

Ohio EPA Policy DSW-0100.028 Removed	Ohio's Sewage Sludge Rules: Chapter 3745-40 of the Ohio Administrative Code	
	Statutory references: ORC 6111.01, 6111.03, 6111.039, 6111.04, 6111.042, 6111.05, 6111.07, 6111.44, 6111.45, 6111.46 Rule references: OAC 3745-31-02(B), 3745-33, 3745-40, 40 CFR 503.	Ohio EPA, Division of Surface Water Revision 0, August 1, 1988 Revision 1, August 23, 2002 (formerly DSW Policies 0400.010, 0400.018 and 0400.021) Reviewed w/o revision, December 21, 2006 Removed, December 29, 2011
THIS POLICY DOES NOT HAVE THE FORCE OF LAW Pursuant to Section 3745.30 of the Revised Code, this policy was reviewed and removed.		

Ohio EPA is removing this document from the Division of Surface Water Policy Manual because it is out of date.

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Ohio EPA Policy DSW-0100.028 Final	Ohio's Sewage Sludge Rules: Chapter 3745-40 of the Ohio Administrative Code	
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THIS POLICY DOES NOT HAVE THE FORCE OF LAW Pursuant to Section 3745.30 of the Revised Code, this policy was reviewed on the last revision date.		

This document contains both a reprint of the Ohio sewage sludge rules and Agency policy regarding those rules. Policy is a written clarification or explanation of the rules, and is identified by the FAQ heading and/or is printed in italics. Unlike rules, policy does not have the force of law.



Photo courtesy of USDA Natural Resources Conservation Service

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Purpose

The purpose of this manual is to provide clarification and/or explanation of Ohio's new sewage sludge rules, Chapter 3745-40 of the Ohio Administrative Code. This document contains both a reprint of the Ohio sewage sludge rules and Agency policy regarding those rules. Policy is a written clarification or explanation of the rules, and is identified by the FAQ heading and/or is printed in italic. Unlike rules, policy does not have the force of law.

This document also contains suggestions or guidelines as to how to comply with said rules. As such, the terms "should" and "recommend" are used in places. The use of such terms should be construed to mean that the identified act is discretionary, rather than mandatory.

The majority of this manual is devoted to operation and management of land application of sewage sludge programs, but other management practices are covered. Additional technical information regarding sludge and land application of sludge is also included. References made to "503" in this manual are references to Chapter 40 of the Code of Federal Regulations, Part 503. The 503 "Standards for the Use and Disposal of Sewage Sludge" were published in Vol. 58, No. 32 of the Federal Register on February 19, 1993.

This manual was prepared by the Ohio Environmental Protection Agency (EPA), Division of Surface Water, Permits and Compliance Section, with guidance and assistance from an Ad Hoc committee of experts representing, among others, education, government, sludge application and transportation contractors, and citizens of Ohio. Questions regarding the content of this manual, or requests for copies, should be directed to the Ohio EPA Division of Surface Water, P.O. Box 1049, Columbus, OH 43216-1049, Attn: Chris Bowman, (614) 644-2134, chris.bowman@epa.state.oh.us.

This manual will be updated periodically. Hardcopies of future updates will be mailed to parties that request a copy, but will not be mass mailed to all interested parties. The most current version of the manual will be maintained on the following website:

<http://www.epa.state.oh.us/dsw/sludge/biosolid.html>

The last date the manual was edited will appear on the website, and on each page of the manual.

Any suggestions on improvements to this manual would be appreciated and may be directed to Chris Bowman at the above address.

Background

Pursuant to requirements established in Title 40 of the Code of Federal Regulations, sections 123.22 and 123.62, the State of Ohio Environmental Protection Agency (EPA) is preparing a submission to receive delegation from the United States EPA to administer the land application, surface disposal, landfilling, and incineration portions of 503. Modifications to the Ohio Revised Code and Ohio Administrative Code were required before Ohio EPA could seek delegation of 503. Chapter 6111 of the Ohio Revised Code had to be revised to broaden the authority of the Director of Ohio EPA to permit activities related to sewage sludge disposal, use, storage, or treatment. Such enabling legislation, Ohio House Bill 197, became effective on March 17, 2000.

The revisions to Chapter 6111 of the Ohio Revised Code provide the Director of Ohio EPA the authority to “adopt and enforce, modify or rescind rules necessary for the implementation of division (S)” of section 6111.03 of the Ohio Revised Code (division (S) of section 6111.03 contains details of the sewage sludge statutory language). The Ohio EPA initiated a rules drafting effort, and worked closely with interested parties during the rules writing process. Comments were solicited three times during the drafting of the rules. Final draft rules were released for public comment on September 8, 2000, as per paragraph 121.39(D) of the Ohio Revised Code. Comments received from interested parties were incorporated into the rules as appropriate. Proposed rules were submitted to the Ohio General Assembly Joint Committee on Agency Rule Review (JCARR), and released to the public for comment, on September 18, 2001. Public hearings were held on the proposed rules package on October 23, 2001, and the proposed rules were considered by JCARR on November 13, 2001. There were no questions or comments offered on the proposed rules at any of the hearings. A final rules package was adopted by the Director of Ohio EPA on January 8, 2001. Chapter 3745-40 of the Ohio Administrative Code became effective on April 8, 2002.

Sludge Management Plans

Although Ohio EPA does not, as of the publication date of this version of the manual, have delegation of the federal sludge program, the Ohio program has met the federal regulation standards for years. The Ohio EPA has administered the oversight of the program through Chapters 3745-31 and 3745-33 of the Ohio Administrative Code, the Permit-to-Install and National Pollutant Discharge Elimination System (NPDES) rules of the State of Ohio. Under paragraph 3745-31-02(B), the Ohio EPA requires an approved Sludge Management Plan (SMP) for the land application of sewage sludge. This is a legally binding document signed by the Director of Ohio EPA. Ohio EPA, over time, will phase out the SMP and rely solely upon the NPDES permit to regulate sewage sludge in Ohio. During the transition period, existing approved SMPs are grandfathered under Ohio's new sewage sludge rules. It is highly unlikely that any existing SMPs exactly match all requirements in the new rules. The following scenarios provide clarification by the Division of Surface Water as to when a SMP or the rules take precedence:

1. SMP is more stringent than the same item in Chapter 3745-40 of the Ohio Administrative Code.

SMP takes precedence.

2. SMP is less stringent than the same item in Chapter 3745-40 of the Ohio Administrative Code.

Chapter 3745-40 of the Ohio Administrative Code takes precedence.

3. SMP includes conditions that are not addressed in Chapter 3745-40 of the Ohio Administrative Code.

SMP takes precedence.

4. Chapter 3745-40 of the Ohio Administrative Code includes conditions that are not addressed in a SMP.

Chapter 3745-40 of the Ohio Administrative Code takes precedence.

NPDES permits will no longer be issued with standard language that the permittee shall review and/or submit a new SMP, unless the Ohio EPA District Office has concerns and believes that a new SMP is required for the protection of public health and the environment. Should a SMP be required, or an entity wish to update their SMP or apply for a new SMP, a SMP application should consist of the following (use Permit-to-Install forms A and B9 for the submittal):

1. A detailed description, that meets the requirements of Chapter 3745-40 of the Ohio Administrative Code, of the treatment works processes for a land applied sewage sludge. This description should include information on pathogen reduction compliance, vector attraction reduction compliance, distribution and marketing plans (if applicable for an EQ sewage sludge), and other issues related to a sludge generator's sewage sludge management. Include a statement that the land application program will operate under Chapter 3745-40 of the Ohio Administrative Code (language to that effect will be added to the approval letter signed by the Director).

The Ohio EPA reserves the right to impose any further conditions necessary to protect public health and the environment, and minimize the creation of nuisance odors.

2. The following sludge monitoring:
 - a. For new land application programs (facilities that have never land applied sewage sludge and do not have a historical database of land application monitoring and reporting), the following sludge monitoring data is required:
 - i. Three composite sludge samples monitored for the following parameters: arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, zinc (all metals are total metals, dry weight basis, in mg/kg), pH, total Kjeldahl nitrogen, ammonia nitrogen, total solids, volatile solids (if required to demonstrate vector attraction reduction compliance), and pathogen analysis (if required to demonstrate pathogen reduction compliance).
 - b. For existing land application programs that are submitting a new SMP application:
 - i. Contact the appropriate Ohio EPA District Office to determine if historical sludge monitoring is adequate or if there is a need for further monitoring and reporting as part of the SMP application. In most cases, no further monitoring will be necessary.
3. A copy of the Sludge Site Authorization Packet for Non-EQ Sewage Sludge.
4. A permittee involved in a SMP application that was initiated prior to April 8, 2002, is encouraged to revise their submittal to conform with Ohio's new sewage sludge rules.

National Pollutant Discharge Elimination System Permits

The Ohio EPA will, in time, manage sewage sludge under Ohio's NPDES program. Currently, the plan is to begin transferring sludge management to NPDES permits after Ohio EPA receives delegation of the federal sewage sludge program. Ohio EPA will initiate sludge management under an NPDES permit, or issue NPDES sludge-only permits, when appropriate.

Ohio EPA expects to receive delegation of the federal sewage sludge program in calendar year 2003. After receiving delegation, as NPDES permits come up for renewal, language will be added to the NPDES permits to manage sewage sludge as per Chapter 3745-40 of the Ohio Administrative Code. Since NPDES permits are on a five-year renewal basis, this conversion process will not be complete until at least five years after Ohio EPA receives delegation. In the interim, grandfathered SMPs and Ohio's new sewage sludge rules, as described in the previous section, will be a permittee's management vehicles for sewage sludge in Ohio.

Ohio Administrative Code 3745-40-01; Definitions

(A) As used in this chapter:

- (1) “Aerobic digestion” means the biochemical decomposition of organic matter in sewage sludge material into carbon dioxide and water by microorganisms in the presence of oxygen.
- (2) “Agronomic rate” means the whole sewage sludge application rate (dry weight basis) intended to provide the food crop, feed crop, fiber crop, cover crop, pasture, or vegetation the appropriate nitrogen for the reasonably expected yield, and to minimize the amount of nitrogen in the sewage sludge that passes to waters of the state.
- (3) “Anaerobic digestion” means the biochemical decomposition of organic matter in sewage sludge into methane gas and carbon dioxide by microorganisms in the absence of oxygen.
- (4) “Authorized site” means an area of land bordered by fences, tree lines, streams, roads, or other means of demarcation, upon which sewage sludge is land applied.
- (5) “Available water capacity” means the capacity of soils to hold water available for use by most plants.
- (6) “Bedrock” means any continuous or connected solid rock exposed at the surface of the earth or covered by soil or glacial deposits.
- (7) “Bulk sewage sludge” means sewage sludge that is not sold or given away in a bag or other container for application to the land.
- (8) “Class I sludge management facility” means any publicly owned treatment works as defined in 40 C.F.R. 501.2, required to have an approved pretreatment program under 40 C.F.R. 403.8(a) (including any publicly owned treatment works located in a state that has elected to assume local program responsibilities pursuant to 40 C.F.R. 403.10(e)) and any treatment works treating domestic sewage, as defined in 40 C.F.R. 122.2, classified as a class I sludge management facility by the United States environmental protection agency regional administrator in conjunction with the director, because of the potential for its sewage sludge use or disposal practice to affect public health and the environment adversely.

- (9) “Community public water system” means a water system that has at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents. Examples of community water systems may include, but are not limited to, cities, villages, nursing homes and mobile home parks.
- (10) “Cover crop” means a small grain crop, such as oats, wheat, or barley, not grown for harvest.
- (11) “Crop year” means the period of time for a particular crop to be planted and harvested, or one year’s time, whichever is shorter.
- (12) “Cumulative pollutant loading rate” means the maximum amount of an inorganic pollutant that can be applied to an area of land.
- (13) “Dioxin” means all of the seven 2,3,7,8 chlorinated dibenzo-p-dioxin congeners, ten 2,3,7,8 chlorinated dibenzofuran congeners, and twelve coplanar polychlorinated biphenyl congeners as follows.

CAS Number	Congener
1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin
40321-76-4	1,2,3,7,8-pentachlorodibenzo-p-dioxin
39227-28-6	1,2,3,4,7,8-hexachlorodibenzo-p-dioxin
57653-85-7	1,2,3,6,7,8-hexachlorodibenzo-p-dioxin
19408-74-3	1,2,3,7,8,9-hexachlorodibenzo-p-dioxin
35822-46-9	1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
3268-87-9	1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin
51207-31-9	2,3,7,8-tetrachlorodibenzofuran
57117-41-6	1,2,3,7,8-pentachlorodibenzofuran
57117-31-4	2,3,4,7,8-pentachlorodibenzofuran
70648-26-9	1,2,3,4,7,8-hexachlorodibenzofuran
57117-44-9	1,2,3,6,7,8-hexachlorodibenzofuran
72918-21-9	1,2,3,7,8,9-hexachlorodibenzofuran
60851-34-5	2,3,4,6,7,8-hexachlorodibenzofuran
67562-39-4	1,2,3,4,6,7,8-heptachlorodibenzofuran
55673-89-7	1,2,3,4,7,8,9-heptachlorodibenzofuran
39001-02-0	1,2,3,4,6,7,8,9-octachlorodibenzofuran
32598-13-3	3,3',4,4'-tetrachlorobiphenyl
70362-50-4	3,4,4',5-tetrachlorobiphenyl
57465-28-8	3,3',4,4',5-pentachlorobiphenyl
32598-14-4	2,3,3',4,4'-pentachlorobiphenyl
31508-00-6	2',3,4,4',5-pentachlorobiphenyl
65510-44-3	2,3',4,4',5'-pentachlorobiphenyl

74472-37-0	2,3,4,4',5-pentachlorobiphenyl
32774-16-6	3,3',4,4',5,5'-hexachlorobiphenyl
38380-08-4	2,3,3',4,4',5-hexachlorobiphenyl
69782-90-7	2,3,3',4,4',5'-hexachlorobiphenyl
52663-72-6	2,3',4,4',5,5'-hexachlorobiphenyl
39635-31-9	2,3,3',4,4',5,5'-heptachlorobiphenyl

- (14) "Director" means director of the Ohio environmental protection agency.
- (15) "Disposal" means the final use of sewage sludge, including, but not limited to, land application, land reclamation, surface disposal, or disposal in a landfill or an incinerator.
- (16) "Division" means the Ohio environmental protection agency division of surface water, with any division approvals or authorizations manifested through its chief.
- (17) "Domestic septage" means either liquid or solid material removed from a septic tank, cesspool, portable toilet, type III marine sanitation device, or similar treatment works that receives only domestic sewage. Domestic septage does not include liquid or solid material removed from a septic tank, cesspool, or similar treatment works that receives either commercial wastewater or industrial wastewater and does not include grease removed from a grease trap at a restaurant.
- (18) "Dry weight basis" means calculated on the basis of having been dried at one hundred five degrees Celsius until reaching a constant mass (i.e., essentially one hundred per cent solids content).
- (19) "Effective neutralizing power" has the same meaning as in division (N) of section 905.51 of the Revised Code.

FAQ: Do I have to report the effective neutralizing power, fineness index, and standard of fineness? *The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on effective neutralizing power, fineness index and standard of fineness. Such a material should be characterized by its Total Neutralizing Power as weight per cent of calcium carbonate, however, since Ohio EPA did not include that as a monitoring requirement in rule, it will not be a monitoring requirement.*

- (20) "Exceptional quality sludge" means sewage sludge that meets all of the following qualifications:
- (a) Satisfies the class A pathogen standards in paragraphs (N)(1) to (N)(6) of rule 3745-40-05 of the Administrative Code;
 - (b) Satisfies one of the vector attraction reduction requirements in paragraphs (Q)(1) to (Q)(8) of rule 3745-40-05 of the Administrative Code;
 - (c) Does not exceed the ceiling concentration limitations for metals listed in paragraph (F)(1) of rule 3745-40-05 of the Administrative Code; and
 - (d) Does not exceed the concentration limitations for metals listed in paragraph (F)(3) of rule 3745-40-05 of the Administrative Code.
- (21) "Facility storage of sewage sludge" means the storage of sewage sludge at the permittee's treatment works.
- (22) "Feed crops" means crops produced primarily for consumption by animals.
- (23) "Fiber crops" means crops such as flax and cotton.
- (24) "Field storage of sewage sludge" means an area where sewage sludge may be stored for greater than thirty days but not to exceed ninety days.
- (25) "Fineness index" has the same meaning as in division (O) of section 905.51 of the Revised Code.

FAQ: Do I have to report the effective neutralizing power, fineness index, and standard of fineness? The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on effective neutralizing power, fineness index and standard of fineness. Such a material should be characterized by its Total Neutralizing Power as weight per cent of calcium carbonate, however, since Ohio EPA did not include that as a monitoring requirement in rule, it will not be a monitoring requirement.

- (26) "Food crops" means crops consumed by humans. These include, but are not limited to, fruits, vegetables, and tobacco.
- (27) "Frequently flooded" means an authorized site or area of an authorized site

that has been flooded an average of more than once in two years. Frequently flooded, and the months when flooding is expected, shall be determined by consulting the appropriate "National Cooperative Soil Survey" publication.

- (28) "Grade" means the percentage of total Kjeldahl nitrogen, available phosphorus, and soluble potassium stated in the same terms and order.

FAQ: Do I have to report available phosphorus (phosphate) and soluble potassium (potash) as a grade? The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on available phosphorus and soluble potassium in sewage sludge.

- (29) "Grassed waterway" means a natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion and conducts surface water away from cropland.
- (30) "Ground cover" means vegetation canopy or crop residue on agricultural land.
- (31) "Ground water source water assessment and protection area" and "wellhead protection area" mean the surface and subsurface area that provides water to a community public water system well(s) as delineated or endorsed by the director.
- (32) "Immediate incorporation" means sewage sludge is mechanically incorporated into the soil within six hours after surface application.
- (33) "Industrial wastewater" means wastewater generated in a commercial or industrial process.
- (34) "Isolation distance" means the distance to a specified object from the nearest edge of the sewage sludge application area.
- (35) "Landfill" means a sanitary landfill facility, as defined in rules adopted under section 3734.02 of the Revised Code, that is licensed under section 3734.05 of the Revised Code.
- (36) "Land application," "land apply," "applied to the land," and "application to the land" mean the spraying or spreading of sewage sludge onto the land surface, the injection of sewage sludge below the land surface, or the

incorporation of sewage sludge into the soil for the purposes of conditioning the soil or fertilizing crops or vegetation grown on the soil.

- (37) “Land reclamation” means the returning of disturbed land to productive uses.

FAQ: Does productive use mean agriculture? *No, productive use is a broad term. Stabilization of a site so grass and/or brush can grow is productive use. There are many sites in Ohio that would be improved if grass was able to grow on the site. Erosion and leaching would be reduced, and wildlife would benefit. Reclamation can lead to agricultural usage, or redevelopment, but does not have to be as complex.*

- (38) “Land with a high potential for public exposure” means land that does not meet the definition of “land with a low potential for public exposure”.

- (39) “Land with a low potential for public exposure” means agricultural land and land reclamation sites.

FAQ: What about a private industrial site, no public access allowed, but no agriculture? *Public exposure refers to people, whether or not the site is public or private. While the public is typically not allowed onto a private industrial site, the workers at the industrial site would be expected to be around, and potentially exposed. Such a site would be considered “land with a high potential for public exposure”.*

- (40) “Liming material” has the same meaning as in division (A) of section 905.51 of the Revised Code.

- (41) “Medical care facility” means “home” as defined in section 3721.01 of the Revised Code, “hospital” as defined in section 3727.01 of the Revised Code, “adult care facility” as defined in section 3722.01 of the Revised Code, “nursing facility” as defined in section 5111.20 of the Revised Code and similar facilities.

- (42) “NPDES” means the federally approved national pollutant discharge elimination system pursuant to section 402 of the “Federal Water Pollution Control Act” (commonly referred to as the “Clean Water Act”) and Chapter 6111. of the Revised Code and rules adopted thereunder.

- (43) “Nuisance odor” means an emission of any gas, vapor, aerosol or combination thereof from the management of sewage sludge, in whatever quantities, that causes, either alone or in reaction with other air contaminants: injurious effects to public health or the environment or unreasonable interference with the comfortable enjoyment of life or property.

- (44) “Occupied building” means a structure, permanent in nature, occupied or

capable of being occupied. "Occupied building" does not include "medical care facility".

- (45) "Other container" means an open or closed receptacle. This includes, but is not limited to, a bucket, box and carton and a vehicle or trailer with a load capacity of one metric ton or less.
- (46) "Pasture" means land on which animals feed directly on vegetation such as legumes, grasses, grain stubble or stover.
- (47) "Pathogen" means disease-causing organisms. These include, but are not limited to, certain bacteria, protozoa, viruses, and viable helminth ova.
- (48) "pH" means the logarithm of the reciprocal of the hydrogen ion concentration measured at twenty-five degrees Celsius or measured at another temperature and then converted to an equivalent value at twenty-five degrees Celsius.
- (49) "Phosphorus index" means an assessment technique for determining the relative risk of phosphorus movement from various landforms to waters of the state. Factors assessed include, but are not limited to, proximity to waters of the state, slope, soil and weather conditions, soil type, buffer strips, soil surface condition, surface and sub-surface drainage, and application method.
- (50) "Pollutant" means an organic substance, an inorganic substance, a combination of organic and inorganic substances, or a pathogenic organism that, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism either directly from the environment or indirectly by ingestion through the food chain, could, on the basis of information available to the administrator of the United States environmental protection agency, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunction in reproduction), or physical deformations in either organisms or offspring of the organisms.
- (51) "Regional storage of sewage sludge" means an area of land or constructed facility engineered for the storage of sewage sludge destined for land application on more than one site.
- (52) "Representative sample" means a sample of a universe or whole which can be expected to exhibit the average properties of the universe or whole.
- (53) "Runoff" means rainwater, leachate or other liquid that drains overland on any part of a land surface and runs off of the land surface.

- (54) "Same day incorporation" means incorporation of sewage sludge within twenty-four hours after surface application.
- (55) "Sewage" means any liquid waste containing sludge, sludge materials, or animal or vegetable matter in suspension or solution, and may include household wastes as commonly discharged from residences and wastes discharged from commercial, institutional, or similar facilities.
- (56) "Sewage sludge" means a solid, semi-solid, or liquid residue generated during the treatment of sewage in a treatment works. "Sewage sludge" includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes. "Sewage sludge" does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator, grit and screenings generated during preliminary treatment of domestic sewage in a treatment works, animal manure, residue generated during treatment of animal manure, or domestic septage.
- (57) "Sewage sludge facility" means an entity that performs treatment on or is responsible for the disposal of sewage sludge.
- (58) "Sinkhole" means a surface depression produced when underlying material, such as carbonate bedrock, dissolves resulting in a direct conduit to groundwater.
- (59) "Sludge" means sewage sludge and a solid, semi-solid, or liquid residue that is generated from an industrial wastewater treatment process and that is applied to land for agronomic benefit. "Sludge" does not include ash generated during the firing of sludge in a sludge incinerator, grit and screening generated during preliminary treatment of sewage in a treatment works, animal manure, residue generated during treatment of animal manure, or domestic septage.
- (60) "Sludge management" means the use, storage, treatment, or disposal of, and management practices related to, sludge and sludge materials.
- (61) "Sludge management permit" means a permit for sludge management that is issued under division (J) of section 6111.03 of the Revised Code.
- (62) "Sludge materials" means solid, semi-solid, or liquid materials derived from sludge, or mixed with sludge, and includes products from a treatment works that result from the treatment, blending, or composting of sludge.

- (63) "Soil phosphorus test" means a soil test procedure using the "Bray-Kurtz P1 extraction" or the "Mehlich 3 extraction" that produces an index of plant available phosphorus expressed in either parts per million or pounds per acre.
- (64) "Specific oxygen uptake rate (SOUR)" means the mass of oxygen consumed per unit time per unit mass of total solids (dry weight basis) in the sewage sludge or sewage sludge material.
- (65) "Staging area" means field placement of sewage sludge at the time of delivery in such a manner as to facilitate land application within twenty-four hours. Staging includes the transfer of liquid sewage sludge from transport vehicles to land application equipment for injection.
- (66) "Standard of fineness" has the same meaning as in section 905.54 of the Revised Code.

FAQ: Do I have to report the effective neutralizing power, fineness index, and standard of fineness? *The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on effective neutralizing power, fineness index and standard of fineness. Such a material should be characterized by its Total Neutralizing Power as weight per cent of calcium carbonate, however, since Ohio EPA did not include that as a monitoring requirement in rule, it will not be a monitoring requirement.*

- (67) "Stockpile area" means an area where sewage sludge may be stored for greater than twenty-four hours but not to exceed thirty days.
- (68) "Storage of sewage sludge" means the placement of sludge on land on which the sludge remains for not longer than two years, but does not include the placement of sludge on land for treatment.
- (69) "Surface application" and "surface apply" mean the placement of sewage sludge on the land for agronomic benefit. "Surface application" includes immediate incorporation and same day incorporation.
- (70) "Surface disposal" means the placement of sludge on an area of land for disposal including, but not limited to, monofills, surface impoundments, lagoons, waste piles, or dedicated disposal sites.

- (71) "Total solids" means the materials in sewage sludge or sewage sludge material that remain as residue when the sewage sludge or sewage sludge material is dried at one hundred three to one hundred five degrees Celsius.
- (72) "Treatment" means the preparation of sewage sludge for final use or disposal and includes, but is not limited to, thickening, stabilization, and dewatering of sewage sludge.
- (73) "Treatment works" means any plant, disposal field, lagoon, dam, pumping station, building sewer connected directly to treatment works, incinerator, or other works used for the purpose of treating, stabilizing, blending, composting, or holding sewage, sludge, sludge materials, industrial waste, or other wastes, except as otherwise defined.
- (74) "Underground injection control (UIC) class V drainage well" means a drainage well used to drain surface fluid, primarily storm runoff, into a subsurface formation which may include, but is not limited to, an agricultural or stormwater drainage well and an identified unsealed gas/oil well.
- (75) "Unstabilized solids" means organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.
- (76) "Use" means, but is not limited to, the land application of sewage sludge for agronomic benefit.
- (77) "Vector attraction" means the characteristic of sewage sludge that attracts rodents, flies, mosquitos, or other organisms capable of transporting infectious agents.
- (78) "Vegetation" means, but is not restricted to, pasture, range land, or forest.
- (79) "Volatile solids" means the amount of the total solids in sewage sludge lost when the sewage sludge is combusted at five hundred fifty degrees Celsius in the presence of excess air.
- (80) "Waters of the state" means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and other bodies or accumulations of water, surface and underground, natural or artificial, regardless of the depth of the strata in which underground water is located, that are situated wholly or partly within, or border upon, this state, or are within its jurisdiction, except those private waters that do not combine or effect a junction with natural surface or underground waters.

Ohio Administrative Code 3745-40-02; Purpose, Applicability and Exclusions

- (A) The purpose of this chapter is to establish standards applicable to the disposal, use, storage, or treatment of sewage sludge, which standards are intended to reasonably protect public health and the environment, encourage the beneficial reuse of sewage sludge, and minimize the creation of nuisance odors. Said standards shall be consistent with section 405 of the federal "Water Pollution Control Act" and regulations adopted under it.
- (B) This chapter is applicable to any person engaged in the disposal, use, storage, or treatment of sewage sludge in the state of Ohio.
- (C) A permittee may be exempted from certain requirements applicable to the land application of sewage sludge when such land application is performed for research, demonstration, or educational purposes and the permittee has received a letter of authorization from the division. Said letter of authorization shall specify with certainty the land application requirements to which the exemption applies.
- (D) As used in this chapter the term "sewage sludge" shall include "sewage sludge materials."
- (E) This chapter does not establish requirements for the ash generated during the incineration of sewage sludge.
- (F) This chapter does not establish requirements for the disposal, use, storage, or treatment of sewage sludge determined to be hazardous waste as defined in section 3734.01 of the Revised Code.
- (G) This chapter does not establish requirements for the disposal, use, storage, or treatment of sewage sludge with a concentration of polychlorinated biphenyls equal to or greater than fifty milligrams per kilogram of total solids on a dry weight basis.
- (H) This chapter does not establish requirements for the use or disposal of grit (sand, gravel, cinders, or other materials with a high specific gravity) or screenings (relatively large materials such as rags) generated during treatment of sewage in a treatment works.
- (I) This chapter does not establish requirements for the disposal, use, storage, or treatment of domestic septage and grease trap waste.
- (J) This chapter does not establish requirements for the disposal, use, storage, or treatment of final effluent.
- (K) This chapter does not establish requirements for the disposal, use, storage, or

treatment of sludge generated at an industrial facility during treatment of industrial wastewater with or without such sewage as is present.

- (L) This chapter does not establish requirements for the disposal, use, storage, or treatment of sludge generated during the treatment of drinking water.

FAQ: Does Chapter 3745-40 of the Ohio Administrative Code apply to sludges other than sewage sludge that are not already explicitly excluded above? No, Chapter 3745-40 of the Ohio Administrative Code was written with the intent to exclude all other sludges. Paragraph 3745-40-02(K) should achieve that goal. Chapter 3745-40 of the Ohio Administrative Code does not exclude generators of other sludges from their responsibility to meet all other applicable laws and rules.

Ohio Administrative Code 3745-40-03; Permits, Plans and Authorizations

- (A) As used in this chapter, permittee shall mean the holder of a valid Ohio NPDES permit or the holder of an approved sewage sludge management plan.
- (B) Except as provided in paragraph (D) of this rule, no person shall engage in the disposal, use, storage, or treatment of sewage sludge for which requirements are established in this chapter, except pursuant to a valid Ohio NPDES permit or under an approved sewage sludge management plan, and such permit or plan identifies and regulates the specific disposal, use, storage, or treatment of that sewage sludge.
- (C) A permittee is responsible that any disposal, use, storage, or treatment of sewage sludge is in compliance with this chapter and the conditions of its Ohio NPDES permit or sewage sludge management plan.
- (D) A permittee of an approved sewage sludge management plan for the land application of sewage sludge issued by the director under paragraph (B) of rule 3745-31-02 of the Administrative Code, shall either:
 - (1) Cease operations; or
 - (2) Continue operations under the sewage sludge management plan until such time as an Ohio NPDES permit is issued or, if said permittee possesses an Ohio NPDES permit, said permit is modified or renewed and such issuance, modification, or renewal identifies and regulates the specific disposal, use, storage, or treatment of sewage sludge.
- (E) Ohio NPDES permits shall contain terms and conditions which are consistent with this chapter.
- (F) The director may specify in Ohio NPDES permits the net volume, net weight, quality, and pollutant concentration of the sewage sludge, and the manner and frequency of the disposal, use, storage, or treatment of the sewage sludge, to protect public health and the environment from adverse effects relating to those activities. The director shall impose other permit conditions to protect public health and the environment, minimize the creation of nuisance odors, and achieve compliance with this chapter and in doing so shall consider whether the permit conditions are consistent with the goal of encouraging the beneficial reuse of sewage sludge.
- (G) The director may condition permits on the implementation of disposal, use, storage, treatment, distribution, or land application agronomic management methods and the filing of periodic reports on the amounts, composition, and quality of sewage sludge.

- (H) The director may specify in Ohio NPDES permits or impose in orders, any terms and conditions, including schedules of compliance, necessary to achieve compliance with this chapter.
- (I) The director may specify in Ohio NPDES permits or impose in orders, any terms and conditions which are more stringent than the requirements in this chapter when the director has determined that such are necessary to protect public health and the environment.
- (J) Upon written request from a permittee, which request shall contain supporting documentation, the director may, by order, grant a variance from any requirement of this chapter or impose a less stringent requirement than that imposed by this chapter, provided that such variance or less stringent requirement shall, in the determination of the director, not adversely affect the public health or the environment and such variance or less stringent requirement shall not be less stringent than a similar requirement in 40 C.F.R. 503, as amended.
- (K) Prior to the land application of bulk sewage sludge, permittees shall obtain from the division a specific site authorization for the site to which the land application of bulk sewage sludge is to occur. This requirement for specific site authorization does not apply to the land application of exceptional quality sewage sludge. Applications for specific site authorizations shall be on forms prepared by the division.
- (L) A specific site authorization is valid only for the conditions stated in the authorization, including the source or generator of the bulk sewage sludge, land application practices, and acreage authorized. If a change in source or generator of the bulk sewage sludge, land application practices, or acreage is proposed, the requested change shall be submitted to, and approval obtained from, the division before a permittee shall initiate such change.

FAQ: Under whose signature will the Division approve or deny a site authorization application? *Approval or denial of a site authorization application will be under the signature of the District Chief where the site is located. Use the [Sludge Site Authorization Packet for Non-EQ Sewage Sludge](#), contained in this manual, when making an application for site authorization.*

Ohio Administrative Code 3745-40-04; Land Application Agronomic Management

- (A) For exceptional quality sewage sludge sold or given away in a bag or other container, or distributed in bulk, for land application, a label shall be affixed to such bag or other container or an information sheet shall be provided to the person who receives such sewage sludge. The label or information sheet shall contain at least the following information:
- (1) The name, address, telephone number, and Ohio NPDES permit number of the permittee;
 - (2) A statement that the material is or contains a by-product of wastewater treatment;
 - (3) A statement that the Ohio EPA, division of surface water, may be contacted at 1-800-644-2001 (*Note: the correct telephone number is 1-877-644-2001*);
 - (4) The concentration of total Kjeldahl nitrogen, ammonia nitrogen, total phosphorus, and total potassium of the sewage sludge in milligrams per kilogram (dry weight basis);
 - (5) The concentration of total Kjeldahl nitrogen, available phosphorus, and soluble potassium of the sewage sludge as a “grade”; and
 - (6) When applicable for a liming material, the effective neutralizing power, fineness index, and standard of fineness of the sewage sludge.

FAQ: Do I have to report available phosphorus (phosphate) and soluble potassium (potash) as a grade? *The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on available phosphorus and soluble potassium in sewage sludge.*

FAQ: When should I report as a liming material? *A sewage sludge or sewage sludge material should be reported as a liming material, as a courtesy to the recipient of the material, if the agronomic rate is limited by the lime content of the material.*

FAQ: Do I have to report the effective neutralizing power, fineness index, and standard of fineness? *The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on*

effective neutralizing power, fineness index and standard of fineness. Such a material should be characterized by its Total Neutralizing Power as weight per cent of calcium carbonate, however, since Ohio EPA did not include that as a monitoring requirement in rule, it will not be a monitoring requirement.

- (B) Except as provided below, exceptional quality sewage sludge shall be exempt from paragraphs (D) to (R) of this rule.
- (C) The director may apply any or all of the requirements in paragraphs (D) to (R) of this rule to exceptional quality sewage sludge on a case-by-case basis after determining that the requirements are needed to protect public health and the environment.

FAQ: What is exceptional quality sewage sludge? *Exceptional quality sewage sludge was not defined in 40 CFR 503, but is described in Section 503.10 of the federal regulations. Those requirements are defined in paragraph 3745-40-01(A)(2) of the Ohio Administrative Code. Once those requirements are met, exceptional quality sewage sludge is considered a product whose use is virtually unregulated.*

FAQ: Why is exceptional quality sewage sludge exempted from many of the management requirements of sewage sludge that does not meet the criteria of exceptional quality? *The exemption for exceptional quality sewage sludge is written into Ohio's sewage sludge rules for two primary reasons. First, exceptional quality sewage sludge is encouraged because it meets the strictest requirements for pathogen reduction, vector attraction reduction and pollutant loadings. That allows exceptional quality sewage sludge to enter the marketplace with no restrictions on who may acquire, buy, use, or redistribute the material. As an aside, to attempt to track the land application of such a material would be virtually impossible. Second, exceptional quality sewage sludge is generally more expensive to produce than sewage sludge that does not meet the definition of exceptional quality. To support permittees making the extra investment to generate an exceptional quality sewage sludge, Ohio's new sewage sludge rules exempt exceptional quality sewage sludge from many agronomic management practices. In Ohio, this cost reduction is accompanied by a 35% reduction in Annual Sludge Fees for exceptional quality sewage sludge. The federal 503 regulations also exempt sewage sludge that meets exceptional quality criteria from many agronomic management practices.*

- (D) Bulk sewage sludge shall be land applied at a rate that is equal to or less than the agronomic rate except as provided for in rule 3745-40-07 of the Administrative Code.

FAQ: What is the agronomic rate for the land application of sewage sludge? *Agronomic rate is defined as the dry weight sewage sludge application rate that will provide a given crop the appropriate nitrogen for the reasonably expected yield. A source for appropriate nitrogen fertilizer rates for reasonably expected yields is Michigan State*

FAQ: How should sewage sludge plant available nitrogen be estimated? The Ohio EPA provides a Nitrogen Agronomic Rate Worksheet as part of the Sludge Site Authorization Packet for Non-EQ Sewage Sludge that is included in the appendices of this manual. A superior resource would be a recent publication from the Water Environment Research Foundation entitled Estimating Plant-Available Nitrogen in Biosolids. There is an extensive appendix to this research publication entitled "Calculating Biosolids Application Rates for Agriculture". The application rate calculation is based on the plant available nitrogen of the sewage sludge, site characteristics, and crop requirements. Because site characteristics are included, it is appropriate for use across the state. Ohio EPA recommends all land application programs obtain a copy of this publication. Please see the Other Guidance Documents section of the Appendices for information on obtaining a copy.

- (E) A permittee who generates bulk sewage sludge shall provide a label or information sheet to the following persons: all persons who receive bulk sewage sludge from the permittee; all persons who land apply bulk sewage sludge received from the permittee; and the owner or lease holder of the land upon which the bulk sewage sludge is land applied. Such label or information sheet shall provide all notices and information necessary to comply with the requirements of this chapter including the following:
- (1) The name, address, telephone number, and Ohio NPDES permit number of the permittee;
 - (2) A statement that the material is or contains a by-product of wastewater treatment;
 - (3) A statement that the Ohio EPA, Division of Surface Water, may be contacted at 1-800-644-2001 (*Note: the correct telephone number is 1-877-644-2001*);
 - (4) The concentration of total Kjeldahl nitrogen, ammonia nitrogen, total phosphorus, and total potassium of the sewage sludge in milligrams per kilogram (dry weight basis);
 - (5) The concentration of total Kjeldahl nitrogen, available phosphorus, and soluble potassium of the sewage sludge as a "grade"; and
 - (6) When applicable for a liming material, the effective neutralizing power, fineness index, and standard of fineness of the sewage sludge.

FAQ: Do I have to report available phosphorus (phosphate) and soluble potassium (potash) as a grade? *The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on available phosphorus and soluble potassium in sewage sludge.*

FAQ: When should I report as a liming material? *A sewage sludge or sewage sludge material should be reported as a liming material, as a courtesy to the recipient, if the agronomic rate is limited by the lime content of the material.*

FAQ: Do I have to report the effective neutralizing power, fineness index, and standard of fineness? *The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on effective neutralizing power, fineness index and standard of fineness. Such a material should be characterized by its Total Neutralizing Power as weight per cent of calcium carbonate, however, since Ohio EPA did not include that as a monitoring requirement in rule, it will not be a monitoring requirement.*

- (F) For soils with soil phosphorus test results greater than one hundred fifty parts per million (three hundred pounds per acre) Bray-Kurtz P1 extraction or one hundred seventy parts per million (three hundred forty pounds per acre) Mehlich 3 extraction, land application of bulk sewage sludge shall either:
- (1) Cease until such time that soil phosphorus test results are less than or equal to one hundred fifty parts per million (three hundred pounds per acre) Bray-Kurtz P1 extraction or one hundred seventy parts per million (three hundred forty pounds per acre) Mehlich 3 extraction; or
 - (2) Continue when it has been demonstrated to the division, using a phosphorus index, that a low relative risk of phosphorus movement to waters of the state exists at the authorized site.

FAQ: Is land application of sewage sludge prohibited at a field when a soil phosphorus level of 150 ppm Bray-Kurtz P1 has been reached? *No, but a result above 150 ppm Bray-Kurtz P1 soil phosphorus would trigger one of two actions. A generator could decide to not use that field again until the soil phosphorus level has dropped below 150 ppm Bray-Kurtz P1. The other option would be to manage the field using the United States Department of Agriculture, Natural Resources Conservation Service Phosphorus Index. The following summarizes the field vulnerability to phosphorus runoff, or leaching, specified in the PI and at what rate land application of sewage sludge may continue:*

Phosphorus Index <15 - no restrictions on agronomic rate.

Phosphorus Index 15 to 30 - no restrictions on agronomic rate, best management practices encouraged, application at the phosphorus crop removal rate should be considered.

Phosphorus Index 31 to 45 - land application of sewage sludge restricted to the phosphorus removal application rate.

Phosphorus Index >45 - No land application of sewage sludge allowed.

Please see the Appendices for the United States Department of Agriculture, Natural Resources Conservation Service Phosphorus Index developed for use in Ohio.

FAQ: What is the recommended protocol for collecting soil samples from a field?

Soil samples can be collected at any time, however, it is recommended to obtain the soil sample prior to spring planting. A soil probe, auger, spade, or garden trowel can be used to sample soil. A plastic bucket should be used to collect soil grab samples. Each composite sampling should represent 15 to 20 acres of uniform area (uniform in soil series, slope, drainage, erosion, and fertilizer application (including sewage sludge)) and less than 5 acres of rolling land. Generally, any area that is large enough to spread separately should be sampled separately. Grab samples should be taken 75 to 100 feet apart with a minimum of 15 grab samples in a composite sample. Low spots or other unusual areas (sludge stockpiling area, lime, and fertilizer spills) should be omitted or sampled separately. Grab samples should be taken to plow depth (about 8 inches). For row crops, samples should be taken between rows. For establishing grass pasture crops, samples should be collected to the rooting zone (3 to 4 inches). All grab samples should be broken up and mixed thoroughly before a composite sample is taken.

- (G) Land application of liquid bulk sewage sludge shall be at the agronomic rate for the reasonably expected yield or the available water capacity of the soil, whichever is less at the time of land application.

FAQ: How do I determine the available water capacity of the soil? *A table of available water capacity information has been included in the Appendices of this manual. The final determination is made in the field at the time of land application and is based on readily identifiable soil qualities.*

FAQ: Can multiple passes be used on successive days to maximize liquid sewage sludge land application without exceeding the available water capacity of the soil?

Theoretically yes, but there are soil compaction issues that apply. Ohio EPA does not recommend more than two passes of liquid sewage sludge application per crop year.

- (H) The permittee shall post signs at sites where class B bulk sewage sludge is land

applied. The signs shall read "NOTICE: CLASS B SEWAGE SLUDGE HAS BEEN APPLIED TO THIS SITE." Such signs shall include the name of the permittee and the permittee's telephone number. Such sign(s) shall be posted within twenty-five feet of an obvious access point(s) and shall be unobstructed from view. Any authorized site with road frontage shall have at least one sign facing the road, within twenty-five feet of the road when possible, and shall be unobstructed from view. The text shall be in black capital letters on a white background and the letters shall be one inch in height. At sites with a low potential for public exposure, such signs shall be in place from the time land application begins to a minimum of thirty days after the termination of land application activity at the site. At sites with a high potential for public exposure such signs shall be in place from the time land application begins to a minimum of one year after the termination of land application activity at the site.

FAQ: Why are signs required at sites where Class B sewage Sludge has been land applied? *Signage at Class B sewage sludge land application sites is a requirement of Section 6111.039 of the Ohio Revised Code. Signage at agricultural sites that have been treated with agricultural chemicals is a common practice.*

- (I) No person shall land apply bulk sewage sludge if such application is likely to adversely affect a threatened or endangered species listed under section 4 of the "Endangered Species Act" or its designated critical habitat.
- (J) No person shall land apply bulk sewage sludge to food crop, feed crop, fiber crop, or cover crop land over fifteen per cent slope or to pasture or vegetation over twenty per cent slope unless one of the following activities is performed:
 - (1) Same day incorporation or subsurface injection with operations done on the contour; or
 - (2) The field is established and managed in contour strips with alternate strips in cover crop, pasture, or vegetation.
- (K) No person shall land apply bulk sewage sludge to land that is frozen or snow-covered so that the bulk sewage sludge enters waters of the state except as provided in a permit issued pursuant to Chapter 6111. of the Revised Code. The following criteria shall be met for surface application of bulk sewage sludge on frozen or snow-covered ground:
 - (1) An isolation distance of one hundred feet shall be maintained from waters of the state (excluding groundwater); and
 - (2) The following ground cover shall be maintained.

- (a) Where slope is less than or equal to six per cent, the soil surface at the time of surface application shall have at least eighty per cent ground cover; or
- (b) Where slope is greater than six per cent, the soil surface at the time of surface application shall have at least ninety per cent ground cover or shall be established and managed in contour strips with at least eighty per cent ground cover on the strips receiving sewage sludge land.

FAQ: What exactly is per cent ground cover? *Per cent ground cover means that the soil of the field has a certain amount of cover over all of the field. Cover is crop residue and/or a cover crop such as winter wheat. It does not mean that, for example, eighty per cent of the field has cover, and twenty per cent of the field is bare soil.*

FAQ: What does “enters waters of the state mean”? *This means upon visual inspection. If a visual inspection indicates sewage sludge is entering waters of the state, a follow-up sampling will be done if possible, to determine conclusively if a violation has occurred.*

- (L) No person shall land apply bulk sewage sludge to land that is flooded so that the bulk sewage sludge enters waters of the state except as provided in a permit issued under Chapter 6111. of the Revised Code. Surface application of bulk sewage sludge shall be limited to same day incorporation on areas of authorized sites that are frequently flooded during periods when flooding is expected.

FAQ: Where can I find information on frequently flooded ground? *This information can be found in county soil surveys printed by the United States Department of Agriculture, Natural Resources Conservation Service. Look in the table entitled “Soil and Water Features”.*

FAQ: What does “enters waters of the state mean”? *This means upon visual inspection. If a visual inspection indicates sewage sludge is entering waters of the state, a follow-up sampling will be done if possible, to determine conclusively if a violation has occurred.*

- (M) No person shall land apply bulk sewage sludge in a grassed waterway.
- (N) No person shall land apply bulk sewage sludge within the following isolation distances:

	Surface application	Injected
Waters of the state (excluding groundwater)	33 feet	
Occupied building	300 feet	100 feet
Medical care facility	1000 feet	300 feet
Private potable water source	300 feet	100 feet
Bedrock	3 feet	
Sinkhole or UIC class V drainage well	300 feet without a grass buffer, 100 feet with a grass buffer	

FAQ: What is a “private potable water source”? Private potable water sources include all residential wells regulated by the Ohio Department of Health and all non-community public water system wells regulated by Ohio EPA. Additional local prohibitions may be in effect around non-community public water system wells.

FAQ: Is a roadside ditch, especially one that is dry for part of the year, considered waters of the state? Yes, the definition of waters of the state includes drainage systems that “effect a junction with natural surface or underground waters”.

- (O) No person shall land apply bulk sewage sludge within a ground water source water assessment and protection area or wellhead protection area that has been delineated or endorsed by the Director for a community public water system. The isolation distance from a community public water system well, where no delineated or endorsed ground water source water assessment and protection area or wellhead protection area exists, shall be one thousand feet.

FAQ: Where are ground water source water assessment and protection areas located in Ohio? The Ohio EPA, Division of Drinking and Groundwater, is currently digitizing these areas in a Geographic Information System (GIS). The information may be available to the public in the future, if security issues allow. The Division of Surface Water has a goal of digitizing authorized land application sites in Ohio. That GIS information will be available to the public. By overlaying the two GIS layers, areas of overlap will be easily identified. In the interim, the Division of Surface Water will coordinate with the Division of Drinking and Groundwater to review new Sludge Site Authorization application submittals to determine if the proposed sites are affected by the above paragraph. Existing authorized sites may be inventoried at NPDES permit renewal, and the Division of Drinking and

Groundwater may work through stakeholders, to identify any current authorized sites affected by the above paragraph. This will be an ongoing process.

- (P) No person shall locate a bulk sewage sludge staging area, stockpile area, field storage of sewage sludge area, or regional storage of sewage sludge facility within the following isolation distances:

Waters of the state (excluding groundwater)	100 feet
Occupied building	300 feet
Private potable water source	300 feet
Bedrock	3 feet
Sinkhole or UIC class V drainage well	300 feet
Medical care facility	1000 feet

FAQ: What is a “private potable water source”? *Private potable water sources include all residential wells regulated by the Ohio Department of Health and all non-community public water system wells regulated by Ohio EPA. Additional local prohibitions may be in effect around non-community public water system wells.*

FAQ: Is a roadside ditch, especially one that is dry for part of the year, considered waters of the state? *Yes, the definition of waters of the state includes drainage systems that “effect a junction with natural surface or underground waters”.*

- (Q) No person shall locate a staging area, stockpile area, field storage of sewage sludge area, or regional storage of sewage sludge facility within a ground water source water assessment and protection area or wellhead protection area that has been endorsed or delineated by the director for a community public water system. The isolation distance from a community public water system well, where no delineated or endorsed ground water source water assessment and protection area or wellhead protection area exists, shall be one thousand feet.
- (R) No person shall locate a staging area, stockpile area, or field storage of sewage sludge area in low-lying wet areas or on soils that are frequently flooded. Runoff shall be diverted around a stockpile area or field storage of sewage sludge area using straw bales or other appropriate means of control. Soil conditions, slope, and ground cover shall be reviewed to assure proper drainage. The maximum amount of material to be delivered in one crop year to a staging area, stockpile area, or field

storage of sewage sludge area is the agronomic rate of bulk sewage sludge for the authorized site and any contiguous sites. No person shall locate a field storage of sewage sludge area without previous authorization from the division. The division may decrease the maximum time sewage sludge may remain at a stockpile area or field storage of sewage sludge area or prohibit the use of a stockpile area or field storage of sewage sludge area at a land application site to protect public health or the environment and to minimize the creation of nuisance odors.

FAQ: How long may a stockpile remain in a field? *Time limits for sludge or sludge material remaining at a staging area, in a stockpile or field storage area are found in the definitions of those terms in rule 3745-40-01 of the Ohio Administrative Code. If it appears sludge or sludge material cannot be land applied within the defined time limits due to circumstances beyond control such as weather or mechanical breakdown, the Division of Surface Water must be so informed.*

- (S) No person shall locate a regional storage of sewage sludge facility without previous authorization from the division. Sewage sludge shall not remain at a regional storage of sewage sludge facility for more than two years. A permit to install, as per Chapter 3745-31 of the Administrative Code, shall be required for the construction of a regional storage of sewage sludge facility. An Ohio NPDES permit shall be obtained by the operator of a regional storage of sewage sludge facility prior to any treatment of sewage sludge at the regional storage of sewage sludge facility.
- (T) Facility storage of sewage sludge shall be provided by the permittee such that there shall be no adverse effects from sewage sludge handling at the permittee's treatment works. Facility storage of sewage sludge shall consist of one hundred twenty days sewage sludge storage for the design capacity of the treatment works. Facility storage of sewage sludge may consist of any combination of additional volume in sludge stabilization units (digesters), separate tanks, sewage sludge treatment lagoons, drying beds, dewatered sewage sludge storage pad areas, or other means to store either liquid or dewatered sewage sludge. In lieu of some of the one hundred twenty day facility storage of sewage sludge requirement, a permittee may demonstrate to the director that they have engineered or contracted alternatives to facility storage of sewage sludge in place. Alternatives to facility storage of sewage sludge include, but are not limited to, the following:
 - (1) Contracts in effect with a sanitary landfill and sufficient transportation to dispose of sewage sludge that cannot be otherwise managed through facility storage of sewage sludge or other means of use or disposal;
 - (2) Contracts in effect with another permitted facility and sufficient transportation to transfer sewage sludge that cannot be otherwise managed through facility storage of sewage sludge or other means of use or disposal; or

- (3) Ownership or leasing of, or contracts in effect with, a regional storage of sewage sludge facility and sufficient transportation to transfer sewage sludge that cannot be otherwise managed through facility storage of sewage sludge or other means of use or disposal.
- (U) If the land application of sewage sludge results in a nuisance odor, as determined by the division, the permittee shall be required by the division to minimize the creation of such nuisance odors.
- (1) Until the creation of such nuisance odors has been minimized, as determined by the division, there shall be no further delivery of sewage sludge to the land application site.
 - (2) The director may deauthorize a land application site for repeated nuisance odors determined by the division, violations of Chapter 3745-40 of the Administrative Code, or violations of other applicable laws or rules. Any deauthorization shall be in accordance with Chapter 3745-47 of the Administrative Code.

FAQ: Why regulate nuisance odors? *There are two reasons why Ohio EPA must regulate nuisance odors from sewage sludge. The first reason is because state law requires the Director of Ohio EPA to minimize the creation of nuisance odors from sewage sludge. Second, it is important from a management perspective that sewage sludge land application programs prevent nuisance conditions. Assurances of the scientifically demonstrated safety of sewage sludge land application will not always alleviate a situation where an individual's lifestyle has been impinged upon by an odorous condition.*

FAQ: Who will make the determination whether a particular odor is a nuisance odor? *That determination will be made by staff of the Ohio EPA, Division of Surface Water. If odors are not detected in nuisance proportions when staff from the Ohio EPA conduct a complaint investigation there will be no action taken. Since there are no scientific instruments that can quantify sewage sludge nuisance odors, and panels of expert "noses" are not practical, there will always be some subjectivity to any nuisance determination. Ohio EPA will be fair and just in its determinations.*

Ohio Administrative Code 3745-40-05; Land Application Restrictions

- (A) No person shall land apply sewage sludge if the concentration of any pollutant in the sewage sludge exceeds the ceiling concentration for that pollutant established in paragraph (F) of this rule.
- (B) No person shall land apply to an authorized site sewage sludge subject to the cumulative pollutant loading rates established in paragraph (F) of this rule if any of the cumulative pollutant loading rates have been reached at the authorized site.
- (C) No person shall land apply sewage sludge to a lawn or a home garden if the sewage sludge is not exceptional quality as defined in rule 3745-40-01 of the Administrative Code.
- (D) No person shall land apply sewage sludge sold or given away in a bag or other container if the sewage sludge is not exceptional quality as defined in rule 3745-40-01 of the Administrative Code.
- (E) Minimum soil pH for land application of bulk sewage sludge shall be 5.5 S.U. If the soil pH at an authorized site is less than 5.5 S.U., sufficient liming material shall be added such that the bulk sewage sludge/soil mixture pH is calculated to reach 5.5 S.U. or greater.

FAQ: Can sewage sludge with a coarse slow reacting lime be applied if it will take several months for the pH of the soil to be affected by the slow reacting lime? Yes. As long as a qualified individual has calculated that the coarse slow reacting lime added with the sewage sludge is adequate to get the required pH adjustment of the soil/sludge mixture, it is permissible to land apply such a liming material with the sewage sludge.

(F) The pollutant ceiling concentrations, cumulative pollutant loading rates, and pollutant monthly average concentrations for sewage sludge shall not exceed the following:

(1) Pollutant ceiling concentrations.

Pollutant	Ceiling concentration (milligrams per kilogram dry weight basis)
Arsenic	75
Cadmium	85
Copper	4,300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7,500

(2) Cumulative pollutant loading rates.

Pollutant	Cumulative pollutant loading rate (pounds per acre)
Arsenic	36.6
Cadmium	34.8
Copper	1,339.9
Lead	267.9
Mercury	15.2
Nickel	375.1
Selenium	89.3
Zinc	2,500.4

(3) Pollutant monthly average concentrations.

Pollutant	Monthly average concentration (milligrams per kilogram dry weight basis)
Arsenic	41
Cadmium	39
Copper	1,500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2,800

FAQ: What does the data show for metals in land applied sewage sludge generated in Ohio? Metals data for the time period from January 1, 1998, to May 31, 2001 was reviewed and is summarized below. As can be seen, a considerable number of samples were summarized for each metal, and the per cent in compliance is very high.

<i>Metal</i>	<i>Number of samples</i>	<i>% at or below Table 3 limit</i>	<i>% at or below Table 1 limit</i>
<i>Arsenic</i>	<i>6,800</i>	<i>97.91</i>	<i>99.65</i>
<i>Cadmium</i>	<i>7,963</i>	<i>98.27</i>	<i>99.54</i>
<i>Copper</i>	<i>8,007</i>	<i>98.35</i>	<i>99.55</i>
<i>Lead</i>	<i>7,932</i>	<i>97.67</i>	<i>99.81</i>
<i>Mercury</i>	<i>8,007</i>	<i>98.79</i>	<i>99.68</i>
<i>Molybdenum</i>	<i>6,675</i>	<i>NA</i>	<i>99.52</i>
<i>Nickel</i>	<i>8,024</i>	<i>99.71</i>	<i>99.71</i>
<i>Selenium</i>	<i>6,629</i>	<i>99.67</i>	<i>99.67</i>
<i>Zinc</i>	<i>7,979</i>	<i>98.21</i>	<i>99.67</i>

- (G) Before bulk sewage sludge subject to the cumulative pollutant loading rates in paragraph (F) of this rule is land applied to an authorized site in Ohio, the person who proposes to apply the bulk sewage sludge shall contact the Division to determine whether bulk sewage sludge subject to the cumulative pollutant loading rates in paragraph (F) of this rule has been land applied to the authorized site since July 20, 1993.

FAQ: What does this mean? *If monitoring results show at least one metal above the Table 3 limits of this rule, but below the Table 1 limits of this rule, the sewage sludge is a CPLR sludge, and a running total of the metals loadings to the authorized site(s) the sludge is applied to must be maintained in perpetuity. If the authorized site(s) were used by some other sludge generator(s) in the past, the Division must be contacted prior to land application to determine if there is a CPLR already established for the authorized site(s).*

FAQ: The Division does not have delegation of the federal sewage sludge program. Does the Division have all the information to determine whether bulk sewage sludge subject to CPLR requirements has been land applied to a site since July 20, 1993? *The Division may not have all the information required to make such a determination prior to receiving delegation of the federal sludge program. USEPA Region 5 is the appropriate authority to contact until such time as Ohio EPA has delegation of the federal sewage sludge program. Contact:*

*Water Division
U.S. EPA, Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3590*

- (1) If land application of bulk sewage sludge subject to the cumulative pollutant loading rates has not occurred since July 20, 1993, the cumulative amount for each pollutant listed in paragraph (F) of this rule may be land applied to the authorized site in accordance with this chapter.

FAQ: What does this mean? *Approximately ninety-eight per cent of the sewage sludge land applied in Ohio does not exceed the Table 3 metals limits for any parameter, and thus is not a CPLR sewage sludge. Metals loadings do not have to be tracked for such sludge. If no CPLR sludge has been land applied to the site, the entire CPLR of Table 2 of this rule is available. The generator must begin to track the CPLR of the authorized site(s) upon which the CPLR sewage sludge is applied. All nine metals must be tracked, even though only one may have triggered the CPLR requirement. This running CPLR total must be kept in perpetuity and made available upon request to Ohio EPA or other generators of sewage sludge that are authorized to use the site(s).*

If exceedence of Table 3 limits by a generator is a regular occurrence, Ohio EPA may require continual CPLR tracking, even during those times when there is no exceedence of

Table 3 limits. If the exceedence of the Table 3 limits appears to have been an anomaly, there is no requirement to track when Table 3 limits are not exceeded.

- (2) If bulk sewage sludge subject to the cumulative pollutant loading rates has been land applied to the authorized site since July 20, 1993, and the cumulative amount of each pollutant applied to the authorized site since that date is known, the cumulative amount of each pollutant land applied to the authorized site shall be used to determine the additional amount of each pollutant that can be applied to the authorized site in accordance with this chapter.

FAQ: What does this mean? *The additional loadings of metals to the authorized site(s) must be added to the known CPLR for the authorized site(s). This running CPLR total must be kept in perpetuity and made available upon request to Ohio EPA or other generators of sewage sludge that are authorized to use the site(s).*

- (3) If bulk sewage sludge subject to the cumulative pollutant loading rates has been land applied to the authorized site since July 20, 1993, and the cumulative amount of each pollutant land applied to the authorized site since that date is not known, an additional amount of each pollutant shall not be land applied to the authorized site.

FAQ: What does this mean? *If it is on record that CPLR sewage sludge was applied to an authorized site(s), but the actual CPLR records have been lost, then the authorized site(s) are off-limits to further land application of CPLR sewage sludge. Sewage sludge that meets the Table 3 limits may be applied to such authorized site(s).*

FAQ: If bulk sewage sludge subject to the cumulative pollutant loading rates has been land applied at a site, but the cumulative amount of each pollutant is not known, can an analysis of the soil metals be submitted in lieu of a cumulative pollutant loading rate? *No, there are no provisions in 40 CFR 503 for the submittal of soil metals data in lieu of a CPLR, kept in perpetuity, for authorized sites where sewage sludge that exceeds Table 3, but does not exceed Table 1, has been applied.*

- (H) Any person who land applies bulk sewage sludge subject to the cumulative pollutant loading rates in paragraph (F) of this rule to an authorized site in Ohio shall provide written notice to the Division prior to initial application of bulk sewage sludge to the authorized site. The Division shall retain and provide access to the notice. The notice shall include the following:
 - (1) The location of the land application site by either street address or latitude and longitude; and

- (2) The name, address, telephone number and Ohio NPDES permit number of the generator of the bulk sewage sludge.
- (I) For a sewage sludge to be classified as class A with respect to pathogens, the sewage sludge shall meet one of the class A pathogen requirements established in paragraphs (N)(1) to (N)(6) of this rule.
- (J) The class A pathogen requirements in paragraphs (N)(1) to (N)(6) of this rule shall be met either prior to meeting or at the same time as meeting the vector attraction reduction requirements in paragraphs (Q)(1) to (Q)(5), (Q)(9), and (Q)(10) of this rule.
- (K) One of the class A pathogen requirements in paragraphs (N)(1) to (N)(6) of this rule or one of the class B pathogen requirements in paragraphs (O)(1) to (O)(3) of this rule and, when applicable, the site restrictions in paragraph (P) of this rule, shall be met when sewage sludge is applied to the land.
- (L) The site restrictions in paragraph (P) of this rule shall be met when sewage sludge that meets the class B pathogen requirements in paragraphs (O)(1) to (O)(3) of this rule is applied to the land.
- (M) One of the vector attraction reduction requirements in paragraphs (Q)(1) to (Q)(10) of this rule shall be met when sewage sludge is applied to the land.
- (N) Class A pathogen reduction alternatives. Either the density of fecal coliform in the sewage sludge shall be less than one thousand most probable number (MPN) per gram of total solids (dry weight basis) or the density of Salmonella sp. bacteria in the sewage sludge shall be less than three MPN per four grams of total solids (dry weight basis): at the time the sewage sludge is used or disposed; at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land; and at the time the sewage sludge is prepared to meet the requirements in paragraph (C) of rule 3745-40-04 of the Administrative Code. In addition, one of the following class A pathogen reduction alternatives shall be met.

FAQ: Why was an “and” substituted in place of “or” in the above paragraph? *The sentence “and at the time the sewage sludge is prepared to meet the requirements in paragraph (C) of rule 3745-40-04 of the Administrative Code” should read “or at the time the sewage sludge is prepared to meet the requirements in paragraph (C) of rule 3745-40-04 of the Administrative Code”. That clerical error will be corrected at the first available opportunity.*

Note: *References to the “White House Document” in the following paragraphs refer to “Control of Pathogens and Vector Attraction in Sewage Sludge” published by the USEPA.*

(1) Alternative one, time and temperature regime ([White House Document Page 28](#)). The temperature of the sewage sludge that is used or disposed shall be maintained at a specific value for a period of time.

(a) When the per cent solids of the sewage sludge is seven per cent or higher, the temperature of the sewage sludge shall be fifty degrees Celsius or higher, the time period shall be twenty minutes or longer and the temperature and time period shall be determined using equation number one, except when small particles of sewage sludge are heated by either warmed gases or an immiscible liquid. Equation number one is:

$$D = \frac{131,700,000}{10^{0.1400T}}$$

Where D = time in days.
T = temperature in degrees Celsius.

(b) When the per cent solids of the sewage sludge is seven per cent or higher and small particles of sewage sludge are heated by either warmed gases or an immiscible liquid, the temperature of the sewage sludge shall be fifty degrees Celsius or higher, the time period shall be fifteen seconds or longer and the temperature and time period shall be determined using equation number one.

(c) When the per cent solids of the sewage sludge is less than seven per cent and the time period is at least fifteen seconds, but less than thirty minutes, the temperature and time period shall be determined using equation number one.

(d) When the per cent solids of the sewage sludge is less than seven per cent, the temperature of the sewage sludge is fifty degrees Celsius or higher, and the time period is thirty minutes or longer, the temperature and time period shall be determined using equation number two. Equation number two is:

$$D = \frac{50,070,000}{10^{0.1400T}}$$

Where D = time in days and
T = temperature in degrees Celsius.

(2) Alternative two, high pH and high temperature process ([White House Document Page 30](#)). The pH of the sewage sludge that is used or disposed

shall be raised to above twelve and shall remain above twelve for seventy-two hours.

- (a) The temperature of the sewage sludge shall be above fifty-two degrees Celsius for twelve hours or longer during the period that the pH of the sewage sludge is above twelve.
 - (b) At the end of the seventy-two hour period during which the pH of the sewage sludge is above twelve, the sewage sludge shall be air dried to achieve a per cent solids in the sewage sludge greater than fifty per cent.
- (3) Alternative three, other processes ([White House Document Page 31](#)).
- (a) The sewage sludge shall be analyzed prior to pathogen treatment to determine whether the sewage sludge contains enteric viruses.
 - (b) When the density of enteric viruses in the sewage sludge prior to pathogen treatment is less than one plaque-forming unit per four grams of total solids (dry weight basis), the sewage sludge is class A with respect to enteric viruses until the next monitoring episode for the sewage sludge.
 - (c) When the density of enteric viruses in the sewage sludge prior to pathogen treatment is equal to or greater than one plaque-forming unit per four grams of total solids (dry weight basis), the sewage sludge is class A with respect to enteric viruses when the density of enteric viruses in the sewage sludge after pathogen treatment is less than one plaque-forming unit per four grams of total solids (dry weight basis) and when the values or ranges of values for the operating parameters for the pathogen treatment process that produces the sewage sludge that meets the enteric virus density requirement are documented.
 - (d) After the enteric virus reduction in paragraph (N)(3)(c) of this rule is demonstrated for the pathogen treatment process, the sewage sludge continues to be class A with respect to enteric viruses when the values for the pathogen treatment process operating parameters are consistent with the values or ranges of values documented in paragraph (N)(3)(c) of this rule.
 - (e) The sewage sludge shall be analyzed prior to pathogen treatment to determine whether the sewage sludge contains viable helminth ova.

- (f) When the density of viable helminth ova in the sewage sludge prior to pathogen treatment is less than one per four grams of total solids (dry weight basis), the sewage sludge is class A with respect to viable helminth ova until the next monitoring episode for the sewage sludge.
 - (g) When the density of viable helminth ova in the sewage sludge prior to pathogen treatment is equal to or greater than one per four grams of total solids (dry weight basis), the sewage sludge is class A with respect to viable helminth ova when the density of viable helminth ova in the sewage sludge after pathogen treatment is less than one per four grams of total solids (dry weight basis) and when the values or ranges of values for the operating parameters for the pathogen treatment process that produces the sewage sludge that meets the viable helminth ova density requirement are documented.
 - (h) After the viable helminth ova reduction in paragraph (N)(3)(g) of this rule is demonstrated for the pathogen treatment process, the sewage sludge continues to be class A with respect to viable helminth ova when the values for the pathogen treatment process operating parameters are consistent with the values or ranges of values documented in paragraph (N)(3)(g) of this rule.
- (4) Alternative four, unknown processes ([White House Document Page 32](#)).
- (a) The density of enteric viruses in the sewage sludge shall be less than one plaque-forming unit per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed, at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land, or at the time the sewage sludge is prepared to meet the requirements in paragraph (C) of rule 3745-40-04 of the Administrative Code, unless otherwise specified by the director.
 - (b) The density of viable helminth ova in the sewage sludge shall be less than one per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed, at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land, or at the time the sewage sludge is prepared to meet the requirements in paragraph (C) of rule 3745-40-04 of the Administrative Code, unless otherwise specified by the director.
- (5) Alternative five, processes to further reduce pathogens. Sewage sludge that is land applied shall be treated in one of the following processes to further reduce pathogens.

- (a) Process to further reduce pathogens number one, composting ([White House Document Page 51](#)). Using either the in-vessel composting method or the static aerated pile composting method, the temperature of the sewage sludge is maintained at fifty-five degrees Celsius or higher for three days. Using the windrow composting method, the temperature of the sewage sludge is maintained at fifty-five degrees Celsius or higher for fifteen days or longer. During the period when the compost is maintained at fifty-five degrees Celsius or higher, there shall be a minimum of five turnings of the windrow. Such facility shall operate in accordance with the requirements of Chapters 3704. and 6111. of the Revised Code, section 3745.11 of the Revised Code, and rules adopted thereunder. Such facility shall not be subject to the requirements of rules 3745-27-40 to 3745-27-47 of the Administrative Code and Chapter 3745-37 of the Administrative Code if all of the following conditions are met:
- (i) The owner or operator of the facility is the same owner or operator of the facility that generates the sewage sludge; and
 - (ii) The owner or operator of the facility co-composts sewage sludge exclusively with type A feedstock, bulking agents, or additives as defined in rules 3745-27-01 and 3745-27-40 of the Administrative Code.
- (b) Process to further reduce pathogens number two, heat drying ([White House Document Page 53](#)). Sewage sludge is dried by direct or indirect contact with hot gases to increase the per cent solids of the sewage sludge to ninety per cent or greater. Either the temperature of the sewage sludge particles exceeds eighty degrees Celsius or the wet bulb temperature of the gas in contact with the sewage sludge as the sewage sludge leaves the dryer exceeds eighty degrees Celsius.
- (c) Process to further reduce pathogens number three, heat treatment ([White House Document Page 54](#)). Liquid sewage sludge is heated to a temperature of one hundred eighty degrees Celsius or higher for thirty minutes.
- (d) Process to further reduce pathogens number four, thermophilic aerobic digestion ([White House Document Page 54](#)). Liquid sewage sludge is agitated with air or oxygen to maintain aerobic conditions and the mean cell residence time of the sewage sludge is ten days at fifty-five to sixty degrees Celsius.

- (e) Process to further reduce pathogens number five, beta ray irradiation ([White House Document Page 55](#)). Sewage sludge is irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (approximately twenty degrees Celsius).
 - (f) Process to further reduce pathogens number six, gamma ray irradiation ([White House Document Page 55](#)). Sewage sludge is irradiated with gamma rays from certain isotopes, such as ⁶⁰ cobalt and ¹³⁷ cesium, at dosages of at least 1.0 megarad at room temperature (approximately twenty degrees Celsius).
 - (g) Process to further reduce pathogens number seven, pasteurization ([White House Document Page 55](#)). The temperature of the sewage sludge is maintained at seventy degrees Celsius or higher for thirty minutes or longer.
- (6) Alternative six, processes equivalent to a process to further reduce pathogens ([White House Document Page 101](#)). Sewage sludge that is used or disposed shall be treated in a process equivalent to a process to further reduce pathogens as approved by the pathogen equivalency committee of the United States environmental protection agency.
- (O) Class B pathogen reduction alternatives.
- (1) Alternative one, geometric mean of seven samples ([White House Document Page 36](#)).
 - (a) Seven representative samples of the sewage sludge that is used or disposed shall be collected.
 - (b) The geometric mean of the density of fecal coliform in the samples shall be less than either two million MPN per gram of total solids (dry weight basis) or two million colony forming units per gram of total solids (dry weight basis).
 - (2) Alternative two, processes to significantly reduce pathogens. Sewage sludge that is used or disposed shall be treated in one of the following processes to significantly reduce pathogens.
 - (a) Process to significantly reduce pathogens number one, aerobic digestion ([White House Document Page 43](#)). Sewage sludge is agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between forty days

at twenty degrees Celsius and sixty days at fifteen degrees Celsius.

- (b) Process to significantly reduce pathogens number two, air drying ([White House Document Page 46](#)). Sewage sludge is dried on sand beds or on paved or unpaved basins. The sewage sludge dries for a minimum of three months. During two of the three months, the ambient average daily temperature is above zero degrees Celsius.
 - (c) Process to significantly reduce pathogens number three, anaerobic digestion ([White House Document Page 45](#)). Sewage sludge is treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between fifteen days at thirty-five to fifty-five degrees Celsius and sixty days at twenty degrees Celsius.
 - (d) Process to significantly reduce pathogens number four, composting ([White House Document Page 47](#)). Using either the in-vessel, static aerated pile or windrow composting methods, the temperature of the sewage sludge is raised to forty degrees Celsius or higher and remains at forty degrees Celsius or higher for five days. For four hours during the five days, the temperature of the sewage sludge exceeds fifty-five degrees Celsius. Such facility shall operate in accordance with the requirements of Chapters 3704. and 6111. of the Revised Code, section 3745.11 of the Revised Code, and rules adopted thereunder. Such facility shall not be subject to the requirements of rules 3745-27-40 to 3745-27-47 of the Administrative Code and Chapter 3745-37 of the Administrative Code if all of the following conditions are met:
 - (i) The owner or operator of the facility is the same owner or operator of the facility that generates the sewage sludge; and
 - (ii) The owner or operator of the facility co-composts sewage sludge exclusively with type A feedstock, bulking agents, or additives as defined in rules 3745-27-01 and 3745-27-40 of the Administrative Code.
 - (e) Process to significantly reduce pathogens number five, lime treatment ([White House Document Page 48](#)). Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to twelve after two hours of contact.
- (3) Alternative three, processes equivalent to a process to significantly reduce pathogens ([White House Document Page 100](#)). Sewage sludge that is used

or disposed shall be treated in a process equivalent to a process to significantly reduce pathogens as approved by the pathogen equivalency committee of the United States environmental protection agency.

- (P) Site restrictions for sewage sludge treated by a class B pathogen reduction process.
- (1) Food crops with harvested parts that touch the sewage sludge/soil mixture and are totally above the land surface shall not be harvested for fourteen months after the application of sewage sludge.
 - (2) Food crops with harvested parts below the surface of the land shall not be harvested for twenty months after the application of sewage sludge when the sewage sludge remained on the land surface for four months or longer prior to incorporation into the soil.
 - (3) Food crops with harvested parts below the surface of the land shall not be harvested for thirty-eight months after the application of sewage sludge when the sewage sludge remained on the land surface for less than four months prior to incorporation into the soil.
 - (4) All other food crops, feed crops, and fiber crops shall not be harvested for thirty days after the application of sewage sludge.
 - (5) Animals shall not be grazed on the land for thirty days after the application of sewage sludge.
 - (6) Turf grown on land where sewage sludge is applied shall not be harvested for one year after the application of sewage sludge when the harvested turf is placed on either land with a high potential for public exposure or a lawn, unless otherwise specified by the director.
 - (7) Public access to land with a high potential for public exposure shall be restricted for one year after the application of sewage sludge.
 - (8) Public access to land with a low potential for public exposure shall be restricted for thirty days after the application of sewage sludge.

FAQ: Does “agricultural land” in the above definition of “land with a low potential for public exposure” include silviculture, grazing, and pasture? Yes, that is the intent of the Ohio EPA.

- (Q) Vector attraction reduction options.

- (1) Vector attraction reduction option number one ([White House Document Page 58](#)). The mass of volatile solids in the sewage sludge shall be reduced by a minimum of thirty-eight per cent.
- (2) Vector attraction reduction option number two ([White House Document Page 60](#)). When the thirty-eight per cent volatile solids reduction requirement in paragraph (Q)(1) of this rule cannot be met for an anaerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge anaerobically in the laboratory in a bench-scale unit for forty additional days at a temperature between thirty and thirty-seven degrees Celsius. When at the end of the forty days the volatile solids in the sewage sludge at the beginning of that period is reduced by less than seventeen per cent, vector attraction reduction is achieved.
- (3) Vector attraction reduction option number three ([White House Document Page 60](#)). When the thirty-eight per cent volatile solids reduction requirement in paragraph (Q)(1) of this rule cannot be met for an aerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge that has a per cent solids of two per cent or less aerobically in the laboratory in a bench-scale unit for thirty additional days at twenty degrees Celsius. When at the end of the thirty days the volatile solids in the sewage sludge at the beginning of that period is reduced by less than fifteen per cent, vector attraction reduction is achieved.
- (4) Vector attraction reduction option number four ([White House Document Page 60](#)). The specific oxygen uptake rate (SOUR) for sewage sludge treated in an aerobic process shall be equal to or less than 1.5 milligrams of oxygen per hour per gram of total solids (dry weight basis) at a temperature of twenty degrees Celsius.
- (5) Vector attraction reduction option number five ([White House Document Page 61](#)). Sewage sludge shall be treated in an aerobic process for fourteen days or longer. During that time, the temperature of the sewage sludge shall be higher than forty degrees Celsius and the average temperature of the sewage sludge shall be higher than forty-five degrees Celsius.
- (6) Vector attraction reduction option number six ([White House Document Page 61](#)). The pH of sewage sludge shall be raised to twelve or higher by alkali addition and, without the addition of more alkali, shall remain at twelve or higher for two hours and then at 11.5 or higher for an additional twenty-two hours.

- (7) Vector attraction reduction option number seven (*White House Document Page 62*). The per cent solids of sewage sludge that does not contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than seventy-five per cent based on the moisture content and total solids prior to mixing with other materials.
- (8) Vector attraction reduction option number eight (*White House Document Page 62*). The per cent solids of sewage sludge that contains unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than ninety per cent based on the moisture content and total solids prior to mixing with other materials.
- (9) Vector attraction reduction option number nine (*White House Document Page 62*). Sewage sludge shall be injected below the surface of the land.
 - (a) No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected.
 - (b) When the sewage sludge that is injected below the surface of the land is class A with respect to pathogens, the sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen treatment process.
- (10) Vector attraction reduction option number ten (*White House Document Page 63*). Immediate incorporation of sewage sludge.
 - (a) Sewage sludge applied to the land surface shall be incorporated into the soil within six hours after application to or placement on the land, unless otherwise specified by the director.
 - (b) When sewage sludge that is incorporated into the soil is class A with respect to pathogens, the sewage sludge shall be applied to or placed on the land within eight hours after being discharged from the pathogen treatment process.

Ohio Administrative Code 3745-40-06; Land Application Monitoring and Reporting

- (A) For land applied sewage sludge, the frequency of monitoring for the pollutants established in rule 3745-40-05 of the Administrative Code, the pathogen reduction requirements established in paragraphs (N)(1) to (N)(6) and (O)(1) of rule 3745-40-05 of the Administrative Code, and the vector attraction reduction requirements established in paragraphs (Q)(1) to (Q)(8) of rule 3745-40-05 of the Administrative Code, shall be the following:

Amount of sewage sludge generated (dry U.S. tons per calendar year)	Frequency of monitoring
Greater than zero but less than seventy	annually
Greater than or equal to seventy but less than three hundred twenty	semi-annually
Greater than or equal to three hundred twenty but less than one thousand six hundred fifty	quarterly
Greater than or equal to one thousand six hundred fifty but less than sixteen thousand five hundred	monthly
Greater than or equal to sixteen thousand five hundred	semi-monthly

FAQ: Is the monitoring frequency based on the dry tons of straight sewage sludge or the dry tons of sludge or sludge materials, including admixtures (biosolids)? The monitoring frequency is based on the most recent calendar year data for dry tons of sludge or sludge materials, including admixtures (biosolids). Note: The annual sewage sludge fee required by section 3745.11(Y) of the Ohio Revised Code is based on the most recent calendar year dry tons of straight sewage sludge.

FAQ: Is semi-monthly the same as every two weeks, which is what my current NPDES permit says? Yes, semi-monthly and every two weeks are the same. NPDES permits will continue to have every two weeks as the monitoring frequency.

FAQ: What parameters will be included as part of the Monthly Operating Report requirements of an NPDES permit? The following parameters will be included in NPDES permits as Monthly Operating Report parameters:

– The pollutants established in paragraphs 3745-40-05(F)(1) and 3745-40-05(F)(3) of the Ohio Administrative Code (arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, zinc).

– The pathogen limits established in paragraphs 3745-40-05(N)(1) to 3745-40-05(N)(6) and 3745-40-05(O)(1) of the Ohio Administrative Code.

FAQ: What parameter records must the generator maintain for five years and make available to the Division upon request?

– The generator must maintain records of all data submitted as part of a Monthly Operating Report as per NPDES permit requirements.

– The pollutants established in paragraph 3745-40-05(F)(2) of the Ohio Administrative Code (Cumulative Pollutant Loading Rates for arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc, on an authorized site basis, when applicable). SWIMS was developed with the capability of Monthly Operating Report submittal of this data. That portion of SWIMS has not been beta tested, so is not implemented. Stakeholders will be informed of any future changes in that regard.

– Management practices to meet pathogen reduction such as the daily logs of time and temperature regimes if such constraints are part of paragraphs 3745-40-05(N)(1) to 3745-40-05(N)(6) and 3745-40-05(O)(1) of the Ohio Administrative Code (an example would be the daily monitoring of a composting operation to ensure that the time and temperature regimes required to meet pathogen reduction have been met).

– Vector attraction reduction requirements of paragraphs 3745-40-05(Q)(1) through 3745-40-05(Q)(8) of the Ohio Administrative Code (an example would be Specific Oxygen Uptake Rate test results to demonstrate compliance with VAR requirements).

The Director of Ohio EPA reserves the right to include further requirements in NPDES permits.

- (B) For land applied sewage sludge, the frequency of monitoring for total Kjeldahl nitrogen, ammonia nitrogen, phosphorus, potassium, pH, and, when applicable for a liming material, effective neutralizing power, fineness index, and standard of fineness, shall be the following:

Amount of sewage sludge generated (dry U.S. tons per calendar year)	Frequency of monitoring
Greater than zero but less than seventy	annually
Greater than or equal to seventy but less than three hundred twenty	quarterly
Greater than or equal to three hundred twenty	monthly

FAQ: Is the monitoring frequency based on the dry tons of straight sewage sludge or the dry tons of sludge or sludge materials, including admixtures (biosolids)? The monitoring frequency is based on the most recent calendar year data for dry tons of sludge or sludge materials, including admixtures (biosolids). **Note: The annual sewage sludge fee required by section 3745.11(Y) of the Ohio Revised Code is based on the most recent calendar year dry tons of straight sewage sludge.**

FAQ: What parameters will be included as part of the Monthly Operating Report requirements of an NPDES permit? The following parameters will be included in NPDES permits as Monthly Operating Report parameters:

- Total Kjeldahl nitrogen, ammonia nitrogen, total phosphorus, total potassium, and pH.

FAQ: What parameter records must the generator maintain for five years and make available to the Division upon request?

- The generator must maintain records of all data submitted as part of a Monthly Operating Report as per NPDES permit requirements.
- The total neutralizing power of a sewage sludge that has an agronomic rate as a liming material (a sewage sludge or sewage sludge material is considered a liming material if the agronomic rate is limited by the lime content of the material).

The Director of Ohio EPA reserves the right to include further requirements in NPDES permits.

- (1) The total Kjeldahl nitrogen, ammonia nitrogen, total phosphorus, and total potassium content of the sewage sludge shall be reported in milligrams per kilogram (dry weight basis); and
- (2) The total Kjeldahl nitrogen, available phosphorus, and soluble potassium content of the sewage sludge shall be reported as a "grade".

FAQ: Do I have to report available phosphorus (phosphate) and soluble potassium (potash) as a grade? *The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on available phosphorus and soluble potassium in sewage sludge.*

FAQ: When do I have to report as a liming material? *A sewage sludge or sewage sludge material should be reported as a liming material if the agronomic rate is limited by the lime content of the material.*

FAQ: Do I have to report the effective neutralizing power, fineness index, and standard of fineness? *The test methodologies used by the Ohio Department of Agriculture to monitor those parameters in fertilizers do not appear to be reliable when used to analyze a sewage sludge. Therefore, in the interim until more reliable test methodologies are developed, Ohio EPA will not be requiring the submission of data on effective neutralizing power, fineness index and standard of fineness. Such a material should be characterized by its Total Neutralizing Power as weight per cent of calcium carbonate, however, since Ohio EPA did not include that as a monitoring requirement in rule, it will not be a monitoring requirement.*

- (C) For land applied sewage sludge, the frequency of monitoring for the per cent total solids, per cent volatile solids, and weight in dry metric tons shall be the following:

Amount of sewage sludge generated (dry U.S. tons per calendar year)	Frequency of monitoring
Greater than zero but less than seventy	monthly
Greater than or equal to seventy but less than three hundred twenty	weekly
Greater than or equal to three hundred twenty	daily

FAQ: Is the monitoring frequency based on the dry tons of straight sewage sludge or the dry tons of sludge or sludge materials, including admixtures (biosolids)? The monitoring frequency is based on the most recent calendar year data for dry tons of sewage sludge, including admixtures (biosolids). **Note: the annual sewage sludge fee required by section 3745.11(Y) of the Ohio Revised Code is based on the calendar year dry tons of straight sewage sludge.**

FAQ: What parameters will be included as part of the Monthly Operating Report requirements of an NPDES permit? The following parameters will be included in NPDES permits as Monthly Operating Report parameters:

– Per cent total solids, per cent volatile solids, and weight in dry U.S. tons.

FAQ: What parameter records must the generator maintain for five years and make available to the Division upon request?

– The generator must maintain records of all data submitted as part of a Monthly Operating Report as per NPDES permit requirements.

The Director of Ohio EPA reserves the right to include further requirements in NPDES permits.

FAQ: Is sludge weight to be reported in dry metric tons or dry U.S. tons? There is a typo in the rules, and the weight should be reported in dry U.S. tons.

(D) After the sewage sludge has been monitored for two years at the frequencies specified by this rule, the director may, upon request of the permittee, reduce the frequency of monitoring for the pollutants established in rule 3745-40-05 of the Administrative Code and for the pathogen density requirements established in paragraphs (N)(3)(b) and (N)(3)(f) of rule 3745-40-05 of the Administrative Code.

FAQ: Under these rules can the frequency of monitoring be reduced to whenever sewage sludge is removed from the facility? Yes, the frequency of monitoring may be reduced. This should be discussed at NPDES permit renewal. Many NPDES permits are approved with the following language:

“Monitoring is required when sludge is removed from the sanitary wastewater treatment facility. If no sludge is removed during the entire month, report “AL” in the first column of the first day of the month on the 4500 Form (Monthly Operating Report). A signature is still required.”

Also, paragraph 3745-40-03(J) of the Ohio Administrative Code allows for variances from the requirements of these rules.

- (E) For authorized sites, the frequency of monitoring for soil pH and soil phosphorus level (Bray-Kurtz P1 extraction or Mehlich 3 extraction) shall be such that the most recent results are not more than two years old at the time of bulk sewage sludge land application.

FAQ: Will Ohio EPA consider a three year monitoring interval for soil phosphorus? Yes, that will be considered at the next available opportunity.

FAQ: Will soil phosphorus be a part of NPDES permit Monthly Operating Report requirements? Not at the present time. Ohio EPA will include soil phosphorus monitoring results, and the subsequent Phosphorus Index methodology usage when performed, as part of the monitoring requirements that the generator must maintain for five years, and make available for review upon request of the Division.

FAQ: What is the recommended protocol for collecting soil samples from a field? Soil samples can be collected at any time, however, it is recommended to obtain the soil sample prior to spring planting. A soil probe, auger, spade, or garden trowel can be used to sample soil. A plastic bucket should be used to collect soil grab samples. Each composite sampling should represent 15 to 20 acres of uniform area (uniform in soil series, slope, drainage, erosion, sludge, and fertilizer application) and less than 5 acres of rolling land. Generally, any area that is large enough to spread separately should be sampled separately. Grab samples should be taken 75 to 100 feet apart with a minimum of 15 grab samples in a composite sample. Low spots or other unusual areas (sludge stockpiling area, lime, and fertilizer spills) should be omitted or sampled separately. Grab samples should be taken to plow depth (about 8 inches). For row crops, samples should be taken between rows. For establishing grass pasture crops, samples should be collected to the rooting zone (3 to 4 inches). All grab samples should be broken up and mixed thoroughly before a composite sample is taken.

- (F) Within six months of the effective date of this rule, and annually thereafter, all treatment works with an average daily final effluent flow greater than or equal to one million gallons per day shall monitor for dioxin in sewage sludge, as the term dioxin is defined in rule 3745-40-01 of the Administrative Code. Within six months of the effective date of this rule, and within six months of each Ohio NPDES permit renewal thereafter, all treatment works with an average daily final effluent flow greater than or equal to one hundred thousand gallons per day but less than one million gallons per day shall monitor for dioxin in sewage sludge, as the term dioxin is defined in rule 3745-40-01 of the Administrative Code. All analysis for dioxin in sewage sludge required in this rule shall be performed by a laboratory equipped to provide accurate results.

FAQ: Which POTW's are required to submit sludge dioxin monitoring data? Only those POTW's that land apply sewage sludge, and meet the average daily final effluent flow requirements stated above.

FAQ: By what date do the sludge dioxin monitoring results have to be submitted to the Ohio EPA? *The effective date of Ohio's sewage sludge rules is April 8, 2002. The initial results need to be submitted to Ohio EPA by October 8, 2002. For POTW's with an average daily final effluent flow greater than or equal to one million gallons per day, future sludge dioxin monitoring results must be submitted annually by October 1 (NPDES permits will include this information). For POTW's with an average daily final effluent flow greater than or equal to one hundred thousand gallons per day but less than one million gallons per day, future sludge dioxin monitoring results must be submitted to the Ohio EPA by October 1, every five years (NPDES permits will include this information). Thus, for those smaller POTW's, future sludge dioxin monitoring will be in 2007, 2012, etc.*

FAQ: What is the sampling protocol for a sludge dioxin analysis? *The sample should be a composite sample that is representative of the sewage sludge leaving the facility for application to the land. Liquid or cake samples are acceptable although cake is preferred. If the facility land applies both liquid and cake, a composite sample of the cake sludge is preferred. The sample should be refrigerated, or maintained on ice, until it is received by the laboratory. Please discuss with the laboratory other storage and transportation requirements.*

- (1) The 2,3,7,8-TCDD total toxicity equivalence of the dioxin in sewage sludge, calculated from the twenty-nine dioxin congeners defined in rule 3745-40-01 of the Administrative Code, shall be reported as part of the permittees monthly operating report.
- (2) All dioxin in sewage sludge monitoring results shall be retained by the permittee for five years and shall be submitted to the division upon request. The results shall include the following:
 - (a) Total class concentrations of the dibenzo-p-dioxins and dibenzofurans in parts per trillion;
 - (b) Concentrations of the twenty-nine individual congeners in parts per trillion; and
 - (c) Calculation of the 2,3,7,8-TCDD total toxicity equivalence in parts per trillion.
- (3) The following analytical methods shall be used for the analysis of dioxin in sewage sludge.
 - (a) United States Environmental Protection Agency Method No. 1613B shall be used for the seven 2,3,7,8 chlorinated dibenzo-p-dioxin congeners and ten 2,3,7,8 chlorinated dibenzofuran congeners.

[Comment: Method No. 1613B may be obtained from: National Technical Information Service No. PB93-236024; or, Educational Resources Information Center No. W-105.]

- (b) United States Environmental Protection Agency Method No. 1668A (USEPA no. 821/C-97-005) shall be used for the twelve coplanar polychlorinated biphenyl congeners.

[Comment: Method No. 1668A may be obtained from: United States Environmental Protection Agency, Office of Water Resource Center.]

- (4) Non-detected values shall be reported as one half of the detection limit.
- (5) The following toxicity equivalence factors (TEF) shall be used in the calculation of the 2,3,7,8-TCDD total toxicity equivalence:

Congener	TEF
2,3,7,8-tetrachlorodibenzo-p-dioxin	1.0
1,2,3,7,8-pentachlorodibenzo-p-dioxin	0.5
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	0.1
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	0.1
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	0.1
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	0.01
1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin	0.001
2,3,7,8-tetrachlorodibenzofuran	0.1
1,2,3,7,8-pentachlorodibenzofuran	0.05
2,3,4,7,8-pentachlorodibenzofuran	0.5
1,2,3,4,7,8-hexachlorodibenzofuran	0.1
1,2,3,6,7,8-hexachlorodibenzofuran	0.1
1,2,3,7,8,9-hexachlorodibenzofuran	0.1
2,3,4,6,7,8-hexachlorodibenzofuran	0.1
1,2,3,4,6,7,8-heptachlorodibenzofuran	0.01
1,2,3,4,7,8,9-heptachlorodibenzofuran	0.01
1,2,3,4,6,7,8,9-octachlorodibenzofuran	0.001
3,3',4,4'-tetrachlorobiphenyl	0.0001
3,4,4',5-tetrachlorobiphenyl	0.0001
3,3',4,4',5-pentachlorobiphenyl	0.1
2,3,3',4,4'-pentachlorobiphenyl	0.0001
2,3',4,4',5-pentachlorobiphenyl	0.0001
2',3,4,4',5-pentachlorobiphenyl	0.0001
2,3,4,4',5-pentachlorobiphenyl	0.0005
3,3',4,4',5,5'-hexachlorobiphenyl	0.01
2,3,3',4,4',5-hexachlorobiphenyl	0.0005
2,3,3',4,4',5'-hexachlorobiphenyl	0.0005

2,3',4,4',5,5'-hexachlorobiphenyl	0.00001
2,3,3',4,4',5,5'-heptachlorobiphenyl	0.0001

FAQ: Is there a list of laboratories capable of analyzing sewage sludge for the required "dioxin" congeners? Yes. A list is provided in the Appendices of this Guidance Manual, or can be accessed at the Ohio EPA Sewage Sludge Program website at <http://www.epa.state.oh.us/dsw/sludge/biosolid.html>.

FAQ: What parameters will be included as part of the Monthly Operating Report requirements of an NPDES permit? The Ohio EPA's Sludge Dioxin, Dibenzofuran and Coplanar PCB Worksheet is included in the Appendices of this guidance Manual, and has all of the necessary Monthly Operating Report codes for all of the required parameters. Use this form until such time as sludge dioxin reporting requirements are added to a permittees NPDES permit. At that time, analysis results should be reported on the Monthly Operating Report 4500 form.

- (G) A permittee shall collect and analyze representative samples of sewage sludge in accordance with this rule. The following methods shall be used to analyze samples of sewage sludge and are adopted by reference in this chapter. Other methods may be used only if such methods are approved by the division.
- (1) Enteric viruses. ASTM designation: D 4994-89, "Standard Practice for Recovery of Viruses from Wastewater Sludges," 1992 annual book of ASTM standards: section 11-water and environmental technology, ASTM, 1916 Race street, Philadelphia, PA 19103-1187.
 - (2) Fecal coliform. Part 9221 E. or part 9222 D., "Standard Methods for the Examination of Water and Wastewater," 18th edition, 1992, American public health association, 1015 15th street, NW., Washington, DC 20005.
 - (3) Helminth ova. Yanko, W. A. "Occurrence of Pathogens in Distribution and Marketing Municipal Sludges," USEPA 600/1-87-014, 1987. National technical information service, 5285 Port Royal road, Springfield, VA 22161 (PB 88-154273S).
 - (4) Inorganic pollutants. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," USEPA publication SW-846, second edition (1982) with updates I (April 1984) and II (April 1985), national technical information service, 5285 Port Royal road, Springfield, VA 22161 (PB-87-120-291) or third edition (November 1986) with revision I (December 1987), superintendent of documents, government printing office, 941 North Capitol street, NE., Washington, DC 20002 (document number 955-001-00000-1).

- (5) Salmonella sp. bacteria. Part 9260 D., "Standard Methods for the Examination of Water and Wastewater," 18th edition, 1992, American public health association, 1015 15th street, NW., Washington, DC 20005 or Kenner, B. A. and H. P. Clark, "Detection and Enumeration of Salmonella and Pseudomonas aeruginosa," journal of the water pollution control federation, vol. 46, no. 9, September 1974, pp. 2163- 2171. Water environment federation, 601 Wythe street, Alexandria, VA 22314.
 - (6) Specific oxygen uptake rate. Part 2710 B., "Standard Methods for the Examination of Water and Wastewater," 18th edition, 1992, American public health association, 1015 15th street, NW., Washington, DC 20005.
 - (7) Total, fixed, and volatile solids. Part 2540 G., "Standard Methods for the Examination of Water and Wastewater," 18th edition, 1992, American public health association, 1015 15th street, NW., Washington, DC 20005.
 - (8) Per cent volatile solids reduction. "Environmental Regulations and Technology - Control of Pathogens and Vector Attraction in Sewage Sludge", 1992 USEPA/625/R-92/013 revised October 1999, United States environmental protection agency, national center for environmental publications and information, 11029 Kenwood road, Cincinnati, OH 45242.
- (H) The permittee who provides treatment to exceptional quality sewage sludge shall develop the following information, shall retain the information for five years, and shall make the information available to the division upon request:
- (1) The concentration of each pollutant listed in paragraph (F) of rule 3745-40-05 of the Administrative Code;
 - (2) A description of how the class A pathogen reduction requirements of rule 3745-40-05 of the Administrative Code are met;
 - (3) A description of how the vector attraction reduction requirements in paragraphs (Q)(1) to (Q)(8) of rule 3745-40-05 of the Administrative Code are met;
 - (4) The results of all other analyses required by paragraphs (A), (B), (C), (F), and (G) of this rule; and
 - (5) The following certification statement signed by the permittee:

"I certify, under penalty of law, that the information that will be used to determine compliance with class A pathogen reduction alternative (insert one of the class A

alternatives in paragraphs (N)(1) to (N)(6) of rule 3745-40-05 of the Administrative Code) and vector attraction reduction requirement (insert one of the vector attraction reduction requirements in paragraphs (Q)(1) to (Q)(8) of rule 3745-40-05 of the Administrative Code) was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment.”

FAQ: Who should sign the certification statement? *Certification statements should be signed in accordance with paragraph 3745-31-04 of the Ohio Administrative Code:*

1) In the case of a corporation, by a principal executive officer of at least the level of vice-president, or his duly authorized representative (in writing), if such representative is responsible for the overall operation of the facility;

2) In the case of a partnership, by a general partner;

3) In the case of sole proprietorship, by the proprietor;

4) In the case of a municipal, state, federal or other government facility, by the principal executive officer, the highest ranking elected official, or other duly authorized employee.

(l) The permittee who provides treatment to bulk sewage sludge shall develop the following information, shall retain the information for five years, and shall make the information available to the division upon request:

(1) The concentration of each pollutant listed in paragraph (F) of rule 3745-40-05 of the Administrative Code;

(2) A description of how the pathogen reduction requirements of rule 3745-40-05 of the Administrative Code are met;

(3) When applicable, a description of how the vector attraction reduction requirements in paragraphs (Q)(1) to (Q)(8) of rule 3745-40-05 of the Administrative Code are met;

(4) The results of all analyses required by paragraphs (A), (B), (C), (D), (F), and (G) of this rule; and

(5) The following certification statement signed by the permittee:

“I certify, under penalty of law, that the information that will be used to determine compliance with class (insert A or B) pathogen reduction alternative (insert one of the class

A alternatives in paragraphs (N)(1) to (N)(6) of rule 3745-40-05 of the Administrative Code or one of the class B alternatives in paragraphs (O)(1) to (O)(3) of rule 3745-40-05 of the Administrative Code) was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment.”; and

- (6) When applicable, the following certification statement signed by the permittee:

“I certify, under penalty of law, that the information that will be used to determine compliance with vector attraction reduction requirement (insert one of the vector attraction reduction requirements in paragraphs (Q)(1) to (Q)(8) of rule 3745-40-05 of the Administrative Code) was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment.”

FAQ: Who should sign the certification statement? Certification statements should be signed in accordance with paragraph 3745-31-04 of the Ohio Administrative Code:

1) In the case of a corporation, by a principal executive officer of at least the level of vice-president, or his duly authorized representative (in writing), if such representative is responsible for the overall operation of the facility;

2) In the case of a partnership, by a general partner;

3) In the case of sole proprietorship, by the proprietor;

4) In the case of a municipal, state, federal or other government facility, by the principal executive officer, the highest ranking elected official, or other duly authorized employee.

- (J) The person who land applies bulk sewage sludge shall develop the following information, shall retain the information for five years, and shall make the information available to the division upon request:

(1) A description of how the land application agronomic management requirements of rule 3745-40-04 of the Administrative Code are met for each site on which bulk sewage sludge is applied;

(2) For class B sewage sludge, a description of how the site restrictions of rule 3745-40-05 of the Administrative Code are met for each site on which bulk sewage sludge is applied;

- (3) When applicable, a description of how the vector attraction reduction requirements in paragraphs (Q)(9) to (Q)(10) of rule 3745-40-05 of the Administrative Code are met for each site on which bulk sewage sludge is applied;
- (4) The agronomic rate calculations used to determine the bulk sewage sludge loading rate in dry tons per acre for each site on which bulk sewage sludge is applied;
- (5) The following certification statement signed by the person who land applies bulk sewage sludge:

“I certify, under penalty of law, that the information that will be used to determine compliance with the land application agronomic management requirements of rule 3745-40-04 of the Administrative Code was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment.”;

- (6) When applicable, the following certification statement signed by the person who land applies bulk sewage sludge:

“I certify, under penalty of law, that the information that will be used to determine compliance with the site restrictions in rule 3745-40-05 of the Administrative Code was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment.”; and

- (7) When applicable, the following certification statement signed by the person who land applies bulk sewage sludge:

“I certify, under penalty of law, that the information that will be used to determine compliance with vector attraction reduction requirement (insert one of the vector attraction reduction requirements in paragraphs (Q)(9) to (Q)(10) of rule 3745-40-05 of the Administrative Code) was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment.”

FAQ: Who should sign the certification statement? Certification statements should be signed in accordance with paragraph 3745-31-04 of the Ohio Administrative Code:

1) In the case of a corporation, by a principal executive officer of at least the level of vice-president, or his duly authorized representative (in writing), if such representative is responsible for the overall operation of the facility;

2) In the case of a partnership, by a general partner;

3) In the case of sole proprietorship, by the proprietor;

4) In the case of a municipal, state, federal or other government facility, by the principal executive officer, the highest ranking elected official, or other duly authorized employee.

(K) The person who land applies bulk sewage sludge subject to the cumulative pollutant loading rates of paragraph (F)(2) of rule 3745-40-05 of the Administrative Code shall develop the following information, shall retain the information indefinitely, and shall make the information available to the division upon request:

(1) The location, by street address, latitude and longitude, or unique identification number, of each site on which bulk sewage sludge is applied;

(2) The number of acres in each site on which bulk sewage sludge is applied;

(3) The date bulk sewage sludge is applied to each site;

(4) The amount of sewage sludge, in dry tons, applied to each site;

(5) The cumulative amount of each pollutant listed in paragraph (F)(2) of rule 3745-40-05 of the Administrative Code applied to each site;

(6) A description of how the requirements to obtain information in paragraph (G) of rule 3745-40-05 of the Administrative Code are met; and

(7) The following certification statement signed by the permittee:

“I certify, under penalty of law, that the information that will be used to determine compliance with the requirement to obtain information in paragraph (G) of rule 3745-40-05 of the Administrative Code was prepared, for each site on which bulk sewage sludge was applied, under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment.”

FAQ: Who should sign the certification statement? Certification statements should be signed in accordance with paragraph 3745-31-04 of the Ohio Administrative Code:

1) In the case of a corporation, by a principal executive officer of at least the level of vice-president, or his duly authorized representative (in writing), if such representative is responsible for the overall operation of the facility;

2) In the case of a partnership, by a general partner;

3) In the case of sole proprietorship, by the proprietor;

4) In the case of a municipal, state, federal or other government facility, by the principal executive officer, the highest ranking elected official, or other duly authorized employee.

Ohio Administrative Code 3745-40-07; Other Management Practices; Prohibition

- (A) An Ohio NPDES permit may authorize the use of exceptional quality sewage sludge, as defined in rule 3745-40-01 of the Administrative Code, at a land reclamation site.
- (1) If the land reclamation site is under the jurisdiction of the Ohio department of natural resources, division of mineral resources management, a land reclamation plan, approved by the Ohio department of natural resources, division of mineral resources management, shall be required prior to the application of any exceptional quality sewage sludge to the land reclamation site.
 - (2) The director may specify in an Ohio NPDES permit any terms and conditions for the use of exceptional quality sewage sludge at a land reclamation site when the director has determined that such terms and conditions are necessary to protect public health and the environment.
- (B) A site specific Ohio NPDES permit shall authorize the use of sewage sludge, other than exceptional quality sewage sludge, at a land reclamation site.
- (1) If the land reclamation site is under the jurisdiction of the Ohio department of natural resources, division of mineral resources management, a land reclamation plan, approved by the Ohio department of natural resources, division of mineral resources management, shall be required prior to the submittal of an application to the director for a site specific Ohio NPDES permit.
 - (2) The director may specify in a site specific Ohio NPDES permit any terms and conditions for the use of sewage sludge, other than exceptional quality sewage sludge, at a land reclamation site when the director has determined that such terms and conditions are necessary to protect public health and the environment.

FAQ: Is a site specific NPDES permit required for land application at agronomic rates to land that was previously reclaimed? No. If the post reclamation land is appropriate for a site authorization, an application for site authorization may be submitted and will be processed like other sites. If authorized, land application is permissible under applicable paragraphs of Ohio's sewage sludge rules.

- (C) The agronomic rate may be exceeded during land reclamation projects using sewage sludge but shall not exceed sixty-five dry tons per acre, or the cumulative pollutant loading rates of paragraph (F) of rule 3745-40-05 of the Administrative Code, whichever is less.

- (D) The surface disposal of sewage sludge is prohibited.
- (E) Sewage sludge disposed in a sanitary landfill, as such is defined in rules adopted under section 3734.02 of the Revised Code and licensed under section 3734.05 of the Revised Code, shall, in addition to compliance with the requirements of this chapter, be in compliance with the rules adopted under Chapter 3734. of the Revised Code.
- (F) When sewage sludge is removed from a sewage sludge treatment lagoon, the disposal, use, storage, or further treatment of said sewage sludge shall be in accordance with this chapter.

FAQ: How is the annual sewage sludge fee calculated for a sewage sludge treatment lagoon? *The annual sewage sludge fee language in ORC 3745.11(Y) states that a fee is owed on sludge treated or disposed of in a calendar year. Recently some permittees emptied sludge lagoons of close to thirty years of sludge accumulation. They land applied the sludge, and correctly reported the dry tons of sewage sludge land applied. There were two problems, both associated with the annual sewage sludge fee. First, much of the sludge was placed in the lagoon long before the statute authorizing the annual sewage sludge fee was passed. Second, since upwards of thirty years of accumulated sludge was land applied, the fee was very large. To correct these problems, Ohio EPA and the permittees estimated the dry tons of sewage sludge treated in the lagoon for the past calendar year. That is the fair method of fee calculation to use for lagoons. Lagoon operators will be able to budget the small annual fees from sludge treated in a calendar year, rather than the large periodic fees from sludge disposed.*

- (G) Sewage sludge may be transferred to another facility provided that said facility has a valid Ohio NPDES permit for the disposal, use, storage, or treatment of sewage sludge.

FAQ: Ohio does not yet have delegation of the federal sewage sludge program, yet treatment works in Ohio do have valid Ohio NPDES permits. Are those permits sufficient to meet the requirements of the above paragraph? *Yes.*

For sewage sludge disposed in a sanitary landfill, contained in a sewage sludge treatment lagoon, or transferred to another facility, the frequency of monitoring for the per cent total solids, per cent volatile solids, and weight in dry metric tons shall be the following:

Amount of sewage sludge produced (dry U.S. tons per calendar year)	Frequency of monitoring
Greater than zero but less than seventy	monthly
Greater than or equal to seventy but less than three hundred twenty	weekly
Greater than or equal to three hundred twenty	daily

FAQ: What parameters will be included as part of the Monthly Operating Report requirements of an NPDES permit? *The following parameters will be included in NPDES permits as Monthly Operating Report parameters:*

-- *Weight in dry U.S. tons.*

FAQ: What parameter records must the generator maintain for five years and make available to the Division upon request?

-- *The generator must maintain records of all data submitted as part of a Monthly Operating Report as per NPDES permit requirements.*

The Director of Ohio EPA reserves the right to include further requirements in NPDES permits.

FAQ: Is sludge weight to be reported in dry metric tons or dry U.S. tons? *There is a typo in the rules, and the weight should be reported in dry U.S. tons.*

Appendices

Other Available Guidance

There are many excellent publications on land application of sewage sludge available from the United States EPA. The following list of publications is suggested for the library of any facility that has a land application program (Note: website addresses are subject to change):

- A Plain English Guide to the EPA Part 503 Biosolids Rule, September, 1994. USEPA, Office of Wastewater Management. EPA/832/R-93/003.
- Land Application of Sewage Sludge: A Guide for Land Appliers on the Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 503, December, 1994. USEPA, Office of Enforcement and Compliance Assurance. EPA/831-B-93-002b.
- Guide to Field Storage of Biosolids, July, 2000. USEPA, Office of Wastewater Management. EPA/832-B-00-007.

All of these publications are available free of charge at the following web site. Some of these publications are in Adobe Acrobat PDF format. A link is provided on the web page to download the Adobe Acrobat Reader:

<http://www.epa.gov/OWM/pub.htm>

- Preparing Sewage Sludge for Land Application or Surface Disposal: A Guide for Preparers of Sewage Sludge on the Monitoring, Recordkeeping, and Reporting Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 503, August 1993. USEPA, Office of Water. EPA/831-B-93-002a.

This publication is available from ERIC or NTIS at the following web site:

<http://www.epa.gov/owm/sectbio.htm>

The following two publications should be in the library of any land application program:

- Environmental Regulations and Technology, Control of Pathogens and Vector Attraction in Sewage Sludge, Revised October, 1999. USEPA, Office of Research and Development, Washington, D.C. 20460. EPA/625/R-92/013.

This document is available free of charge from the National Risk Management Research Laboratory at the following web site. It is a PDF file:

<http://www.epa.gov/ORD/NRMRL/Pubs/1999/625R92013.pdf>

- Estimating Plant-Available Nitrogen in Biosolids, 2000. Water Environment Research Foundation, 601 Blythe Street, Alexandria, VA 22314-1994.

This document is available from the Water Environment Federation at the following web site. There is a nominal charge:

<http://www.wef.org/applications/publications/detail.cfm?PubID=551>

Further information can be obtained from the following organizations:

- USEPA Office of Water, <http://www.epa.gov/OW/>
- USEPA Office of Enforcement and Compliance Assurance, <http://www.epa.gov/compliance/>
- USEPA Office of Research and Development, <http://www.epa.gov/ord/index.htm>
- National Biosolids Partnership, <http://biosolids.policy.net/>
- Great Lakes By-Products Management Association, <http://www.glbma.org/>

Sludge Site Authorization Packet for Non-EQ Sewage Sludge



Photo courtesy of USDA Natural Resources Conservation Service

General Instructions - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

Site authorization **must** be requested for each site proposed for sewage sludge land application. A site may consist of more than one field.

Read the following instructions carefully. These instructions should not be submitted with the application forms. Please retain them for future reference. Included with these instructions is a Nitrogen Agronomic Rate Worksheet, which should not be submitted with the application forms.

The following forms, with support documentation, should be submitted as an application packet:

- Sludge Generator Summary (Form SSA-1)
- Landowner Consent for Sludge Application (Form SSA-2)
- Farm Operator Request and Consent for Sludge Application (Form SSA-3)
- List of Fields (Form SSA-4)
- Field Identification (Form SSA-5)
- Field Soil Analysis (Form SSA-6)

The first three forms are related to the overall property. Only one copy of these forms needs to be submitted. The latter three forms relate to each individual field that may receive sewage sludge. One set of these forms must be submitted for **each** field. Copy the blank forms as needed.

Definitions - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

The following terms are defined to make the application clearer and easier to complete:

Land Owner:	The person who owns the legal rights to the property (pays taxes on the property).
Farm Operator:	The person who grows and manages the crops on the property.
Applicator:	The entity who applies the sludge to the property.
Farm:	The total property receiving the sludge, which may or may not contain more than one site or one field.
Authorized site:	An area of land bordered by fences, tree lines, streams, roads, or other means of demarcation, upon which sewage sludge is land applied.
Vicinity Map:	A portion of a United States Geological Survey 7.5 minute series topographic quadrangle map, scale 1:24,000 map which indicates the location of the field with respect to nearby highways and towns.
Soil Map:	A map which indicates the different types of soils present on the site. Soil maps may be obtained from the local Natural Resources Conservation Service office.
CPLR Sludge:	A sludge with a metals concentration which exceeds the Pollutant Monthly Average Concentrations of paragraph 3745-40-05(F)(3) of the Ohio Administrative Code, but which meets the Pollutant Ceiling Concentration requirements of paragraph 3745-40-04(F)(1) of the Ohio Administrative Code.
Isolation distance:	The distance to a specified object from the nearest edge of the sewage sludge application area (see Chapter 3745-40-04(N) of the Ohio Administrative Code).
Agronomic rate:	The whole sewage sludge application rate (dry weight basis) intended to provide the food crop, feed crop, fiber crop, cover crop, pasture, or vegetation the appropriate nitrogen for the reasonably expected yield, and to minimize the amount of nitrogen in the sewage sludge that passes to waters of the state.
Crop year:	The period of time for a particular crop to be planted and harvested, or one year's time, whichever is shorter.
Division:	The Ohio Environmental Protection Agency, Division of Surface Water, with any approvals or authorizations manifested through its Chief.

Detailed Instructions - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

Use the checklist below to insure that all the necessary items are included. Incomplete packets **will not** be reviewed and will be returned to you for completion. All forms must be typed or printed clearly in ink. Word processor files of this packet may be requested via e-mail at the following address: chris.bowman@epa.state.oh.us .

- 1. Complete all information in the **Sludge Generator Summary** (form SSA-1).
- 2. Complete all landowner information in the **Landowner Consent For Sludge Application** (form SSA-2) and have the land owner of the property sign and date the form.
- 3. Complete all farm operator information in the **Farm Operator Request And Consent For Sludge Application** (form SSA-3) and have the farm operator of the property read, sign and date the form.
- 4. List all the field names for the site on the **List of Fields** (form SSA-4). **Do not** fill in the OEPA Site #, it will be completed by the OEPA upon authorization. Sites that do not get authorized will not receive an OEPA Site #, and will be left blank.
- 5. Complete the information on the **Field Identification** (SSA-5) for each field included on the **List of Fields** (form SSA-4). **Do not** fill in the OEPA Site #. Note special instructions on application rates (a Nitrogen Agronomic Rate Worksheet is included with these instructions).
- 6. Include a vicinity map for each field and insert them after the appropriate **Field Identification** (form SSA-5). Identify the mapped fields with the same field names as were used on the **List of Fields** (form SSA-4). The maps should be 8 ½-inch by 11-inch copies of the appropriate United States Geological Survey 7.5 minute series topographic quadrangle map, scale 1:24,000 (1-inch equals 2,000-feet). Identify the county where the field is located, and the name of the quadrangle map from which the vicinity map (or majority of the vicinity map where overlap occurs) was obtained. USGS 7.5 minute series maps can be ordered from the Ohio Department of Natural Resources from the following website: <http://www.ohiodnr.com/geosurvey/pub/usgstopo.htm>. Another source for USGS

Detailed Instructions - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

topos are local Soil and Water Conservation District offices.

Alternatively, vicinity maps may be generated from the following websites:

<http://www.topozone.com/>, and

<http://terraserver.homeadvisor.msn.com/default.asp>

The “Advanced Find” feature of the Terrasaver site allows entry of an address to bring up an aerial photograph of a field. Once the field is located another feature of the site will switch the background to the USGS topo for that field.

There may be other similar sources for maps. The Ohio EPA requests vicinity maps be produced using this type of map source to enable a more efficient development of a GIS for the land application part of Ohio EPA’s sewage sludge program.

- 7. Show the following features on the vicinity map for each field:
 - (1) Isolation distances from any waters of the state
 - (2) Isolation distances from any occupied building
 - (3) Isolation distances from any medical care facility
 - (4) Isolation distance from any private potable water source
 - (5) Isolation distance from any sinkhole or UIC Class V drainage well

[Note: Circumstances surrounding a field may change over time. New occupied buildings, wells, and other developments that require changes to existing isolation distances may occur. It is the responsibility of the sewage sludge generator, and their contractor, to note any changes that have occurred in the vicinity of an authorized site, and follow all required isolation distances accordingly. In other words, the isolation distances submitted with the site authorization application are a point in time, and subject to change.

- 8. The Division of Surface Water, in conjunction with the Division of Drinking and Groundwater, will determine if any of the proposed fields fall wholly, or partially, within a Groundwater Source Water Assessment and Protection area as described in paragraph 3745-40-04(O) of the Ohio Administrative Code.

Detailed Instructions - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

- 9. Complete all the information on the **Field Soil Analysis** (form SSA-6). Do not fill in the OEPA Site #. Background soil metals analysis is asked for to determine if previous unknown activity may have resulted in a contamination issue. Note: depth to bedrock information is available in county soil survey publications published by the United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Ohio Department of Natural Resources and the Ohio Agricultural Research and Development Center.

- 10. Include a soil map of each field from appropriate soil survey publication as mentioned above. Include after the appropriate **Field Soil Analysis** (form SSA-6). If soil maps are unavailable, please indicate this on the form.

- 11. Check to insure that all forms are filled out completely, and that all required forms and maps are included in the packet.

Sludge Generator Summary - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

Sludge Generator: _____

Address: _____

Phone No: (____) _____ - _____

Plant Superintendent: _____

NPDES Permit No: _____

Responsible Official: _____

Title: _____

Land Owner(s): _____

Farm Operator(s): _____

Applicator: _____

Address: _____

Contact: _____

Phone No: (____) _____ - _____

I hereby agree that all contents of this package are, to the best of my knowledge, true and accurate.

Responsible Official

Date

Title

SSA-1

Landowner Consent for Sludge Application - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

Owner(s) Name(s): _____

Address: _____

Phone No: (____) _____ - _____

Farm Location: _____

Total Acres: _____ (Proposed for sludge application)

County: _____

Township: _____

1. I agree to allow sludge to be land applied to my property at agronomic rates.
2. I agree to allow federal, state and local regulatory staff access to my land for the purposes of inspecting and authorizing the site, applying sludge, obtaining samples from the site and testing. I reserve the right to ask the above parties for proper identification at any time.
3. This Consent may be terminated at any time by the landowner or farm operator.
4. I certify that I am holder of legal title to the above described property or am authorized by the holder to give consent for the land application of sludge and that there are no restrictions to the granting of consent under this form.

Owner Signature

Date

Title (If signing as the owners representative)

SSA-2

Farm Operator Request and Consent for Sludge Application - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

Farm Operator: _____

Address: _____

Phone No: (____) _____ - _____

Farm Location: _____

Total Acres: _____ (proposed for sludge application)

County: _____

Township: _____

Crops: _____

I agree to be responsible for following the Site Restrictions of Chapter 3745-40-05(P) of the Ohio Administrative Code.

Farm Operator Signature

Date

(If signing as the farm operator's representative)

Field Identification - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

Site#: _____
(OEPA Use Only)

Field Identification: _____

If known, Latitude: _____ Longitude: _____

Lat/Long reference point: _____

Has sludge been applied to this site since July 20, 1993 (Yes/No)? _____

If yes, list sources and years: _____

Do you know of any endangered species or endangered species habitats located on the land application site (Yes/No)? _____

If yes, what is the endangered species or habitat: _____

SSA-5

Field Soil Analysis - Sludge Site Authorization Packet for Non-EQ Sewage Sludge

Site #: _____
(OEPA Use Only)

Field Identification: _____

Laboratory Name: _____

Lab Contact: _____

Phone No: (____) _____ - _____

Size of Site: _____ acres

Soil pH: _____ S.U.

Soil CEC: _____ meg/100g

Bedrock Depth: _____ feet

Phosphorus: _____ ppm Bray-Kurtz P1 / Mehlich 3 (circle one)

Please submit the following information if available (Include lab report if available).

Arsenic: _____ mg/kg

Cadmium: _____ mg/kg

Copper: _____ mg/kg

Lead: _____ mg/kg

Mercury: _____ mg/kg

Molybdenum: _____ mg/kg

Nickel: _____ mg/kg

Selenium: _____ mg/kg

Zinc: _____ mg/kg

Soil Map: Included Unavailable

Soil Type(s): _____

SSA-6

Nitrogen Agronomic Rate Worksheet

Complete the following information to determine the agronomic rate for a particular sewage sludge at a specific site.

A. Crop nitrogen needs _____ lb/acre

Type of crop _____

Yield goal _____

B. Existing available nitrogen _____ lb/acre

The amount of nitrogen left from previous applications and crop residue must be determined. Consult with an agronomist or agricultural engineer (e.g. county extension agent). The available nitrogen is dependent on the type of crop last planted, the geographic area, any crop residue left on the ground, and other factors.

C. Non-sludge nitrogen applications _____ lb/acre

Calculate or estimate the total amount of available nitrogen that will be applied to the property for the growing season, including: available nitrogen from commercial fertilizers, septage application, animal waste application and other materials applied to the land

D. Additional nitrogen needs _____ lb/acre

Additional (D) = Crop (A) _____ - Existing (B) _____ - Non-sludge (C) _____

Nitrogen Agronomic Rate Worksheet

E. Available nitrogen in the sludge _____ lb/ton

Using the average values of all nutrient analyses performed on the sewage sludge, calculate the available nitrogen in the sewage sludge you will be applying.

Ammonia nitrogen: _____ mg/kg x 0.002 = _____ lb/ton

Total Kjeldahl nitrogen: _____ mg/kg x 0.002 = _____ lb/ton

Organic nitrogen = total Kjeldahl nitrogen - ammonia nitrogen

Organic nitrogen = _____ lb/ton - _____ lb/ton

Organic nitrogen = _____ lb/ton

Available nitrogen = ammonia nitrogen + (30%* of organic nitrogen)

Available nitrogen = _____ lb/ton + (0.30* x _____ lb/ton)

Available nitrogen = _____ lb/ton (copy this value into E above)

* Use 15% for compost and advanced alkaline stabilized sludge.

F. Agronomic rate _____ dry ton/acre. This value must be included on form SSA-5.

Agronomic rate (dry weight basis) = additional nitrogen needs (D) ÷ available nitrogen in sludge (E)

Agronomic rate (dry weight basis) = _____ lb/acre ÷ _____ lb/ton

Agronomic rate (dry weight basis) = _____ dry ton/acre (copy this value into F above)

Nitrogen Agronomic Rate Calculation Example using Ohio EPA Nitrogen Agronomic Rate Worksheet

An example of nitrogen agronomic rates calculated for sewage sludge are found on the following two pages. Ohio EPA Monthly Operating Report (MOR) data from January, 1995, through December, 2001, was summarized for sewage sludge total Kjeldahl nitrogen (TKN, MOR parameter code 00627) and ammonia nitrogen (NH₃N, MOR parameter code 99991). Comprising thousands of records, the average TKN value was 42,720 mg/kg and the average NH₃N value was 11,601 mg/kg. Using those two values, agronomic rates were calculated for a corn crop with an expected yield potential of 180 bushels per acre. One scenario was for a corn crop on a field that had residual nitrogen that supplied 140 lb/acre of nitrogen. The second scenario is a corn crop with no other sources of nitrogen, so the sewage sludge agronomic rate supplies the entire nitrogen requirement of the corn crop at the expected yield. The nitrogen requirement of the example corn crop is 220 lb/acre nitrogen. This value was taken from the Tri-State Fertilizer Recommendations, Michigan State University Extension Bulletin E-2567, July 1995. The information was found in Table 9 - Nitrogen Recommendations for Corn Based on Yield Potential and Previous Crop.

Note that 5.3 dry tons of a typical sewage sludge generated and land applied in Ohio provided enough nitrogen for a maximum expected corn yield in this scenario. Actual application rates may vary from this figure, but are not expected to vary significantly.

Nitrogen Agronomic Rate Worksheet

SAMPLE

Complete the following information to determine the agronomic rate for a particular sewage sludge at a specific site.

A. Crop nitrogen needs 220 **lb/acre**

Type of crop Corn

Yield goal 180 bu/acre

B. Existing available nitrogen 140 / 0 **lb/acre**

The amount of nitrogen left from previous applications and crop residue must be determined. Consult with an agronomist or agricultural engineer (e.g. county extension agent). The available nitrogen is dependent on the type of crop last planted, the geographic area, any crop residue left on the ground, and other factors.

C. Non-sludge nitrogen applications 0 / 0 **lb/acre**

Calculate or estimate the total amount of available nitrogen that will be applied to the property for the growing season, including: available nitrogen from commercial fertilizers, septage application, animal waste application and other materials applied to the land

D. Additional nitrogen needs 80 / 220 **lb/acre**

Additional (D) = Crop (A) 220 - Existing (B) 140 - Non-sludge (C) 0

Additional (D) = Crop (A) 220 - Existing (B) 0 - Non-sludge (C) 0

Nitrogen Agronomic Rate Worksheet

SAMPLE

E. Available nitrogen in the sludge 41.9 lb/ton

Using the average values of all nutrient analyses performed on the sewage sludge, calculate the available nitrogen in the sewage sludge you will be applying.

Ammonia nitrogen: 11,601 mg/kg x 0.002 = 23.2 lb/ton

Total Kjeldahl nitrogen: 42,720 mg/kg x 0.002 = 85.4 lb/ton

Organic nitrogen = total Kjeldahl nitrogen - ammonia nitrogen

Organic nitrogen = 85.4 lb/ton - 23.2 lb/ton

Organic nitrogen = 62.2 lb/ton

Available nitrogen = ammonia nitrogen + (30%* of organic nitrogen)

Available nitrogen = 23.2 lb/ton + (0.30* x 62.2 lb/ton)

Available nitrogen = 41.9 lb/ton (copy this value into E above)

* Use 15% for compost and advanced alkaline stabilized sludge.

F. Agronomic rate 1.9 / 5.3 dry ton/acre. This value must be included on form SSA-5.

Agronomic rate (dry weight basis) = additional nitrogen needs (D) ÷ available nitrogen in sludge (E)

Agronomic rate (dry weight basis) = 80 / 220 lb/acre ÷ 41.9 lb/ton

Agronomic rate (dry weight basis) = 1.9 / 5.3 dry ton/acre (copy this value into F above)

State of Ohio Signage Requirements at Sites that Receive Class B Sewage Sludge

Ohio House Bill 197, effective March 17, 2000, amended the Ohio Revised Code to, among other provisions, require the posting of signs at sites where class B sewage sludge is land applied (see the complete text of the Ohio Revised Code signage requirement below). The Director of Ohio EPA adopted Ohio Administrative Code rules under House Bill 197 which became effective on April 8, 2002. Amongst other provisions, the rules developed minimum standards for the signage requirement of the Ohio Revised Code (see the complete text of the Ohio Administrative Code signage requirement below). These signs must be displayed at all sites in Ohio that receive class B sewage sludge.

Ohio Revised Code 6111.039: *“The Director of Environmental Protection shall adopt rules in accordance with Chapter 119. of the Revised Code requiring the posting of notice regarding the land application of sludge that is classified as class B sludge under 40 CFR 503.”*

Ohio Administrative Code 3745-40-04(H): *“The permittee shall post signs at sites where class B bulk sewage sludge is land applied. The signs shall read “NOTICE: CLASS B SEWAGE SLUDGE HAS BEEN APPLIED TO THIS SITE.” Such signs shall include the name of the permittee and the permittee’s telephone number. Such sign(s) shall be posted within twenty-five feet of an obvious access point(s) and shall be unobstructed from view. Any authorized site with road frontage shall have at least one sign facing the road, within twenty-five feet of the road when possible, and shall be unobstructed from view. The text shall be in black capital letters on a white background and the letters shall be one inch in height. At sites with a low potential for public exposure, such signs shall be in place from the time land application begins to a minimum of thirty days after the termination of land application activity at the site. At sites with a high potential for public exposure such signs shall be in place from the time land application begins to a minimum of one year after the termination of land application activity at the site.”*

An example sign has been drafted and follows. The example sign contains the required language, with the required lettering format. This would be the minimum requirement of the signage display. Some stakeholders have asked if it is permissible to create a larger sign with extra information. That is permissible, as long as the required signage is included and meets the minimum State of Ohio requirements.

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**NOTICE:
SEWAGE SL
BEEN APPLI
SI
ANYTO
(123) 45**

**CLASS B
UDGE HAS
ED TO THIS
TE.
WN, OH
6-7890**

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CUMULATIVE POLLUTANT LOADING RATE WORKSHEET

Site name and location:	Date of application:
Site ID:	Date of last Application:
Latitude:	Sludge application rate (tons/acre):
Longitude:	

Pollutant	Cumulative Pollutant Loading Rate (lbs/acre)		Calculation for Determining Cumulative Pollutant Loading Rate						
	A	B	C	D	E	F = CxDxE	G	H = F + G	I = A - H
	100%	90%	Sludge metals conc.	Sludge application rate	Conversion factor	Pollutant loading for application	CPLR before application	CPLR to date	CPLR remaining
			mg/kg	tons/acre		lbs/acre	lbs/acre	lbs/acre	lbs/acre
Arsenic	36	32			0.002				
Cadmium	34	31			0.002				
Copper	1,340	1,206			0.002				
Lead	268	241			0.002				
Mercury	15	14			0.002				
Molybdenum	-	-			0.002				
Nickel	375	338			0.002				
Selenium	89	80			0.002				
Zinc	2,500	2,250			0.002				

Sludge Dioxin, Dibenzofuran and Coplanar PCB Worksheet

Facility Name and Address:	Laboratory Name and Address:
Facility NPDES Permit No.:	Laboratory Sample No./Date:

2,3,7,8-TCDD TTE	85865	2,3,7,8-TCDD Total Toxicity Equivalence for all dioxins, dibenzofurans, and coplanar PCBs in Part B (ng/kg)	
Additional Remarks:			
I certify under penalty of law that I have personally examined, and am familiar with the information submitted, and based on my inquiry of those individuals immediately responsible for obtaining the information I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.			
Date Completed:	Signature and Title:		

Instructions:

- Record the concentration of each parameter in nanograms per kilogram (ng/kg).
- The concentration recorded for parameters that are below the detection limit shall be one-half of the detection limit (ng/kg).
- Multiply the concentration by the given TEF and record the answer in the TE column (ng/kg).
- Sum all of the individual TE's. That sum is the 2,3,7,8-TCDD Total Toxicity Equivalence (TTE). Record that value in the appropriate box (ng/kg).
- Report must be signed by the sludge generator's responsible individual (not an employee of the testing laboratory). Call (614) 644-2134 with any questions.

Abbreviations:

TCDD = tetrachlorodibenzo-p-dioxin	TCDF = tetrachlorodibenzofuran	TCB = tetrachlorobiphenyl
PeCDD = pentachlorodibenzo-p-dioxin	PeCDF = tetrachlorodibenzofuran	PeCB = pentachlorobiphenyl
HxCDD = hexachlorodibenzo-p-dioxin	HxCDF = tetrachlorodibenzofuran	HxCB = hexachlorobiphenyl
HpCDD = heptachlorodibenzo-p-dioxin	HpCDF = tetrachlorodibenzofuran	HpCB = heptachlorobiphenyl
OCDD = octachlorodibenzo-p-dioxin	OCDF = tetrachlorodibenzofuran	
TEF = Toxicity Equivalence Factor	TE = Toxicity Equivalence	TTE = Total Toxicity Equivalence

Sludge Dioxin, Dibenzofuran and Coplanar PCB Worksheet

Parameter	MOR Reporting Code	Concentration (ng/kg)	TEF	TE (ng/kg)
Total TCDD	85827			
Total PeCDD	85828			
Total HxCDD	85829			
Total HpCDD	85830			
Total TCDF	85832			
Total PeCDF	85833			
Total HxCDF	85834			
Total HpCDF	85835			
2,3,7,8-TCDD	85837		1	
2,3,7,8-TCDF	85838		0.1	
1,2,3,7,8-PeCDD	85839		0.5	
1,2,3,7,8-PeCDF	85840		0.05	
2,3,4,7,8-PeCDF	85841		0.5	
1,2,3,4,7,8-HxCDD	85842		0.1	
1,2,3,6,7,8-HxCDD	85843		0.1	
1,2,3,7,8,9-HxCDD	85844		0.1	
1,2,3,4,7,8-HxCDF	85845		0.1	
1,2,3,6,7,8-HxCDF	85846		0.1	
1,2,3,7,8,9-HxCDF	85847		0.1	
2,3,4,6,7,8-HxCDF	85848		0.1	
1,2,3,4,6,7,8-HpCDD	85849		0.01	
1,2,3,4,6,7,8-HpCDF	85850		0.01	
1,2,3,4,7,8,9-HpCDF	85851		0.01	
OCDD	85831		0.001	
OCDF	85836		0.001	
3,3',4,4'-TCB	85852		0.0001	
3,4,4',5-TCB	85853		0.0001	
3,3',4,4',5-PeCB	85854		0.1	
2,3,3',4,4'-PeCB	85855		0.0001	
2,3',4,4',5-PeCB	85856		0.0001	
2',3,4,4',5-PeCB	85857		0.0001	
2,3,4,4',5-PeCB	85858		0.0005	
3,3',4,4',5,5'-HxCB	85859		0.01	
2,3,3',4,4',5-HxCB	85860		0.0005	
2,3,3',4,4',5'-HxCB	85861		0.0005	
2,3',4,4',5,5'-HxCB	85862		0.00001	
2,3,3',4,4',5,5'-HpCB	85864		0.0001	
2,3,7,8-TCDD TTE	85865			

Partial List of Laboratories Capable of Analyzing Sewage Sludge for “Dioxins”

USEPA Method No. 1613b - Tetra through Octa Chlorinated Dioxins and Furans by Isotope Dilution High Resolution Gas Chromatography/High Resolution Mass Spectrometry (USEPA Method 1613b may be obtained from the National Technical Information Service No. PB93-236024; or, Educational Resources Information Center No. W-105). This does not represent a complete list of laboratories capable of performing this test, nor does it constitute endorsement by Ohio EPA.

Alta Analytical
5070 Robert J. Matthews Pkwy, Suite 2
Eldorado Hills, CA 95630
(916) 933-1640

Axys Analytical Services
P.O. Box 2219, 2045 Mills Road West
Sidney, British Columbia, CANADA V8L3S8
(250) 655-5800
(250) 655-5811 FAX

Battelle Columbus Laboratories
505 King Ave.
Columbus, OH 43201
(614) 424-4028
(614) 424-4976

Brehm Research Laboratories
Wright State University
Dayton, OH 45435
(937) 775-2202
(937) 873-3807 FAX

Chemserv Industrie Service Ges.mb.H
St. Peter Strasse 25
P.O. Box 296
A-4021 Linz (Austria)
0043-0732-5917-3771

CNRS Service Central D'Analyse
Spectrometrie De Masse
Echangeur de Solaise-Chemin du Canal
B.P. 22-69390 Vernaison France
011-33-7802-2291

Columbia Analytical Services
10655 Richmond Avenue, Suite 130A
Houston, TX 77042
(713) 266-1599

Diverse Analyticals Limited
5 Chesterfield Road
Newbury Berks RG14 7QB England
011-44-061-876-4220

Environment Canada
Chemistry Division, Technology Development Branch
River Road Environmental Technology Centre
Ottawa, Ontario, CANADA K1A0H3
(613) 998-3671

Enviro-Test Laboratories
9936 67th Avenue
Edmonton, Alberta, CANADA T6E0P5
(780) 413-5203

Midwest Research Institute
425 Volker Boulevard
Kansas City, MO 64110
(816) 753-7600

New York State Department of Health
Wadsworth Laboratories, Empire State Plaza
P.O. Box 509
Albany, NY 12201-0509
(518) 474-4151

Pace Analytical Services Incorporated
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(765) 778-0201 Mike King
(612) 607-1700

Pacific Analytical, Inc.
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(916) 374-4408

Severn Trent Laboratories Sacramento
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(916) 372-1059 FAX

Severn Trent Laboratories Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921-5947
(865) 291-3000
(865) 584-4315 FAX

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San Antonio, TX 78238
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Triangle Laboratories
801 Capitola Dr.
Durham, NC 27713-4411

University of Umea
Institute of Environmental Chemistry
Umea Sweden 5-90187
011-46-90-165266

US EPA EMSL
944 East Hammon Avenue
Las Vegas, NV 89109

Wellington Environmental Consultants
395 Laird Road
Guelph, Ontario, CANADA N1G3X7
(519) 822-2436

USEPA Method 1668a - Polychlorinated Biphenyls by Isotope Dilution High Resolution Gas Chromatography/High Resolution Mass Spectrometry (USEPA Method 1668a may be obtained from United States EPA, Office of Water Resource Center). This does not represent a complete list of laboratories capable of performing this test, nor does it constitute endorsement by Ohio EPA.

Alta Analytical
5070 Robert J. Matthews Pkwy, Suite 2
Eldorado Hills, CA 95630
(916) 933-1640

Axys Analytical Services Ltd.
P.O. Box 2219, 2045 Mills Road West
Sidney, British Columbia, CANADA V8L3S8
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(250) 655-5811 FAX

Battelle-Columbus Laboratories
505 King Avenue
Columbus, OH 43201
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(614) 424-4976

Columbia Analytical Services
1317 S 13th Avenue
Kelso, WA 98626-2845
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801 Capitola Dr.
Durham, NC 27713-4411

Approved Methods for the Analysis of Sewage Sludge

Parameter	Analytical Method	Max. Holding Time Sample Preservation Sample Container	Comments
Arsenic	AA Gaseous Hydride SW-846 Method 7061 AA Furnace SW-846 Method 7060 Inductively Coupled Plasma SW-846 Method 6010	6 months Cool 4°C Plastic or glass	All samples must be digested using SW-846 Method 3050 (using equivalent to 1 g dry weight) prior to analysis by any of the procedures indicated. The AA Direct Aspiration analyses are applicable at moderate concentration levels in clean complex matrix systems. AA Furnace methods can increase sensitivity if matrix effects are not severe. Inductively Coupled Plasma (ICP) methods are applicable over a broad linear range and are especially sensitive for refractory elements. Detection limits for AA Furnace methods are generally lower than for ICP methods.
Cadmium	AA Direct Aspiration SW-846 Method 7130 AA Furnace SW-846 Method 7131 Inductively Coupled Plasma SW-846 Method 6010		
Copper	AA Direct Aspiration SW-846 Method 7210 Inductively Coupled Plasma SW-846 Method 6010		
Lead	AA Direct Aspiration SW-846 Method 7420 AA Furnace SW-846 Method 7421 Inductively Coupled Plasma SW-846 Method 6010		
Molybdenum	AA Direct Aspiration SW-846 Method 7480 AA Furnace SW-846 Method 7481 Inductively Coupled Plasma SW-846 Method 6010		
Nickel	AA Direct Aspiration SW-846 Method 7520 Inductively Coupled Plasma SW-846 Method 6010		

Selenium	AA Gaseous Hydride SW-846 Method 7741 AA Furnace SW-846 Method 7740 Inductively Coupled Plasma SW-846 Method 6010	6 months Cool 4°C Plastic or glass	All samples must be digested using SW-846 Method 3050 (using equivalent to 1 g dry weight) prior to analysis by any of the procedures indicated. The AA Direct Aspiration analyses are applicable at moderate concentration levels in clean complex matrix systems. AA Furnace methods can increase sensitivity if matrix effects are not severe. Inductively Coupled Plasma (ICP) methods are applicable over a broad linear range and are especially sensitive for refractory elements. Detection limits for AA Furnace methods are generally lower than for ICP methods.
Zinc	AA Direct Aspiration SW-846 Method 7950 Inductively Coupled Plasma SW-846 Method 6010		
Mercury	Cold Vapor (manual) SW-846 Method 7470 SW-846 Method 7471 AA Furnace SW-846 Method 7060 Inductively Coupled Plasma SW-846 Method 6010	28 days Cool 4°C Plastic or glass	SW-846 Method 7470 applies to Mercury in liquid wastes. SW-846 Method 7471 applies to Mercury in solid or semisolid wastes. The digestion procedure is contained in the analytical method.
Fecal Coliform	SM-9221 E Most Probable Number (required for Class A and recommended for Class B, Alternative 1) SM-9222 D Membrane Filter	24 hours Cool 4°C Plastic or glass	Both procedures are very temperature sensitive. Samples must be analyzed within defined holding times.
Salmonella sp.	Kenner and Clark (recommended, see Appendix G of Environmental Regulations and Technology, Control of Pathogens and Vector Attraction in Sewage Sludge, EPA/625/R-92/013, October, 1999) SM-9260 D	24 hours Cool 4°C Plastic or glass	Large sample volumes are needed due to the low concentration of Salmonella in wastewater and sludge. Also, due to the large number of Salmonella species, more than one procedure may be necessary to adequately determine the presence of Salmonella.
Enteric Viruses	ASTM-Method D 4994-89	2 days (up to 2 weeks at 0°F) Cool 4°C No preservative Plastic or glass	Concentration of sample is necessary due to the presumably low numbers of viruses in the sample.

Helminth Ova	Yanko (see Appendix I of Environmental Regulations and Technology, Control of Pathogens and Vector Attraction in Sewage Sludge, EPA/625/R-92/013, October, 1999)	1 month Cool 4°C Plastic or glass	Analyst must be familiar with other Ova test methods which are found in this same document. Due to the complexity in determining viable Ova, all Ova identified shall be considered viable.
Total Solids	SM-2540 G	7 days Cool 4°C Plastic or glass	Method 2540 G is the recommended procedure for solid and semi-solid samples.
Volatile Solids	SM-2540 G	7 days Cool 4°C Plastic or glass	Method 2540 G is the recommended procedure for solid and semi-solid samples.
Specific Oxygen Uptake Rate (SOUR)	SM-2710 B (see Appendix D of Environmental Regulations and Technology, Control of Pathogens and Vector Attraction in Sewage Sludge, EPA/625/R-92/013, October, 1999)	Perform as soon as possible No preservation Plastic or glass	Quite sensitive to sample temperature variation and lag time between sample collection and test initiation. Replicate samples are suggested. SOUR must be calculated based on total solids (dry weight) rather than on volatile solids.
Total Kjeldahl Nitrogen (TKN)	SM-4500-N _{org}	28 days Cool 4°C Plastic or glass	Total Kjeldahl nitrogen is the sum of organic and ammonia nitrogen in a sample. Sample digestion and distillation are required and are included or referenced in the method.
Total Ammonia Nitrogen (NH ₃ -N)	SM-4500-NH ₃	28 days Cool 4°C Plastic or glass	All samples must be distilled using procedure SM-4500-NH ₃ B prior to analysis by one of the specific analysis procedures listed.
Total Nitrate Nitrogen (NO ₃ -N)	SM-4500-NO ₃ SW-846 Method 9056 SW-846 Method 9210	28 days Cool 4°C Plastic or glass	Nitrate nitrogen is the fully oxidized state of nitrogen. Organics may interfere with the method.
Total Phosphorus	SM-4500-P	28 days Cool 4°C Plastic or glass	Pay close attention to sample preparation requirements found in section 4500-P B.

Total Potassium	AA Direct Aspiration SW-846 Method 7610	6 months Cool 4°C Plastic or glass	All samples must be digested using SW-846 Method 3050 (using equivalent to 1 g dry weight) prior to analysis by any of the procedures indicated. The AA Direct Aspiration analyses are applicable at moderate concentration levels in clean complex matrix systems.
Soil Phosphorus	Bray/Kurtz P1 Test for P Mhelich 3 Test for P Olsen (NaHCO ₃) P Test may be approved on a case-by-case basis for highly calcareous soils)	28 days Cool 4°C 500 mL amber jar	North Central Regional Research Publication No. 221 (Revised); Recommended Chemical Soil Test Procedures for the North Central Region
pH	SW-9045	Immediate No preservation Plastic or glass	Sample is mixed with a prescribed liquid and pH determined with a probe. Sample should be measured at 25°C or temperature corrections made and results reported at 25°C.
Conductivity	SW-9050	28 days Cool 4°C Plastic or glass	Sample should be measured at 25°C or temperature corrections made and results reported at 25°C.

Available Water Capacity Table

AVAILABLE WATER CAPACITY OF THE SOIL	SANDS AND LOAMY SANDS	SANDY LOAM AND FINE SANDY LOAM	VERY FINE SANDY LOAM, LOAM, SILT LOAM, SILTY CLAY LOAM	SANDY CLAY, SILTY CLAY, CLAY, FINE AND VERY FINE TEXTURED SOILS
NEAR 100% AVAILABLE WATER CAPACITY	DRY, LOOSE AND SINGLE-GRAINED; FLOWS THROUGH FINGERS.	DRY AND LOOSE; FLOWS THROUGH FINGERS.	POWDERY DRY; IN SOME PLACES SLIGHTLY CRUSTED BUT BREAKS DOWN EASILY INTO POWDER.	HARD, BAKED AND CRACKED; HAS LOOSE CRUMBS ON SURFACE IN SOME PLACES.
SOIL DEPTH AND AMOUNT TO REACH AWC	0-8" <u>27,000</u> 0-24 " <u>70,000</u>	0-8" <u>27,000</u> 0-24 " <u>70,000</u>	0-8" <u>40,000</u> 0-24 " <u>95,000</u>	0-8" <u>27,000</u> 0-24 " <u>70,000</u>
GREATER THAN 50% AVAILABLE WATER CAPACITY	APPEARS TO BE DRY; DOES NOT FORM A BALL UNDER PRESSURE.	APPEARS TO BE DRY; DOES NOT FORM A BALL UNDER PRESSURE.	SOMEWHAT CRUMBLY BUT HOLDS TOGETHER UNDER PRESSURE.	SOMEWHAT PLIABLE; BALLS UNDER PRESSURE.
SOIL DEPTH AND AMOUNT TO REACH AWC	0-8" <u>20,000</u> 0-24 " <u>55,000</u>	0-8" <u>20,000</u> 0-24 " <u>55,000</u>	0-8" <u>30,000</u> 0-24 " <u>70,000</u>	0-8" <u>20,000</u> 0-24 " <u>55,000</u>
25% TO 50% AVAILABLE WATER CAPACITY	APPEARS TO BE DRY; DOES NOT FORM A BALL UNDER PRESSURE.	BALLS UNDER PRESSURE BUT SELDOM HOLDS TOGETHER.	FORMS A BALL UNDER PRESSURE; SOMEWHAT PLASTIC; SLICKS SLIGHTLY UNDER PRESSURE.	FORMS A BALL; RIBBONS OUT BETWEEN THUMB AND FOREFINGER.
SOIL DEPTH AND AMOUNT TO REACH AWC	0-8" <u>13,000</u> 0-24 " <u>35,000</u>	0-8" <u>13,000</u> 0-24 " <u>35,000</u>	0-8" <u>20,000</u> 0-24 " <u>49,000</u>	0-8" <u>13,000</u> 0-24 " <u>35,000</u>
LESS THAN 25% AVAILABLE WATER CAPACITY	STICKS TOGETHER SLIGHTLY; MAY FORM A WEAK BALL UNDER PRESSURE.	FORMS A WEAK BALL THAT BREAKS EASILY, DOES NOT STICK.	FORMS BALL; VERY PLIABLE; SLICKS READILY IF RELATIVELY HIGH IN CLAY.	RIBBONS OUT BETWEEN FINGERS EASILY; HAS A SLICK FEELING.
SOIL DEPTH AND AMOUNT TO REACH AWC	0-8" <u>7,000</u> 0-24 " <u>16,000</u>	0-8" <u>7,000</u> 0-24 " <u>16,000</u>	0-8" <u>11,000</u> 0-24 " <u>25,000</u>	0-8" <u>7,000</u> 0-24 " <u>16,000</u>
NO AVAILABLE WATER CAPACITY	ON SQUEEZING, NO FREE WATER APPEARS ON SOIL, BUT WET OUTLINE OF BALL ON HAND.	ON SQUEEZING, NO FREE WATER APPEARS ON SOIL, BUT WET OUTLINE OF BALL ON HAND.	ON SQUEEZING, NO FREE WATER APPEARS ON SOIL, BUT WET OUTLINE OF BALL ON HAND.	ON SQUEEZING, NO FREE WATER APPEARS ON SOIL, BUT WET OUTLINE OF BALL ON HAND.
ABOVE FIELD CAPACITY	FREE WATER APPEARS WHEN SOIL IS BOUNCED IN HAND.	FREE WATER IS RELEASED WITH KNEADING.	FREE WATER CAN BE SQUEEZED OUT.	PUDDLES: FREE WATER FORMS ON SURFACE

Phosphorus Index Methodology

Nitrogen and phosphorus are the two nutrients most often associated with the impairment of the quality of our groundwater and surface water. Nitrogen leaching out of the root zone may enter a tile and be transported to surface water, or it may leach to the groundwater. The Ohio EPA Drinking Water Maximum Contaminant Level for nitrate is 10 mg/L. Phosphorus leachate, or runoff entering the surface water, may contribute to excessive algae growth which may cause low oxygen levels in surface water. This in turn may impair aquatic life and adversely affect the taste of the water.

To supply the needed nutrients to achieve realistic yield goals, and minimize the transport of nitrogen and phosphorus to ground and surface water, Ohio's sewage sludge rules have adopted a nitrogen agronomic limit, and the use of a Phosphorus Index Risk Assessment Procedure developed by the Ohio Natural Resources Conservation Service (NRCS). The rule requirements are designed to assist the planner and the producer to identify fields or areas of a field that have varying risks of nutrient transport and assist in nutrient management to minimize nutrient transport and achieve production goals.

The Phosphorus Index is a procedure that combines well established factors that influence the transport of phosphorus to surface waters. Each of the factors is evaluated based on site specific data and weighted according to its overall effect on phosphorus transport. Each of the site subvalues are added together to establish an overall site rating of Low, Moderate, High, or Very High risk.

Use the Phosphorus Index Assessment Procedure Worksheet to determine the site's overall Phosphorus Index. Use the following guidance to determine each of the site's subvalues. The subvalues are added together to determine the overall site Phosphorus Index. A Field Summary Worksheet is also provided to record a series of site/field values for a given farm.

1. Sheet and rill erosion, as measured by the most current version of the Revised Universal Soil Loss Equation (RUSLE) or Wind Erosion Prediction Procedure (where wind erosion is the primary concern), determines the predicted soil loss from erosion. Determine the predicted soil loss in tons per acre per year (tons/ac/yr) and multiply by 1.0 to determine the soil loss site subvalue. Ohio EPA recommends working with local Ohio NRCS offices to develop site specific soil loss predictions using RUSLE or the Wind Erosion Prediction Procedure. Local Ohio NRCS office information is available at www.oh.nrcs.usda.gov.
2. The runoff class represents the effect of the Hydrologic Soil Group (A, B, C, D) combined with the effect of slope. This factor represents the site's runoff vulnerability. Use the table below to determine the runoff class. The runoff class is the site's subvalue.

Table 1: Runoff Class Determination

Slope Range	Hydrologic Soil Group			
	A	B	C	D
<1 %	0	1	3	6
1-3%	1	2	4	7
4-6%	2	3	5	8
7-10%	3	5	7	10
11-15%	4	6	9	12
>15%	6	8	11	15

3. Connectivity to water defines the vulnerability of phosphorus to be transferred to waters of the state. The more closely connected the runoff is from the field via concentrated flow (from a defined grassed waterway or surface drain) to waters of the state the higher the vulnerability of phosphorus transport. To determine the "connectivity to water" site subfactor ask the question: Does concentrated flow (via a defined waterway, tile inlet, or surface drain) leave the site? Read the value definitions to determine the site's "connectivity to water" subvalue.
4. The soil phosphorus test procedure, using the Bray-Kurtz P1 extraction, provides an index of plant available P expressed in parts per million (ppm). Determine the Bray-Kurtz P1 in ppm and multiply the ppm by 0.07 to determine the site soil phosphorus subvalue.
 - a. To convert from Bray-Kurtz P1 in pounds per acre to Bray-Kurtz P1 in ppm, divide the pounds per acre value by 2.
 - b. To convert from Mehlich 3 in ppm to Bray-Kurtz P1 in ppm, multiply the Mehlich 3 value by 0.88.
 - c. To convert from Mehlich 3 in pounds per acre to Bray-Kurtz P1 in ppm, divide the Mehlich 3 value by 2, and multiply the number from that operation by 0.88.

FAQ: What if the lab results say something like >250 ppm Bray-Kurtz P1? Explain to the lab that these results are not to determine if there is adequate soil phosphorus for the next crop, but to determine the actual soil phosphorus level. You need an accurate determination of the soil phosphorus level.

5. The fertilizer P₂O₅ application rate is the amount of manufactured (commercial) phosphate fertilizer applied to the site expressed in pounds per acre (lbs/ac) of P₂O₅. To determine the site's subvalue multiply the year's fertilizer P₂O₅ application

rate (lbs/ac) by 0.05.

6. The fertilizer P₂O₅ application method defines if fertilizer P₂O₅ is actually incorporated into the soil, and the time interval between application and incorporation, or if the fertilizer P₂O₅ is applied over a given amount of crop residue. Incorporation is either through direct injection with the fertilizer application equipment or using a tillage tool operated a minimum of 3-4 inches deep to incorporate the fertilizer P₂O₅. To determine the site's subvalue select the description that most closely describes the method of application. The value with that description is the site's subvalue.
7. The organic P₂O₅ application rate defines the amount of organic P₂O₅ applied, in pounds per acre (lbs/ac) of P₂O₅, from manure, sewage sludge, etc. To determine the site's subvalue multiply the year's organic P₂O₅ fertilizer application rate (lbs/ac) by 0.06.
8. Organic P₂O₅ application method defines if the organic P₂O₅ from the manure, sewage sludge, etc., is incorporated into the soil, the time interval between application and incorporation, or if the organic P₂O₅ is applied over a given amount of crop residue. Incorporation is either through direct injection with the application equipment or by using a tillage tool operated a minimum of 3-4 inches deep to incorporate the manure, sewage sludge, etc. To determine the site's subvalue select the description that most closely describes the method of application. The value with that description is the site's subvalue.
9. Deduct 2 points if field runoff flows via sheet flow through a designed grassed waterway.

Phosphorus Index Risk Assessment Procedure Worksheet

Site Characteristic	Phosphorus Vulnerability Values					Site Subvalue
1. Soil Erosion	Soil Loss (tons/acre/year) X 1.0					
2. Connectivity to Water. Does concentrated flow (via a defined waterway, tile inlet, or surface drain) leave the site?	NO, and the site is not adjacent to an intermittent or perennial stream. Value = 0	NO, but the site is adjacent to an intermittent or perennial stream. Value = 4.0	Yes, but the site is not adjacent to an intermittent or perennial stream. Value = 8.0	Yes, and the site is adjacent to and/or the concentrated flow outlets into an intermittent stream or through a tile inlet. Value = 12.0	Yes, and the site is adjacent to and/or the concentrated flow outlets into a perennial stream or through a tile inlet; or outlets to a pond or lake within 1 mile. Value = 16.0	
Runoff Class	From Runoff Class Table					
4. Soil Test Bray-Kurtz P1 (ppm)	Bray – Kurtz P1 (ppm) X (0.07)					
5. Fertilizer P ₂ O ₅ Application Rate	Fertilizer P ₂ O ₅ applied (lbs/acre) X (0.05)					

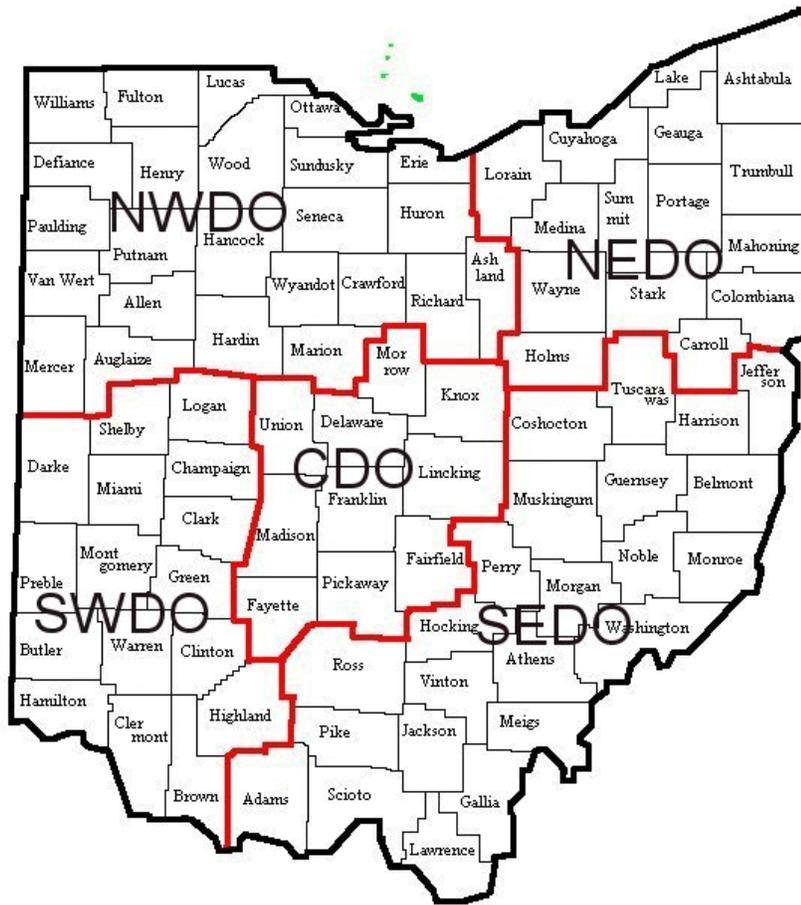
Phosphorus Index Risk Assessment Procedure Worksheet Continued

6. Fertilizer P ₂ O ₅ Application Method	None applied. Value = 0	Immediate incorporation or applied on ≥80% cover. Value = 0.75	Incorporation in ≤1 week or applied on 50% to 80% cover. Value = 1.5	Incorporation in >1 week and ≤3 months or applied on 30% to 49% cover. Value = 3.0	No incorporation or incorporation >3 months or applied on <30% cover. Value = 6.0	
7. Organic P ₂ O ₅ Application Rate	Available organic P ₂ O ₅ applied (lbs/acre) X (0.06)					
8. Organic P ₂ O ₅ Application Method	None applied. Value = 0	Immediate incorporation or applied on ≥80% cover. Value = 0.5	Incorporation in ≤1 week or applied on 50% to 80% cover. Value = 1.0	Incorporation in >1 week and ≤3 months or applied on 30% to 49% cover. Value = 2.0	No incorporation or incorporation >3 months or applied on <30% cover. Value = 4.0	
Deduct 2 points if field runoff flows through a designed grassed waterway.						
Total Phosphorus Index Value for the Site						

Phosphorus Index Field Summary											
Name:	Farm:										
	Field Identification										
Site Characteristic											
1. Erosion (Value)											
2. Connectivity to Water (Value)											
3. Runoff Class (Value)											
4. Soil Phosphorus (Value)											
5. Fertilizer P ₂ O ₅ Rate (Value)											
6. Fertilizer P ₂ O ₅ Method (Value)											
7. Organic P ₂ O ₅ Rate (Value)											
8. Organic P ₂ O ₅ Method (Value)											
9. Grassed Waterway (-2 if present)											
Total Field Score											
Field Rating (L, M, H, VH)											

Field Vulnerability for Phosphorus Loss to Surface Water	
Phosphorus Index	Generalized Interpretation of Phosphorus Index & Management
< 15 = Low	Low potential for phosphorus movement from the field. If farming practices are maintained at the current level there is a low probability of an adverse impact to waters of the state from phosphorus loss. Sewage sludge can be applied to meet the recommended nitrogen for the next grass crop or nitrogen removal of the next legume crop.
15 to 30 = Medium	Medium potential for phosphorus movement from the field. The chance of organic material and nutrients getting into waters of the state exists. Runoff reduction practices such as buffers, setbacks, cover crops, and crop residue practices alone or in combination should be considered to reduce phosphorus loss impacts. Sewage sludge can be applied to meet the recommended nitrogen for the next grass crop or nitrogen removal of the next legume crop. Application of phosphorus at the crop removal rate should be considered.
31 to 45 = High	High potential for phosphorus movement from the field and for an adverse impact on waters of the state unless remedial action is taken. Runoff reduction practices such as buffers, setbacks, cover crops, and crop residue practices alone or in combination should be considered to reduce phosphorus loss impacts. Sewage sludge application rate shall be limited to the phosphorus crop removal rate.
>45 = Very High	Very high potential for phosphorus movement from the field and an adverse impact on waters of the state. Remedial action is required to reduce the risk of phosphorus loss. A complete soil and water conservation system is needed. Land application of sewage sludge is prohibited.

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Southeast District Office

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Northeast District Office

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Northwest District Office

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