 significantly reduce pathogens or process to further reduce
10 pathogens used to treat the sewage sludge, including
11 temperatures, retention times, volatile solids reduction, and
12 chemical doses, if applicable.

13 2. Sewage sludge chemical characteristics shall be
14 determined from either a single composite sample taken within
15 six months of application submittal or the average of analyses
16 from any number of samples taken within one year of application
17 submittal. Sewage sludge shall be analyzed for parameters
18 listed in 6 MCAR S 4.6111 A.5. The dates of sampling and
19 analysis shall be included with the analysis.

20 B. Site characterization. Applications shall contain site
21 characterization.

22 1. This shall include a copy of Soil Conservation Service
23 soil survey maps or comparable soil maps prepared by a soil
24 scientist with mapping experience, delineating the boundaries of
25 the specific sewage sludge landspreading and short-term or
26 long-term storage areas. Information included with the soil
27 survey maps or obtained from actual on-site investigations shall
28 include the following items for each soil type present at the
29 landspreading site:

30 a. texture and thickness of each soil horizon to 60
31 inches of depth;

32 b. permeability of each soil horizon to 60 inches of
33 depth;

34 c. available water-holding capacity of each soil
35 horizon to 60 inches in depth;

36 d. soil depth required to obtain six inches of

1 available water-holding capacity;

2 e. depth to seasonal high water table;

3 f. depth to bedrock; and

4 g. slope of land surface.

5 2. It shall include a copy of a United States Geological
6 Service quadrangle map or aerial photo which shows the location
7 of and distance to each of the following features, if within
8 one-quarter mile of the landspreading site:

9 a. lakes and ponds;

10 b. rivers and streams;

11 c. wetlands;

12 d. intermittent streams;

13 e. ten-year flood plains;

14 f. sinkholes, caves, bedrock outcrops, mines, or
15 quarries;

16 g. potable water supply wells;

17 h. places of habitation;

18 i. recreational areas;

19 j. residential developments;

20 k. road right-of-ways; and

21 l. airports.

22 3. It shall include a legal description of the
23 landspreading site, including township, range, section, quarter
24 section, township or city name, and county.

25 4. It shall include the approximate quantity of sewage
26 sludge solids previously applied to the landspreading site.

27 5. Required sampling and analytical procedures of soil
28 characteristics listed in a. to g. are provided in 6 MCAR S
29 4.6132. Applications shall contain the following soil
30 characteristics which shall be determined from samples obtained
31 within six months of application submittal:

32 a. United States Department of Agriculture textural
33 classification;

34 b. percentage of organic matter;

35 c. extractable phosphorus in pounds per acre;

36 d. exchangeable potassium in pounds per acre;

- 1 e. pH;
- 2 f. soluble salts expressed in millimhos per
- 3 centimeter; and
- 4 g. cation exchange capacity expressed in
- 5 milliequivalents per 100 grams.

6 6. Site characterization shall include the acreage of the
7 landspreading site.

8 7. It shall include the name and address of landowner.

9 8. It shall also include the name and address of any
10 renter, lessee, or occupier of the landspreading site.

11 C. Site management. Applications shall include site
12 management. This includes the following:

13 1. a description of the proposed method or methods of
14 sewage sludge application;

15 2. the name and address of the person who will apply
16 sewage sludge to the proposed landspreading site;

17 3. the maximum annual application rate, in tons of sewage
18 sludge solids per acre per year, based on nitrogen or cadmium
19 additions, whichever is limiting;

20 4. the estimated maximum sewage sludge loading rate over
21 the life of the site, in tons of sewage sludge solids per acre,
22 based on cumulative heavy metal limits, current sewage sludge
23 analysis, and past heavy metal applications;

24 5. a description of the crop to be grown or dominant
25 vegetation at the site and intended use of the crop;

26 6. a description of how public access to the site is
27 proposed to be controlled; and

28 7. months and approximate dates when sewage sludge will
29 be landspread.

30 D. Provisions for long-term sewage sludge storage at the
31 site. Applications shall include the following provisions for
32 long-term sewage sludge storage at the site:

33 1. A description of the necessity for storage at the
34 landspreading site.

35 2. The location of the storage area delineated on maps
36 submitted pursuant to B.1. and B.2.

1 3. A description of how sewage sludge is to be stored.

2 4. The acreage of the sewage sludge storage area.

3 5. The quantity of sewage sludge to be stored.

4 6. Boring logs from at least two soil borings to a depth
5 of ten feet taken at the perimeter of the proposed storage
6 area. The boring logs shall include:

7 a. texture and thickness of each soil horizon
8 encountered;

9 b. color and presence or absence of mottling for each
10 soil horizon encountered;

11 c. depth to water table, if encountered; and

12 d. depth to bedrock, if encountered.

13 7. The soil depth required to obtain eight inches of
14 available water-holding capacity.

15 8. The expected duration and dates of storage before
16 landspreading.

17 9. The description of precaution or practices to minimize
18 or prevent leachate, runoff, or nuisance conditions from the
19 storage area. If the long-term storage site is to be at the
20 same location for each year the landspreading site is used, an
21 evaluation of the necessity for an impervious pad shall be
22 included.

23 E. Public notification. Applications shall include evidence
24 that the applicable county and local officials have been
25 notified that application is being made to the agency for
26 approval of the proposed landspreading site and operation.

27 6 MCAR S 4.6106 Application requirements for landspreading
28 facilities. Applications for state disposal system permits for
29 sewage sludge landspreading facilities shall include the
30 information required by A.-D.

31 A. Information required for letters of approval. The
32 application shall contain all information required in 6 MCAR S
33 4.6105 A., B., and C. for letters of approval for landspreading
34 sites.

35 B. Ground water quality. Applications shall contain present
36 ground water quality for the following parameters:

- 1 1. pH;
- 2 2. electrical conductivity expressed in millimhos per
- 3 centimeter;
- 4 3. total hardness expressed in milligrams per liter as
- 5 CaCO_3 ;
- 6 4. alkalinity expressed in milligrams per liter as CaCO_3 ;
- 7 5. chlorides expressed in milligrams per liter;
- 8 6. sulfates expressed in milligrams per liter;
- 9 7. total organic carbon expressed in milligrams per liter;
- 10 8. nitrate-nitrogen expressed in milligrams per liter;
- 11 9. total phosphorus expressed in milligrams per liter;
- 12 10. methylene blue active substances expressed in
- 13 milligrams per liter;
- 14 11. total dissolved solids expressed in milligrams per
- 15 liter; and
- 16 12. total coliform bacteria expressed in organisms per
- 17 100 milliliters.

18 The ground water to be sampled and analyzed shall be from the
19 first aquifer below the proposed landspreading facility that is
20 being used or may be used for drinking water purposes.

21 Analytical methods for these parameters may be found in 6 MCAR S
22 4.6134.

23 C. Ground water monitoring wells and soil water sampling
24 devices. Applications shall contain a description of all ground
25 water monitoring wells and soil water sampling devices installed
26 at the facility, including:

- 27 1. location on required soil map;
- 28 2. elevation of ground water surface, depth of boring and
- 29 well; well seals, and screened interval; and
- 30 3. description of well construction materials such as
- 31 casing, well seal, grouting and packing.

32 D. Sewage sludge storage facility and operation.

33 Applications shall contain a description of the sewage sludge
34 storage facility and operation, including:

- 35 1. facility type and capacity;
- 36 2. frequency of sewage sludge addition to and removal

1 from the storage facility; and

2 3.. description and permeability of storage pond liner or
3 storage pad base, whichever is applicable.

4 E. Additional information. The information in 1.-3. shall
5 be submitted in addition to that required in A.-D. if the
6 applicant or permittee proposes to apply available nitrogen in
7 excess of that stipulated in 6 MCAR S 4.6121 A.2.e., cadmium in
8 excess of two pounds per acre per year, or metals in excess of
9 levels stipulated in Exhibits 6 MCAR S 4.6121 D.2.f.-1 or
10 D.2.g.-2. The information in 4., 5., 6., or 7., whichever is
11 applicable, shall be submitted in addition to that required in
12 A.-D. if the applicant or permittee proposes not to comply with
13 one or more of the minimum design requirements in 6 MCAR S
14 4.6121.

15 1. An application shall contain a characterization of
16 hydrogeological conditions at and within one mile from the
17 landspreading facility, including:

- 18 a. type of and depth to bedrock;
- 19 b. bedrock condition, such as fractures, faults, and
20 channels;
- 21 c. texture of unconsolidated material above bedrock;
- 22 d. depth to hydrostatic ground water table;
- 23 e. direction of ground water flow and rate of movement;
- 24 f. ground water recharge and discharge areas;
- 25 g. available well boring logs for any public or
26 private, potable or non-potable water supply wells;
- 27 h. present ground water quality and use; and
- 28 i. suitability of ground water for future use.

29 This information may be obtained from available well boring
30 data, United States Geological Survey hydrogeologic atlases,
31 other hydrogeological studies in the area, or by actual on-site
32 investigations.

33 2. The application shall contain a description of soil
34 characteristics to a minimum depth of 25 feet. The minimum
35 number of borings required can be determined using the following
36 formula:

1 Number of borings = (landspreading acreage x 0.1) + 3.

2 The information given for each boring shall include:

3 a. location and depth of boring;

4 b. soil classification using the Unified system for
5 each soil horizon encountered;

6 c. color and presence or absence of mottling for each
7 soil horizon encountered; and

8 d. water level measurement.

9 3. Utilizing the information in 1. and 2., the
10 application shall contain an evaluation of the potential for
11 impacting aquifer quality based on proposed facility management
12 practices.

13 4. It shall contain a description and evaluation of the
14 provisions, practices, and site features that will be utilized
15 to comply with 6 MCAR S 4.6121 A.1. if one or more of the
16 minimum design requirements in 6 MCAR S 4.6121 A.2. cannot be
17 accomplished.

18 5. It shall contain a description and evaluation of the
19 provisions, practices, and site features that will be utilized
20 to comply with 6 MCAR S 4.6121 B.1. if one or more of the
21 minimum design requirements in 6 MCAR S 4.6121 B.2. cannot be
22 accomplished.

23 6. It shall contain a description and evaluation of the
24 provisions, practices, and site features that will be utilized
25 to comply with 6 MCAR S 4.6121 C.1. if one or more of the
26 minimum design requirements in 6 MCAR S 4.6121 C.2. cannot be
27 accomplished.

28 7. It shall also contain a description and evaluation of
29 the provisions, practices and site features that will be
30 utilized to comply with 6 MCAR S 4.6121 D.1. if one or more of
31 the minimum design requirements in 6 MCAR S 4.6121 D.2. cannot
32 be accomplished.

33 6 MCAR S 4.6107 Administration of letters of approval.

34 A. Review. All applications shall be reviewed for
35 completeness by the director. If the application is incomplete,
36 the director shall promptly advise the applicant of the

1 incompleteness. Further processing of the application may be
2 suspended until the applicant has supplied the necessary
3 information.

4 B. Preparation of preliminary determinations. The director
5 shall make a preliminary determination regarding a completed
6 application. This preliminary determination shall include a
7 proposed determination to issue or to deny the approval sought
8 in the application.

9 1. If the preliminary determination is to deny an
10 approval, the director shall notify the applicant in writing and
11 include the specific reasons for denial. The applicant may
12 request an appearance before the agency to appeal the denial
13 pursuant to agency rules of procedure, rule MPCA 3 of the
14 Minnesota Pollution Control Agency.

15 2. If the preliminary determination is to issue an
16 approval, the procedures set out in C. and D. shall apply.

17 C. Public participation.

18 1. The director shall provide notice of the application
19 and a copy of the draft letter of approval to the following
20 persons: the applicant; the owner and occupier of land proposed
21 to be used for sewage sludge landspreading; the city or township
22 and county officials of the area where a sewage sludge
23 landspreading site is located; and other persons known by the
24 director to have an interest in the proposed approval.

25 2. Any interested person, including the applicant, may,
26 within 14 days following the date of issuance of the notice,
27 submit written comments on the application and the proposed
28 approval to the director.

29 3. All written comments submitted during the comment
30 period shall be retained and considered in the formulation of
31 final determinations concerning the application.

32 D. Final determination.

33 1. The director shall attempt to resolve all comments
34 prior to a final determination concerning the application. If
35 such comments have been resolved, the director shall issue or
36 deny the approval.

1 2. If all comments cannot be resolved, the application
2 shall be presented to the agency, which shall issue or deny the
3 approval. A public hearing may be requested in accordance with
4 rule WPC 36(k) of the Minnesota Pollution Control Agency.

5 3. All persons submitting comments on the application and
6 the proposed approval shall be notified of the final
7 determination concerning the application.

8 E. Denial of approval.

9 1. Approval shall be denied if the proposed site does not
10 comply with this rule and other applicable state or federal laws
11 or rules; or approval is likely to cause pollution, impairment
12 or destruction of the air, water, land or other natural
13 resources of the state and there is a feasible and prudent
14 alternative.

15 2. Notice of denial and reasons for the denial shall be
16 issued to the persons listed in C.1.

17 F. Modification, suspension, and revocation of letters of
18 approval. A letter of approval may be modified, suspended, or
19 revoked in accordance with the requirements of rule WPC 36(s) of
20 the Minnesota Pollution Control Agency.

21 G. Duration of approvals. The letter of approval shall have
22 a duration of one to five years. The term of approval shall be
23 based upon the request of the applicant and a determination of
24 the suitability of the landspreading site and operation for
25 compliance with 6 MCAR SS 4.6101-4.6136 for the duration of the
26 requested approval period.

27 H. Enforcement. A letter of approval issued to a political
28 subdivision pursuant to this rule shall become part of the
29 political subdivision's national pollutant discharge elimination
30 system or state disposal system permit and shall be enforceable
31 to the same extent as the permit.

32 6 MCAR S 4.6108 Administration of state disposal system permits.
33 The administration of state disposal system permits for
34 landspreading facilities shall be governed by rule WPC 36 of the
35 Minnesota Pollution Control Agency.

1 Chapter Six: Landspreading Sites

2 6 MCAR S 4.6111 Requirements and limitations. The following
3 requirements and limitations apply to the management of
4 landspreading sites.

5 A. Sewage sludge sampling and analysis.

6 1. Sewage sludge samples shall be representative of the
7 sewage sludge to be landspread.

8 2. In the case of digesters and liquid storage tanks, a
9 representative sample shall be composed of at least four grab
10 samples composited over a 24-hour period prior to landspreading.

11 3. In the case of lagoons, stockpiles, drying beds, and
12 compost piles, a representative sample shall be composed of at
13 least ten grab samples composited from the sewage sludge prior
14 to landspreading.

15 4. Other recommended sampling and handling procedures are
16 provided in 6 MCAR S 4.6131.

17 5. Sewage sludge shall be analyzed according to methods
18 set forth in 6 MCAR S 4.6131 for the following parameters:

19 a. percentage of total solids;

20 b. volatile solids as percentage of total solids;

21 c. pH;

22 d. nitrogen, including the percentages of kjeldahl,

23 ammonia and, in the case of aerobically digested and composted
24 sewage sludges only, nitrate;

25 e. total weight of heavy metals, including milligrams
26 per kilogram of zinc, copper, lead, nickel, cadmium, chromium
27 and mercury; and

28 f. polychlorinated biphenyls expressed as milligrams
29 per kilogram.

30 All analytical values, except pH and total solids, shall be
31 recorded on a dry weight basis.

32 6. The minimum frequency of sewage sludge sampling and
33 analysis is given in Exhibit 6 MCAR S 4.6111 A.6.-1.

34

35

36

1 Exhibit 6 MCAR S 4.6111 A.6.-1

2 Minimum Frequency of Sewage Sludge Sampling and Analysis

3

| 4 Wastewater Treatment System | 5 Minimum |
|--------------------------------------|------------------|
| 6 Design Flow in Million Gallons/Day | 7 Frequency |
| 8 Less than 1.0 | 9 annually |
| 10 1.0 - 20 | 11 semi-annually |
| 12 More than 20 | 13 quarterly |

14 7. Each parameter exceeding concentrations listed in
 15 Exhibit 6 MCAR S 4.6111 A.7.-2 shall be analyzed for at two or
 16 three times the minimum frequency given in Exhibit 6 MCAR S
 17 4.6111 A.6.-1.

18 Exhibit 6 MCAR S 4.6111 A.7.-2

19 Greater Frequency of Sewage Sludge Sampling and Analysis

20 Concentration Expressed in Milligrams/
 21 Kilogram of Dry Weight

| 22 Parameter | 23 2x Frequency | 24 3x Frequency |
|------------------------------|-----------------|-----------------|
| 25 Zinc | 26 1800 | 27 3600 |
| 28 Copper | 29 900 | 30 1800 |
| 31 Lead | 32 500 | 33 1000 |
| 34 Nickel | 35 100 | 36 200 |
| 37 Cadmium | 38 20 | 39 40 |
| 40 Chromium | 41 1000 | 42 2000 |
| 43 Mercury | 44 5 | 45 10 |
| 46 Polychlorinated biphenyls | 47 5 | 48 10 |

49 8. Frequency of sewage sludge sampling and analysis may
 50 be reduced by the director depending on the annual frequency of
 51 landspreading and the variability of sewage sludge quality.

52 B. Pathogen control.

53 1. Sewage sludge, at a minimum, shall be treated by a
 54 process to significantly reduce pathogens prior to landspreading.

55 2. Sewage sludge shall be treated by a process to further

1 reduce pathogens if crops for direct human consumption are to be
 2 grown within 18 months of sewage sludge application, unless
 3 there is no contact between the sewage sludge and the edible
 4 portion of the crop.

5 3. Sewage sludge shall only be applied to pasture or
 6 forage crops when foliage is minimal unless the sewage sludge is
 7 injected. Surface application during the growing season shall
 8 only be permitted within seven days following a cutting.

9 4. If sewage sludge is to be applied to land used for
 10 pasturing livestock or for growing forage crops, the pasturing
 11 or harvesting of the crop shall not be permitted for at least
 12 one month following the last sewage sludge application unless
 13 the sewage sludge was treated by a process to further reduce
 14 pathogens.

15 5. Public access to a landspreading site shall be
 16 controlled during and for a period of 12 months following sewage
 17 sludge application unless the sewage sludge was treated by a
 18 process to further reduce pathogens. Fencing or posting of
 19 appropriate signs is required if the site is likely to be
 20 frequented by the general public. If the site is remote, or
 21 used for agricultural purposes, fencing and or posting are is
 22 not required if unless inadvertant public contact is deemed
 23 unlikely likely. -----

24 C. Soil pH and cadmium application.

25 1. For landspreading sites where food-chain crops will be
 26 grown, the pH of the soil and sewage sludge mixture shall be 6.5
 27 or greater during the growing season following sewage sludge
 28 application.

29 2. Annual cadmium application shall not be more than
 30 one-half pound per acre on the land used for the production of
 31 tobacco, leafy vegetables, or root crops grown for human
 32 consumption. For other food-chain crops, the annual cadmium
 33 application shall not exceed two pounds per acre.

34 3. Cumulative cadmium application to any landspreading
 35 site shall not exceed the levels provided in Exhibit 6 MCAR S
 36 4.6111 C.3.-3.

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Exhibit 6 MCAR S 4.6111 C.3.-3

Maximum Cumulative Cadmium Application

| Soil Cation Exchange Capacity (milliequivalents/100 grams) | Maximum Cumulative Cadmium Application (pounds/acre) |
|---|---|
| Less than 5 | 5 |
| 5 - 15 | 10 |
| More than 15 | 20 |

D. Cumulative heavy metal additions. Sewage sludge application shall be terminated when the sum addition of any one heavy metal equals the level in Exhibit 6 MCAR S 4.6111 D.-4 for that particular heavy metal and soil.

Exhibit 6 MCAR S 4.6111 D.-4

Maximum Cumulative Heavy Metal Addition

| Soil Cation Exchange Capacity (milliequivalents/100 grams) | Maximum Cumulative Heavy Metal Addition (pounds/acre) | | | |
|---|--|------|--------|--------|
| | Lead | Zinc | Copper | Nickel |
| Less than 5 | 500 | 250 | 125 | 50 |
| 5 - 15 | 1000 | 500 | 250 | 100 |
| More than 15 | 2000 | 1000 | 500 | 200 |

E. Sewage sludge application rates.

1. Sewage sludge application rates, combined with other known nitrogen sources, shall supply no more nitrogen than the amount required by the vegetation to be grown at the site. The rate of sewage sludge application shall be determined using the method outlined in 6 MCAR S 4.6135.

1 2. Sewage sludge application to a site shall be suspended
2 whenever the soil extractable phosphorus content exceeds 400
3 pounds per acre.

4 3. Sewage sludge application to a site shall be suspended
5 whenever the electrical conductivity of the saturation extract
6 of soil exceeds four millimhos per centimeter as determined by
7 the soluble salt test.

8 4. Sewage sludge shall not be applied to fallow land
9 unless the following provisions are met: the soil surface has a
10 medium or fine texture; the average annual precipitation is no
11 greater than 24 inches; the addition of available nitrogen does
12 not exceed 50 pounds per acre on medium-textured soil and 75
13 pounds per acre on fine-textured soil; and a crop is grown the
14 year following sewage sludge application. The amount of
15 available nitrogen applied to that crop is reduced by the amount
16 of available nitrogen applied the previous year.

17 F. Organic priority pollutant limitations.

18 1. Sewage sludge containing concentrations of PCBs equal
19 to or greater than 10 milligrams per kilogram of sewage sludge
20 solids shall be incorporated into the soil when applied to land
21 used for producing food-chain crops.

22 2. Sewage sludge containing concentrations of PCBs equal
23 to or greater than 50 milligrams per kilogram of sewage sludge
24 solids shall not be landspread.

25 3. If there is a known source in the sewer system service
26 area which discharges a significant quantity of an organic
27 priority pollutant, the sewage sludge shall be analyzed for that
28 chemical. Concentrations will be considered on a case-by-case
29 basis and recommendations will be made regarding the utilization
30 of that sewage sludge on land.

31 G. Suitable soil conditions.

32 1. A soil profile shall be of sufficient depth to provide
33 an available water-holding capacity of at least six inches above
34 bedrock or the seasonal high water table. In no case shall this
35 depth be less than three feet. Where sewage sludge is injected
36 into the soil, the six inches of water-holding capacity or the

1 three foot separation distance, whichever is applicable, shall
2 exist between the bottom of the injection zone and the seasonal
3 high water table or bedrock.

4 2. For the purpose of 1., a perched water condition, in
5 which a zone of saturated soil exists between zones of
6 unsaturated soil in the upper five feet of the soil profile,
7 shall not be considered a seasonal high water table.

8 3. For the purpose of 1., the depth to subsurface
9 drainage tiles shall be considered the depth to the seasonal
10 high water table for tile drainage systems that are designed
11 according to or equivalent to Soil Conservation Service
12 engineering standards and criteria.

13 4. If, according to available information such as Soil
14 Conservation Service soil surveys and soil interpretation
15 sheets, the required six inches of available water-holding
16 capacity is not provided in the upper five feet of soil for any
17 given soil type, a boring shall be made to the depth in which
18 six inches of available water-holding capacity would be
19 provided. If indication of a seasonal high water table or
20 bedrock is found before this depth is accomplished, that soil
21 type shall not be used for landspreading.

22 5. The soil texture, United States Department of
23 Agriculture classification, at the zone of sewage sludge
24 application shall be one of the following: fine sand; loamy
25 sand; sandy loam; loam; silt loam; silt; sandy clay loam; sandy
26 clay; clay loam; silty clay loam; silty clay; or clay.

27 6. Liquid sewage sludge shall not be spread on soils with
28 surface permeabilities of less than 0.2 inch per hour unless the
29 sewage sludge is immediately incorporated.

30 7. Sewage sludge shall not be spread on soils that have
31 permeabilities of greater than six inches per hour throughout
32 the top five feet.

33 8. Sewage sludge shall not be spread in areas where
34 bedrock containing solution cavities or fractures or cracks
35 exists within six feet of the soil surface.

36 9. Sewage sludge shall not be spread on areas ponded with

1 water or sewage sludge.

2 10. Surface application of sewage sludge shall not be
3 allowed on land with a slope greater than six percent.

4 Subsurface application or an immediately incorporated
5 application of sewage sludge shall not be allowed on land with a
6 slope greater than 12 percent.

7 11. Soil samples shall be collected and analyzed prior to
8 each cropping season that a landspreading site is used. The
9 following parameters shall be determined using collection and
10 analysis procedures provided in 6 MCAR S 4.6132:

- 11 a. United States Department of Agriculture textural
- 12 classification;
- 13 b. percentage of organic matter content;
- 14 c. extractable phosphorus in pounds per acre;
- 15 d. exchangeable potassium in pounds per acre;
- 16 e. pH; and
- 17 f. soluble salts expressed in millimhos per centimeter.

18 H. Separation distances.

19 1. A distance of at least 200 feet from any place of
20 habitation and a distance of at least 600 feet from any
21 residential development or recreational area shall be
22 maintained, unless written permission is obtained from the
23 appropriate party all persons responsible for residential
24 developments and places of recreation and all persons inhabiting
25 within the otherwise protected distance.

26 2. A distance of at least 200 feet from any private water
27 supply well and a distance of at least 1,000 feet from any
28 public water supply well shall be maintained. Monitoring and
29 test wells are exempt from this limitation.

30 3. Separation distances prescribed in 1. may be reduced
31 by one-half if sewage sludge is injected into the soil.

32 4. Land application of sewage sludge shall be conducted
33 so that sewage sludge is not applied to adjoining property or to
34 road right-of-ways.

35 5. A distance of at least 200 feet for coarse-textured
36 soils and at least 300 feet for medium and fine-textured soils

1 shall be maintained from any downgradient surface water where
 2 sewage sludge is surface applied during the months of May
 3 through October. These separation distances shall be doubled
 4 where sewage sludge is surface applied during the months of
 5 November through April.

6 6. The minimum distances in Exhibit 6 MCAR S 4.6111
 7 H.6.-5 from any downgradient surface water shall be maintained
 8 where sewage sludge is immediately incorporated into the soil.

9
 10 Exhibit 6 MCAR S 4.6111 H.6.-5

11 Minimum Distances From Downgradient Surface Water

| 12 | 13 Land Slope | 13 Separation (feet) |
|----|---------------------|----------------------|
| 14 | Less than 2 percent | 25 |
| 15 | 2 - 6 percent | 50 |
| 16 | 6 - 12 percent | 100 |

17
 18 7. A 100 foot separation distance from intermittent
 19 streams shall be maintained when applying sewage sludge unless
 20 one or more of the following conditions exist, in which case the
 21 separation distance shall be at least 25 feet:

- 22 a. the sewage sludge is immediately incorporated;
- 23 b. the sewage sludge is surface applied and the
 24 intermittent stream does not discharge to any surface water; or
- 25 c. the sewage sludge is surface applied and the
 26 intermittent stream discharges to a surface water that is more
 27 than one mile downstream.

28 I. Short-term dewatered sewage sludge storage.

29 1. Sewage sludge in short-term storage shall be spread as
 30 soon as conditions permit. In no case shall the short-term
 31 storage of sewage sludge be in excess of 30 days. It is
 32 advisable that the short-term storage site be relocated each
 33 year the landspreading site is used.

34 2. Separation distances for short-term sewage sludge
 35 storage areas shall be those provided in H. for landspreading
 36 sites except that short-term storage of sewage sludge shall not

1 be within 100 feet of any adjoining property without the written
2 permission of the owner or within 100 feet of any road
3 right-of-way.

4 3. Short-term storage of sewage sludge shall not take
5 place on land with a slope greater than two percent unless
6 measures are taken to control water runoff or the sewage sludge
7 is being spread concurrent with the unloading of sewage sludge
8 delivery trucks.

9 4. The suitable soil conditions for short-term storage of
10 sewage sludge shall be the same as those for landspreading sites
11 in G.

12 J. Long-term dewatered sewage sludge storage.

13 1. Long-term storage of sewage sludge shall only be
14 allowed at landspreading sites where the stored sewage sludge is
15 to be applied. Long-term storage at one landspreading site of
16 sewage sludge that is intended for application at several
17 landspreading sites is allowed provided that all sites are owned
18 by the same person and all sites are within a one-half mile
19 radius.

20 2. Long-term storage of sewage sludge for landspreading
21 areas of 40 acres or less shall not take place within 400 feet
22 from any place of habitation. This separation distance shall
23 increase 100 feet for every additional ten acres of
24 landspreading area, or portion thereof, up to a maximum of 1,000
25 feet. Separation distances may be reduced if written permission
26 is obtained from the appropriate party all persons inhabiting
27 within the otherwise protected distance.

28 3. Long-term storage of sewage sludge shall not take
29 place within 1,000 feet of any residential development or
30 recreational area.

31 4. Long-term storage of sewage sludge shall not take
32 place within 1,000 feet of any downgradient surface waters or
33 ten-year floodplain, unless measures are taken to control runoff
34 in which case the separation distance may be reduced to 200 feet.

35 5. Long-term storage of sewage sludge shall not be
36 allowed on land with greater than two percent slope unless

1 measures are taken to control runoff, in which case the maximum
2 land slope may be increased to six percent.

3 6. Long-term sewage sludge storage areas shall not be
4 located in areas where the soil profile has less than eight
5 inches of available water-holding capacity between the soil
6 surface and the seasonal high water table and bedrock.

7 7. Long-term sewage sludge storage shall not take place
8 in areas where the soil permeability is greater than six inches
9 per hour throughout the top five feet of soil.

10 8. Long-term sewage sludge storage shall not take place
11 in the same area for two or more consecutive years.

12 9. Conditions set forth in 6., 7., and 8. are not
13 required if measures are taken to control leachate generation
14 from the area of long-term sewage sludge storage.

15 K. Prohibited sites and other limitations.

16 1. Sewage sludge shall not be disposed of on or into any
17 cave, sinkhole, or wetland. Except as part of a reclamation,
18 project, sewage sludge shall not be disposed of in or on any
19 mine or quarry.

20 2. Sewage sludge shall not be applied on any land without
21 the permission of the owner.

22 3. Organic soils or peat shall not be utilized for sewage
23 sludge application unless subsurface drainage is provided by a
24 system designed according to or equivalent to Soil Conservation
25 Service engineering criteria.

26 4. Daily surface applications of liquid sewage sludge
27 shall not exceed the following: for coarse-textured soil,
28 25,000 gallons per acre; for medium-textured soil, 15,000
29 gallons per acre; or for fine-textured soil, 10,000 gallons per
30 acre.

31 5. Sewage sludge shall be applied to land in such a
32 manner as to provide uniform spreading or application over the
33 entire site.

34 6. The boundary of a landspreading site shall be
35 identified prior to and during application with the use of
36 conspicuous flags placed every 100 feet along the border unless

1 apparent boundaries, such as fence rows, roads, tree lines, or
2 steep slopes, exist.

3 7. Putrescible sewage sludge, regardless of pathogen
4 reduction process, shall be immediately incorporated into the
5 soil.

6 6 MCAR S 4.6112 Record keeping and annual reporting.

7 A. Record keeping. A record keeping system shall be
8 initiated and maintained by the political subdivision generating
9 the sewage sludge that is applied at landspreading sites to
10 verify compliance with 6 MCAR S 4.6111. The information
11 recorded in the system shall include the following:

- 12 1. required sewage sludge composition data pursuant to 6
13 MCAR S 4.6111 A.5.;
- 14 2. soil test data for landspreading sites used during the
15 year, pursuant to 6 MCAR S 4.6111 G.11.;
- 16 3. the location of the landspreading and stockpile sites
17 on a United States Geological Survey quadrangle or soil survey
18 map and the number of acres to which sewage sludge was applied,
19 if different from the submitted application;
- 20 4. the amount of sewage sludge applied that year and
21 cumulatively expressed in terms of tons of sewage sludge solids
22 per acre;
- 23 5. the known amount of available nitrogen applied that
24 year expressed in terms of pounds per acre;
- 25 6. the amount of cadmium, zinc, lead, nickel, and copper
26 applied that year and cumulatively expressed in terms of pounds
27 per acre; and
- 28 7. vegetation grown on the site during the year.

29 B. Reports. The information in A. shall be recorded on an
30 agency form by the political subdivision and submitted annually
31 to the agency no later than the March 1 next following the end
32 of the reporting year. The form for annual reporting may be
33 obtained from the director.

1 Chapter Seven: Landspreading Facilities

2 6 MCAR S 4.6121 Requirements and limitations. The following
3 requirements and limitations apply to the management of
4 landspreading facilities.

5 A. Ground water protection.

6 1. A sewage sludge landspreading facility shall be
7 designed, constructed, monitored, and maintained so that it will
8 comply with the standards of rule WPC 22 of the Minnesota
9 Pollution Control Agency at the facility boundary.

10 2. The facility shall comply with the following minimum
11 design requirements unless the permittee can demonstrate that
12 compliance with 1. will be accomplished.

13 a. A minimum of six ground water monitoring wells
14 shall be installed at the facility. Four wells shall be placed
15 within the facility boundaries, two upgradient and two
16 downgradient of ground water flow. The remaining two wells
17 shall be placed within the area of landspreading. All wells
18 shall be placed in the uppermost portion of the first aquifer
19 below the landspreading facility that is currently being used or
20 may be used in the future for drinking well water purposes. All
21 wells shall sample the same portion of the aquifer. At a
22 minimum, the frequency of sampling shall be semi-annually. The
23 parameters to be tested for and a sampling frequency exceeding
24 the minimum shall be determined by the director and will be
25 based upon soil permeabilities, depth to water table, direction
26 of ground water flow in relation to the location of potable
27 water supply wells, distance to potable water supply wells,
28 sewage sludge application rates, sewage sludge quality, and
29 suitability of the ground water as a source of potable drinking
30 water.

31 b. A landspreading facility shall not be located on
32 soils that have permeabilities of greater than six inches per
33 hour throughout the profile above the water table.

34 c. Landspreading facilities shall not be located in
35 areas where the soil profile has less than six inches of
36 available water-holding capacity between the soil surface and

1 the water table or bedrock.

2 d. Landspreading facilities shall be located at least
3 1,000 feet from potable water supply wells that are finished to
4 a depth of less than 50 feet and are downgradient with respect
5 to ground water flow direction.

6 e. Sewage sludge application rates shall supply no
7 more nitrogen than the amount required by the vegetation to be
8 grown at the facility. The rate of sewage sludge application
9 shall be determined using the method outlined in 6 MCAR S 4.6135.

10 f. Any basin, tank, pit, or lagoon used to store
11 liquid sewage sludge shall not seep at a rate greater than 500
12 gallons per acre per day. Any area at a landspreading facility
13 used to store dewatered sewage sludge for a period in excess of
14 one month per year shall be paved with asphalt or concrete to a
15 depth sufficient to bear the weight of unloading and loading
16 trucks and equipment without cracking. The pad shall be sloped
17 and curbed to collect all runoff water. Runoff water shall be
18 routed to a wastewater treatment facility or land applied in a
19 manner approved by the director.

20 B. Surface waters protection.

21 1. A sewage sludge landspreading facility shall be
22 designed, constructed, operated, and maintained so that it will
23 not impact the use or the quality of surface waters.

24 2. The facility shall comply with the following minimum
25 design requirements unless the permittee can demonstrate that
26 compliance with 1. will be accomplished.

27 a. A sewage sludge landspreading facility shall not be
28 located within 1,000 feet of the normal high water level of any
29 lake or pond.

30 b. A sewage sludge landspreading facility shall not be
31 located within 300 feet of any river or stream.

32 c. A sewage sludge landspreading facility shall not be
33 located within a wetland.

34 d. A sewage sludge landspreading facility shall not be
35 located within a hundred year floodplain.

36 e. Surface sewage sludge application at a

1 landspreading facility shall not take place within 100 feet of
2 an intermittent stream unless it is immediately incorporated, in
3 which case the separation distance may be reduced to 25 feet.

4 f. The director may determine that discharge from a
5 landspreading facility of subsurface water via underground
6 drainage systems or of channelized runoff to surface waters
7 should be monitored. Any required monitoring, parameters to be
8 monitored for, and sampling frequency shall be determined by the
9 director based upon the following: discharge quantity; time of
10 year discharge is expected; classification of receiving water;
11 sewage sludge quality; sewage sludge application rate; source of
12 channelized runoff; depth of tile drainage system; and purpose
13 of tile drainage system.

14 C. Public health and safety.

15 1. A sewage sludge landspreading facility shall be
16 designed, constructed, operated, and maintained so that it will
17 not adversely impact the health and safety of the public living
18 near or passing by the facility. The facility shall comply with
19 applicable provisions of rule APC 9 of the Minnesota Pollution
20 Control Agency at the facility boundary.

21 2. The facility shall comply with the following minimum
22 design requirements unless the permittee can demonstrate that
23 compliance with 1. will be accomplished.

24 a. At a minimum, sewage sludge applied to a
25 landspreading facility shall be treated by a process to
26 significantly reduce pathogens.

27 b. Daily surface applications of liquid sewage sludge
28 shall be limited to quantities that will infiltrate into the
29 soil within 24 hours.

30 c. Unauthorized public access to a landspreading
31 facility shall be controlled by fencing or posting of
32 appropriate signs.

33 d. Any landspreading facility located within 10,000
34 feet of any airport runway used by turbojet aircraft or within
35 5,000 feet of any airport runway used by only piston-type
36 aircraft shall have the approval of the Federal Aviation

1 Administration.

2 D. Food-chain protection.

3 1. A sewage sludge landspreading facility shall be
4 designed, constructed, operated, and maintained so that the
5 quality of food-chain crops grown at the facility complies with
6 applicable regulations of the Food and Drug Administration,
7 United States Department of Agriculture, and rules of the
8 Minnesota Department of Agriculture.

9 2. The facility shall comply with the following minimum
10 design requirements unless the permittee can demonstrate that
11 compliance with 1. will be accomplished.

12 a. If crops for direct human consumption are to be
13 grown at a landspreading facility within 18 months of sewage
14 sludge application, the sewage sludge shall be treated by a
15 process to further reduce pathogens.

16 b. If sewage sludge is to be applied to land used for
17 pasturing livestock or for growing forage crops, the pasturing
18 or harvesting of the crop shall not take place for at least one
19 month following the last sewage sludge application.

20 c. Sewage sludge containing concentrations of PCBs
21 greater than ten milligrams per kilogram of sewage sludge solids
22 shall be incorporated into the soil when applied to land used
23 for producing food-chain crops.

24 d. Sewage sludge containing concentrations of PCBs
25 equal to or greater than 50 milligrams per kilogram of sewage
26 sludge solids shall not be landspread.

27 e. If the facility is used for growing a food-chain
28 crop, vegetative tissue shall be sampled at the stage of
29 development designated in 6 MCAR S 4.6133 and analyzed for
30 cadmium if the pH of the soil and sewage sludge mixture is less
31 than 6.5 immediately before the time food-chain crops are grown;
32 or the annual application of cadmium exceeds one-half pound per
33 acre on land used for the production of tobacco, leafy
34 vegetables or root crops grown for human consumption; or the
35 annual cadmium application rate exceeds two pounds per acre on
36 land used for the production of other food-chain crops.

1 f. The cumulative addition of cadmium to any land
 2 shall not exceed the levels in Exhibit 6 MCAR S 4.6121 D.2.f.-1,
 3 unless the only food-chain crop produced is animal feed; the pH
 4 of the soil and sewage sludge mixture is 6.5 or greater
 5 immediately before the time the crop is planted and this pH
 6 level is maintained whenever food-chain crops are grown;
 7 vegetative tissue is sampled at the stage of development
 8 designated in 6 MCAR S 4.6133 and analyzed for cadmium; there is
 9 a facility operating plan which demonstrates how the animal feed
 10 will be distributed to preclude ingestion by humans and which
 11 describes the measures to be taken to safeguard against possible
 12 health hazards from cadmium entering the food-chain, which may
 13 result from alternative land uses; and future property owners
 14 are notified by a stipulation in the land record or property
 15 deed of the amount of cadmium the property has received and that
 16 food-chain crops should not be grown due to a possible health
 17 hazard.

18
 19 Exhibit 6 MCAR S 4.6121 D.2.f.-1

20 Maximum Cumulative Addition of Cadmium

| 21 | 22 Soil Cation | 23 Maximum Cumulative |
|----|---------------------------------|-----------------------|
| 24 | 25 Exchange Capacity | 26 Cadmium Addition |
| 27 | 28 (milliequivalents/100 grams) | 29 (pounds/acre) |
| 30 | 31 Less than 5 | 32 5 |
| 33 | 34 5 - 15 | 35 10 |
| 36 | 37 More than 15 | 38 20 |

39 g. The cumulative addition of lead, zinc, copper, and
 40 nickel shall not exceed the levels in Exhibit 6 MCAR S 4.6121
 41 D.2.g.-2 unless future property owners are notified by a
 42 stipulation in the land record or property deed of the amount of
 43 lead, zinc, copper, or nickel applied, whichever are in excess.
 44 The stipulation shall state that these levels may result in
 45 reduced crop yield.

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Exhibit 6 MCAR S 4.6121 D.2.g.-2

Maximum Cumulative Heavy Metal Addition

| Soil Cation Exchange Capacity (milliequivalents/100 grams) | Maximum Cumulative Heavy Metal Addition (pounds/acre) | | | |
|--|---|------|--------|--------|
| | Lead | Zinc | Copper | Nickel |
| Less than 5 | 500 | 250 | 125 | 50 |
| 5 - 15 | 1000 | 500 | 250 | 100 |
| More than 15 | 2000 | 1000 | 500 | 200 |

16 6 MCAR S 4.6122 Record keeping and annual reporting.

17 A. Record keeping. A record keeping system shall be
18 initiated and maintained by the permittee of the landspreading
19 facility to verify compliance with requirements and limitations
20 in 6 MCAR S 4.6121. The information recorded in such a system
21 shall include the following:

22 1. sewage sludge composition data for parameters outlined
23 in 6 MCAR S 4.6111 A.5.;

24 2. the quantity and rate of sewage sludge solids applied
25 to the facility expressed in tons per acre;

26 3. the amount of available nitrogen applied to the
27 facility expressed in pounds per acre;

28 4. the amount of cadmium, zinc, lead, nickel, and copper
29 applied that year and cumulatively expressed in pounds per acre;

30 5. vegetation grown and use of vegetation grown at the
31 facility;

32 6. results of required monitoring of ground water, soils,
33 or vegetative tissue;

34 7. information required in the facility operating permit;

35 8. a description of any adverse environmental, health, or
36 social effects, complaints, management problems, or other

1 difficulties encountered during the year due to sewage sludge
2 disposal; and

3 9. a report of any action not in compliance with the
4 permit or 6 MCAR S 4.6121.

5 At a minimum, the frequency of sewage sludge sampling and
6 analysis shall be once a year. A frequency exceeding the
7 minimum may be required by the director at the time of permit
8 issuance based on the following: sewage sludge characteristics;
9 quantity of sewage sludge applied at the facility; frequency of
10 sewage sludge application; and design wastewater treatment
11 system daily flow.

12 B. Reports. The information and records prescribed in A.
13 shall be organized into a report to be submitted annually to the
14 agency no later than the March 1 next following the end of the
15 reporting year.

1 Chapter Eight: Appendices

2 6 MCAR S 4.6131 Collection and analysis of sewage sludge samples.

3 A. Collection of sewage sludge samples.

4 1. The following sampling and handling methods for liquid
5 sewage sludge are recommended to obtain a sample that accurately
6 represents the sewage sludge being sampled.

7 a. Daily grab samples of approximately one cup of
8 sewage sludge are transferred to a two-gallon watertight
9 container left in a refrigerator at 4 degrees Centigrade. After
10 one month, the large composite sample is thoroughly mixed and a
11 quart subsample removed for analysis. The quart subsample is
12 delivered or shipped to the analytical laboratory as rapidly as
13 possible in a very well-insulated shipping container. During
14 very warm weather, the subsample is packed with dry ice to
15 prevent microbial activity which would affect analytical
16 values. If more than one day will elapse between sample
17 collection and cold storage, enough sulfuric acid (H_2SO_4) is
18 added to decrease the sewage sludge pH to about pH 1.0, which is
19 approximately 10 to 20 milliliters per quart, prior to shipping.

20 b. Random grab samples of equal volume are taken from
21 different depths and locations in the storage lagoon, tank, or
22 digester. Care is exercised to obtain samples from many varied
23 sampling points. The grab samples are composited into a single
24 container, thoroughly mixed, and a quart subsample removed for
25 analysis. Subsample handling then proceeds as discussed in a.

26 2. The following sampling and handling method is
27 recommended for dewatered sewage sludges that are stored in
28 stockpiles, compost piles, or drying beds. The storage area is
29 divided up into sections of equal size using an imaginary grid.
30 Grab samples or cores are taken from the center of each section
31 at several depths. The samples are then composited, thoroughly
32 mixed, and a pint subsample removed for analysis. The subsample
33 is delivered or shipped to the analytical laboratory as rapidly
34 as possible in a well-insulated container.

35 B. Analysis of sewage sludge. Analytical procedures for
36 determining constituents in sewage sludge samples shall be

1 obtained from one of the following publications:

2 1. 'Methods for Chemical Analysis of Water and Wastes,'
3 issued by the United States Environmental Protection Agency as
4 EPA-625/6-74-003 (1974).

5 2. 'Standard Methods for the Examination of Water and
6 Wastes,' 14th edition, issued by the American Public Health
7 Association.

8 3. 'Analytical Procedures for Determining Organic
9 Priority Pollutants in Municipal Sludges,' issued by the United
10 States Environmental Protection Agency as EPA 600/2-80-030
11 (1980).

12 4. 'Method Development for Determination of
13 Polychlorinated Hydrocarbons in Municipal Sludge,' issued by the
14 United States Environmental Protection Agency as EPA
15 600/2-80-029 (1980).

16 6 MCAR S 4.6132 Collection and analysis of soil samples.

17 A. Collection of soil samples. At a minimum, one soil
18 sample shall represent an area of no more than 40 acres.
19 Additional soil samples may be required if there are areas
20 differing greatly in previous fertilization, liming, cropping
21 history, land management, or soil texture. The soil shall be
22 sampled to a depth of six to nine inches from at least 15 to 20
23 random locations in the sampling area. The samples shall be
24 composited, thoroughly mixed, and subsampled for analysis.
25 Approximately one pint of soil is necessary for analysis.

26 B. Analysis of soils.

27 1. Acceptable analytical methods for United States
28 Department of Agriculture textural classification, organic
29 matter, extractable phosphorus, exchangeable potassium, pH, and
30 soluble salts are found in one or more of the following
31 publications:

32 a. 'Guide to Computer Programmed Soil Test
33 Recommendations in Minnesota,' issued by the University of
34 Minnesota, Agricultural Extension Service as Special Report No.
35 1 (St. Paul, Minnesota, 1978).

36 b. 'Recommended Chemical Soil Test Procedures for the

1 North Central Region,' issued by the North Dakota State
2 University as North Central Region Publication No. 221 (1975).

3 c. 'Methods of Soil Analysis,' edited by C.A. Black,
4 issued by the American Society of Agronomy as Agronomy Monograph
5 No. 9 (Madison, Wisconsin, 1965).

6 d. 'Soil Survey Laboratory Methods and Procedures for
7 Collecting Soil Samples,' issued by the Soil Conservation
8 Service as Soil Survey Investigations Report 1 (revised)
9 (Washington, D.C.: United States Government Printing Office,
10 1972).

11 2. Soil cation exchange capacity may be estimated on the
12 basis of soil texture and organic matter content using Exhibit 6
13 MCAR S 4.6132 B.2.-1 or by direct analysis, either by the
14 summation method for distinctly acid soils or the sodium acetate
15 method for neutral, calcareous, or saline soils. ('Methods of
16 Soil Analysis,' edited by C.A. Black, issued by the American
17 Society of Agronomy as Agronomy Monograph No. 9 (Madison,
18 Wisconsin, 1965).)

19
20 Exhibit 6 MCAR S 4.6132 B.2.-1

21 Cation Exchange Capacity

22 (milliequivalents/100 grams)

23
24 Soil Organic Matter Level

| 25 Texture | 26 Low (less than 2%) | 27 Medium (2-4%) | 28 High (greater than 4%) |
|------------|-----------------------|------------------|---------------------------|
| 29 Coarse | less than 5 | 5 - 15 | 5 - 15 |
| 30 Medium | 5 - 15 | 5 - 15 | more than 15 |
| 31 Fine | more than 15 | more than 15 | more than 15 |

32 3. Available water-holding capacity measurements for
33 different soil types and soil horizons may be found in Soil
34 Conservation Service soil surveys or Soil Conservation Service
35 soil interpretation sheets. Another acceptable alternative is
36 the determination by direct analysis of soil samples. In
general, the available water-holding capacity is the difference

1 in water retained at 1/3 bar (1/10 bar for coarse-textured soil)
2 and 15 bar matric suction. Acceptable procedures are discussed
3 in the following publications:

4 a. 'Soil Survey Laboratory Methods and Procedures for
5 Collecting Soil Samples,' issued by the Soil Conservation
6 Service as Soil Survey Investigations Report 1 (revised)
7 (Washington, D.C.: United States Government Printing Office,
8 1972).

9 b. Chapter 8-2, "Water Retentivity of Soil at
10 Specified Values of Matric Suction," in 'Methods of Soil
11 Analysis,' edited by C.A. Black, issued by the American Society
12 of Agronomy as Agronomy Monograph No. 9 (Madison, Wisconsin,
13 1965).

14 4. Soil permeability measurements for different soil
15 types and soil horizons can be found in Soil Conservation
16 Service soil surveys and Soil Conservation Service soil
17 interpretation sheets. Other acceptable alternatives include:

18 a. Determination by direct measurements in the field
19 as outlined in Chapter 15, "Field Measurement of Hydraulic
20 Conductivity Above a Water Table," in 'Methods of Soil
21 Analysis,' edited by C.A. Black, issued by the American Society
22 of Agronomy as Agronomy Monograph No. 9 (Madison, Wisconsin,
23 1965).

24 b. Determination in the laboratory using undisturbed
25 soil samples as outlined in Chapter 13, "Laboratory Measurement
26 of Hydraulic Conductivity of Saturated Soil," in 'Methods of
27 Soil Analysis,' edited by C.A. Black, issued by the American
28 Society of Agronomy as Agronomy Monograph No. 9 (Madison,
29 Wisconsin, 1965).

30 5. The depth to the seasonal high water table for
31 different soil types can be found in Soil Conservation Service
32 soil surveys and Soil Conservation Service soil interpretation
33 sheets. Other acceptable alternatives include:

34 a. Determination of the depth of soil having mottles
35 with a chroma of two or less as discussed on pages 48 and 49 of
36 'Soil Taxonomy,' issued by the Soil Conservation Service as

1 Agriculture Handbook No. 436 (Washington, D.C.: United States
2 Government Printing Office, 1975).

3 b. Measurement of water levels at monthly intervals
4 over the course of one year in piezometers. The highest water
5 level measurement obtained is acceptable as the seasonal high
6 water table. The piezometers must be installed and water levels
7 must be measured as outlined in Chapter 11, "Hydraulic Head," in
8 'Methods of Soil Analysis,' edited by C.A. Black, issued by the
9 American Society of Agronomy as Agronomy Monograph No. 9
10 (Madison, Wisconsin, 1965).

11 6 MCAR S 4.6133 Collection and analysis of vegetative tissue
12 samples.

13 A. Sample collection. Samples collected shall adequately
14 represent the average condition of the vegetation grown at the
15 landspreading facility. This is best accomplished by
16 compositing many grab samples followed by subsampling to a
17 quantity sufficient for chemical analysis. Areas that are
18 managed differently, for example different soil type, crop,
19 sewage sludge application rate, application method, shall be
20 sampled separately. A sample shall represent an area no larger
21 than ten acres.

22 Samples shall be taken from the following plant parts at
23 the designated stages of development:

- 24 1. corn, leaf at, or opposite and below, ear level, at
25 silking stage;
- 26 2. soybeans, the youngest mature leaves and petioles on
27 the plant after first pod formation;
- 28 3. legumes, upper stem cuttings in early flower stage;
- 29 4. cereals, the whole plant at the boot stage; and
- 30 5. grasses, whole plants at early hay cutting stage.

31 B. Sample handling and preservation. All samples should be
32 washed with deionized or distilled water to remove any surface
33 contamination. Samples are then dried at 55 degrees Centigrade
34 as quickly as possible, ground, and stored for analysis. If
35 samples cannot be dried immediately, they shall be placed in
36 plastic bags and stored in a refrigerator.

1 C. Sample analysis. Dried and ground tissue samples may be
2 prepared for analysis by wet digestion in a suitable combination
3 of nitric, sulfuric, or perchloric acid or by dry ashing at a
4 temperature not to exceed 500 degrees Centigrade. Cadmium shall
5 then be analyzed by using atomic absorption or flame emission
6 spectroscopy.

7 6 MCAR S 4.6134 Collection and analysis of ground water samples.

8 A. Sample collection. Construction and sampling of ground
9 water monitoring wells at sewage sludge landspreading facilities
10 shall be consistent with methods discussed in either of the
11 following publications:

12 1. 'Water Quality Monitoring at Solid Waste Disposal
13 Sites in Minnesota,' issued by the Minnesota Pollution Control
14 Agency (May 1979).

15 2. 'Procedures Manual for Ground Water Monitoring at
16 Solid Waste Disposal Facilities,' issued by the United States
17 Environmental Protection Agency as EPA/530/SW-611 (August 1977).

18 B. Sample analysis. Analytical procedures for determining
19 constituents in ground water collected in monitoring wells at
20 sewage sludge landspreading facilities shall be obtained from
21 one of the following publications:

22 1. 'Methods for Chemical Analysis of Water and Wastes,'
23 issued by the United States Environmental Protection Agency as
24 EPA-625/6-74-003 (1974).

25 2. 'Standard Methods for the Examination of Water and
26 Wastes,' 14th edition, issued by the American Public Health
27 Association.

28 6 MCAR S 4.6135 Determination of sewage sludge application rate
29 based on crop nitrogen requirements. Sewage sludge application
30 rates shall be based upon soil texture, crop nitrogen
31 requirements and yield goals, sewage sludge nitrogen
32 availability, carry-over nitrogen supplied by past sewage sludge
33 applications, and available nitrogen added by manures or
34 fertilizers. The procedures in A.-E. shall be used:

35 A. Maximum allowable available nitrogen level. Based on

1 cropping practices and soil texture, determine the maximum
 2 allowable available nitrogen level in pounds per acre from
 3 Exhibit 6 MCAR S 4.6135 A.-1 or Exhibit 6 MCAR S 4.6135 A.-2.

4 Maximum allowable nitrogen levels for crops not listed in
 5 these exhibits shall be based on agricultural extension, Soil
 6 Conservation Service, or University of Minnesota recommendations.

7
 8
 9 Exhibit 6 MCAR S 4.6135 A.-1

10 Maximum Allowable Available Nitrogen Levels for
 11 Various Crops, Yields, and Soil Textures

12
 13 Maximum Allowable Available
 14 Nitrogen Level (pounds/acre)

15 Soil Texture

| 16 | Crop | Yield/Acre | Coarse | Medium | Fine |
|----|-----------|------------|--------|--------|------|
| 17 | Alfalfa | 4 ton | 180 | 210 | 230 |
| 18 | | 6 ton | 280 | 340 | 370 |
| 19 | Barley | 80 bushel | 100 | 110 | 120 |
| 20 | Bluegrass | 3 ton | 180 | 210 | 230 |
| 21 | Corn | 75 bushel | 100 | 120 | 130 |
| 22 | | 100 bushel | 130 | 150 | 160 |
| 23 | | 125 bushel | 150 | 180 | 190 |
| 24 | | 150 bushel | 180 | 210 | 230 |
| 25 | | 175 bushel | 210 | 250 | 270 |
| 26 | Oats | 75 bushel | 80 | 90 | 100 |
| 27 | | 100 bushel | 130 | 150 | 160 |
| 28 | Soybeans | 30 bushel | 120 | 140 | 150 |
| 29 | | 40 bushel | 180 | 210 | 230 |
| 30 | | 50 bushel | 230 | 270 | 300 |
| 31 | | 60 bushel | 280 | 340 | 370 |
| 32 | Wheat | 50 bushel | 100 | 120 | 130 |
| 33 | | 75 bushel | 160 | 180 | 190 |

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Exhibit 6 MCAR S 4.6135 A.-2

Maximum Allowable Available Nitrogen
Levels for Non-Cropped, Non-Harvested Areas

Maximum Allowable Available
Nitrogen Level (pounds/acre)

| Degree of Vegetative Cover | Soil Texture | | |
|---|--------------|--------|------|
| | Coarse | Medium | Fine |
| High density (more than 50 percent cover) | 75 | 100 | 125 |
| Low density (25-50 percent cover) | 50 | 75 | 100 |
| Fallow (less than 25 percent cover) | 0 | 50 | 75 |

B. Carry-over nitrogen. Determine carry-over nitrogen from the previous year's sewage sludge application using the following formula:

Carry-over N (pounds per acre) = (percentage organic sewage sludge N) x (tons sewage sludge solids applied per acre).

If sewage sludge was not applied the previous year, carry-over nitrogen is zero.

C. Net allowable available nitrogen level. To determine the net allowable available nitrogen level in pounds per acre subtract carry-over nitrogen, nitrogen added from other sources such as fertilizer or animal manure, if known, and available nitrogen applied the previous year to fallow land, from the maximum allowable available nitrogen level.

D. Sewage sludge available nitrogen. Determine the available nitrogen in sewage sludge in pounds per ton using the appropriate formula in Exhibit 6 MCAR S 4.6135 D.-3.

Exhibit 6 MCAR S 4.6135 D.-3

Formulas for Determination of Available Nitrogen in Sewage Sludge

(pounds of available nitrogen per ton of sewage sludge solids)

| Type of Stabilization | Application Method | Formula |
|---|-------------------------------|---|
| Digested | Surface..... | (% organic-N x 4)+(NH ₃ -N x 10) |
| | Incorporated or Injected..... | (% organic-N x 4)+(NH ₃ -N x 15) |
| Chemically or Physically Stabilized or Unstabilized | Surface..... | (% organic-N x 6)+(NH ₃ -N x 10) |
| | Incorporated or Injected..... | (% organic-N x 6)+(NH ₃ -N x 15) |

E. Sewage sludge application rate. Divide the net allowable available nitrogen level in pounds per acre from C. by the available nitrogen in sewage sludge in pounds per ton from D. to obtain the sewage sludge application rate in tons of solids per acre per ten year.

6 MCAR S 4.6136 Pathogen reduction processes.

A. Process to significantly reduce pathogens. Paragraphs 1.-5. contain processes to significantly reduce pathogens.

1. Aerobic digestion is a process conducted by agitating sewage sludge with air or oxygen to maintain aerobic conditions at residence times ranging from 60 days at 15 degrees Centigrade to 40 days at 20 degrees Centigrade. The level of volatile solids in the sewage influent must be reduced by at least 38 percent after processing.

2. Air drying is a process by which liquid sewage sludge not exceeding nine inches in depth is allowed to drain and/or

1 dry on underdrained sand beds or paved basins. A minimum of
2 three months is needed, two months of which temperatures average
3 on a daily basis above 0 degrees Centigrade.

4 3. Anaerobic digestion is a process conducted in the
5 absence of air at residence times ranging from 60 days at 20
6 degrees Centigrade to 15 days at 35 degrees Centigrade to 55
7 degrees Centigrade. The level of volatile solids in the sewage
8 influent must be reduced by at least 38 percent after processing.

9 4. In composting by means of the within vessel, static
10 aerated pile, or windrow composting methods, the sewage sludge
11 is maintained at minimum operating conditions of 40 degrees
12 Centigrade for five days. For four hours during this period the
13 temperature exceeds 55 degrees Centigrade.

14 5. Lime stabilization is a process by which sufficient
15 lime is added to produce a pH of 12 after two hours of contact.

16 6. The director may determine that other methods or
17 operating conditions are acceptable if pathogens, vector
18 attraction, and volatile solids of the waste are reduced to an
19 extent equivalent to the reduction achieved by any of the
20 methods listed in 1.-5., or to an extent necessary for the
21 proposed landspreading operation. The director's decision shall
22 be based upon:

- 23 a. sewage sludge residence time;
- 24 b. temperatures achieved during treatment;
- 25 c. duration of sewage sludge storage;
- 26 d. method of sewage sludge application;
- 27 e. crop or crops to which sewage sludge is applied;
- 28 f. potential impact of runoff on surface waters;
- 29 g. location of landspreading area with respect to
30 places of habitation, residential developments, and recreational
31 areas; and
- 32 h. degree of public access control.

33 B. Processes to further reduce pathogens. Paragraphs 1.-4.
34 contain processes to further reduce pathogens.

35 1. Composting consists of the aerobic thermophilic
36 decomposition of organic constituents to a relatively stable,

1 humus-like material. High temperature composting methods which
2 will further reduce pathogens are:

3 a. Windrow, consisting of an unconfined composting
4 process involving periodic aeration or mixing of uninsulated
5 compost piles. At least five turnings must occur during a
6 period of 15 days when the temperature of the mixture is at
7 least 55 degrees Centigrade.

8 b. Static aerated pile, consisting of an unconfined
9 composting process involving mechanical aeration of insulated
10 compost piles. The sewage sludge in the insulated pile is
11 maintained at operating conditions of 55 degrees Centigrade or
12 greater for three days.

13 c. Within vessel, consisting of a confined composting
14 process involving mechanical mixing of compost under controlled
15 environmental conditions so that the sewage sludge is maintained
16 at operating conditions of 55 degrees Centigrade or greater for
17 three days.

18 2. Heat drying consists of a process by which dewatered
19 sewage sludge cake is dried by direct or indirect contact with
20 hot gases and moisture content is reduced to ten percent or
21 lower. Sewage sludge particles must reach temperatures in
22 excess of 80 degrees Centigrade, or the wet bulb temperature of
23 the gas stream in contact with the sewage sludge at the point
24 where it leaves the dryer must be in excess of 80 degrees
25 Centigrade.

26 3. Heat treatment consists of a process by which liquid
27 sewage sludge is heated to temperatures of 180 degrees
28 Centigrade for 30 minutes.

29 4. Thermophilic aerobic digestion consists of a process
30 by which liquid sewage sludge is agitated with air or oxygen to
31 maintain aerobic conditions at residence times of ten days at 55
32 to 60 degrees Centigrade. The level of volatile solids in the
33 sewage influent must be reduced by at least 38 percent after
34 processing.

35 5. The director may determine that other methods or
36 operating conditions are acceptable if pathogens, vector

1 attraction, and volatile solids of the sewage sludge are reduced
2 to an extent equivalent to the reduction achieved by the methods
3 in 1.-4.