

TO BE RESCINDED

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.
- (F) The pollutant ceiling concentrations, cumulative pollutant loading rates, and pollutant monthly average concentrations for sewage sludge shall not exceed the concentrations listed in table F-1, table F-2 and table F-3 of this rule:

(1) Pollutant ceiling concentrations.

Table F-1

| 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.

Table F-2

| 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.

Table F-3

| 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 |

(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.

(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.

(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.

(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.

(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 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.
- (1) Alternative one, time and temperature regime. 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:

Equation number one is: $D = 131,000,000 / 10^{0.1400T}$

Where D equals time in days and T equals 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:

Equation number two is: $D = 50,070,000 / 10^{0.1400T}$

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

- (2) Alternative two, high pH and high temperature process. 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.

- (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 variable 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.
 - (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. 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. 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. 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. 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. 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. Sewage sludge is irradiated with gamma rays from certain isotopes, such as ^{60}Co cobalt and ^{137}Cs 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. 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. 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.

- (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. 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. 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. 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. 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. 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. 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.
- (Q) Vector attraction reduction options.
- (1) Vector attraction reduction option number one. 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. 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. 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. 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. 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. 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. 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. 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. 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. 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.

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Certification

Date

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