

## Chapter 391-3-6-.17(7) Pathogen Reduction Requirements

(7) Pathogen Requirements. This subparagraph contains the requirements for a sewage sludge to be classified as either Class A or Class B with respect to pathogens as well as specific site restrictions for land application of a Class B sewage sludge.

(a) Class A Sewage Sludge. To be classified as Class A with respect to pathogens the sewage sludge shall meet the requirements in 391-3-6-.17(7)(a)1. as well as the requirements of one of the six alternatives described in 391-3-6-.17(7)(a)2. through (a)7. The Class A pathogen requirements shall be met either before or at the same time the vector attraction reduction requirements are met, with the exception of the vector attraction reduction requirements in 391-3-6-.17(8)(f) through (h).

1. Either the density of fecal coliform in the sewage sludge shall be less than 1000 Most Probable Number per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in the sewage sludge shall be less than three Most Probable Number per four grams of total solids (dry weight basis) at the time the sewage sludge is land applied or is prepared for sale or given away in a bag or other container for application of the land.

2. Alternative 1. The temperature of the sewage sludge shall be maintained at a specific value for a period of time.

(I) When the percent solids of the sewage sludge is seven percent or higher, the temperature of the sewage sludge shall be 50 degrees Celsius or higher; the time period shall be 20 minutes or longer; and the temperature and time period shall be determined using equation (3), except when small particles of sewage sludge are heated by either warmed gases or an immiscible liquid.

$$D = 131,700,000 (3) \\ 0.1400t$$

10

Where,

D = time in days.

t = temperature in degrees Celsius.

(ii) When the percent solids of the sewage sludge is seven percent or higher and small particles of sewage sludge are heated by either warmer gases or an immiscible liquid, the temperature of the sewage sludge shall be 50 degrees Celsius or higher, the time period shall be 15 seconds or longer, and the temperature and time period shall be determined using equation (3).

(iii) When the percent solids of the sewage sludge is less than seven percent and the time period is at least 15 seconds, but less than 30 minutes, the temperature and time period shall be determined using equation (3).

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(iv) When the percent solids of the sewage sludge is less than seven percent; the temperature of the sewage sludge is 50 degrees Celsius or higher; and the time period is 30 minutes or longer, the temperature and time period shall be determined using equation (4).

$$D = 50,070,000 (4)$$

$$0.1400t$$

$$10$$

Where,

D = time in days.

t = temperature in degrees Celsius.

3. Alternative 2. The sewage sludge pH shall be raised to above 12 standard units and shall remain above 12 standard units for 72 hours. At the end of the 72 hour period, the sewage sludge shall be air dried to achieve greater than 50 percent solids. The temperature of the sewage sludge shall be maintained above 52 degrees Celsius for at least 12 hours while the sewage sludge pH is above 12 standard units.

4. Alternative 3. The sewage sludge shall be analyzed before pathogen treatment to determine whether the sewage sludge contains enteric viruses.

(I) If the density of enteric viruses is less than one Plaque-forming Unit per four grams of total solids (dry weight basis), the sewage sludge shall be considered Class A until the next monitoring episode.

(ii) If the density of enteric viruses is equal to or greater than one Plaque-forming Unit per four grams of total solids (dry weight basis), the sewage sludge shall be analyzed for enteric viruses after pathogen treatment. The sewage sludge shall be considered Class A if the density of enteric viruses after pathogen treatment is less than one Plaque-forming Unit per four grams of total solids and the values or range of values for the pathogen treatment process operating parameters are documented. Once the enteric virus reduction is demonstrated for the pathogen treatment process, the sewage sludge shall be considered Class A as long as the pathogen treatment operating parameters are consistent with the documented values or ranges of values.

5. Alternative 4. The sewage sludge shall be analyzed before pathogen treatment to determine if the sewage sludge contains viable helminth ova.

(I) If the density of viable helminth ova is less than one per four grams of total solids (dry weight basis), the sewage sludge shall be considered Class A until the next monitoring episode.

(ii) If the density of viable helminth ova is equal to or greater than one per four grams of total solids (dry weight basis), the sewage sludge shall be analyzed for viable helminth ova after pathogen treatment. The sewage sludge shall be considered Class A if the density of viable

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helminth ova after pathogen treatment is less than one per four grams of total solids and the values or range of values for the pathogen treatment process operating parameters are documented. Once the viable helminth ova reduction is demonstrated for the pathogen treatment process, the sewage sludge shall be considered Class A as long as the pathogen treatment operating parameters are consistent with the documented values or ranges of values.

6. Alternative 5. 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) or 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 either land applied, prepared for sale, or given away in a bag or other container for application to the land.

7. Alternative 6. The sewage sludge shall be treated in one of the Processes to Further Reduce Pathogens as described in 40 CFR 503 Appendix B or treated in a process determined by the EPD to be equivalent to a Process to Further Reduce Pathogens.

(b) Class B Sewage Sludge. To be classified as Class B with respect to pathogens the sewage sludge shall meet one of the following alternatives.

1. Alternative 1. Seven samples of the sewage sludge shall be collected at the time of land application. The geometric mean of the density of fecal coliform in the samples shall be less than either 2,000,000 Most Probable Number per gram of total solids or 2,000,000 Colony Forming Units per gram of total solids.

2. Alternative 2. Sewage sludge that is to be land applied shall be treated in one of the Processes to Significantly Reduce Pathogens as described in 40 CFR 503 Appendix B or treated in a process that is equivalent to a Process to Significantly Reduce Pathogens, as determined by the EPD.

(c) Restrictions for Land Application Sites Receiving Class B Sewage Sludge.

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 14 months after application of sewage sludge.

2. Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of sewage sludge when the sewage sludge remains on the land surface for four months or longer before incorporation, or for 38 months after application when the sewage sludge remains on the land surface for less than four months before incorporation.

3. All other food crops, as well as feed crops, and fiber crops shall not be harvested for 30 days after application of sewage sludge.

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4. Animals shall not be allowed to graze on the land for 30 days after application of sewage sludge.

5. Turf grown on land where sewage sludge is applied shall not be harvested for one year after application of the 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 EPD.

6. Public access to land with a high potential for public exposure shall be restricted for one year after application of sewage sludge.

7. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of sewage sludge.

8. Additional restrictions as may be determined by the EPD.

## Chapter 391-3-6-.17(8) Vector Attraction Reduction

(8) Vector Attraction Reduction. Sewage sludge that is land applied, including sewage sludge sold or given away in a bag or other container for application to the land, shall meet one of the vector attraction reduction requirements contained in 391-3-6-.17(8)(a) through (8)(h) except that bulk sewage sludge that is applied to agricultural land, forests, public contact sites, or reclamation sites may instead meet the vector attraction reduction requirements contained in 391-3-6-.17(8)(I) or (8)(j).

(a) The mass of volatile solids in the sewage sludge shall be reduced by at least 38 percent

(b) If the mass of volatile solids in an anaerobically digested sewage sludge cannot be reduced by at least 38 percent, vector attraction reduction can be demonstrated by anaerobically digesting a portion of the previously digested sewage sludge in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37 degrees Celsius. The volatile solids shall be measured at the beginning and end of the forty day test period. Vector attraction reduction is achieved when the volatile solids in the sewage sludge are reduced by less than 17 percent over the test period.

(c) If the mass of volatile solids in an aerobically digested sewage sludge cannot be reduced by at least 38 percent, vector attraction reduction can be demonstrated by aerobically digesting a portion of the previously digested sewage sludge that has a maximum of 2 percent solids in the laboratory in a bench-scale unit for thirty additional days at 20 degrees Celsius. The volatile solids shall be measured at the beginning and end of the thirty day test period. Vector attraction reduction is achieved when the volatile solids in the sewage sludge are reduced by less than 15 percent over the test period.

(d) 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 20 degrees Celsius.

(e) Sewage sludge shall be treated in an aerobic process for at least fourteen days. During that time, the temperature of the sewage sludge shall be maintained above 40 degrees Celsius with the average temperature above 45 degrees Celsius.

(f) The sewage sludge pH shall be raised to 12 standard units or higher by addition of alkaline material and shall remain at 12 standard units or higher for two hours and then 11.5 standard units or higher for an additional 22 hours without the addition of more alkaline material.

(g) If sewage sludge does not contain unstabilized solids generated in a primary wastewater treatment process, the percent solids shall be equal to or greater than 75 percent based on the moisture content and total solids before mixing with other materials.

(h) If sewage sludge contains unstabilized solids generated in a primary wastewater treatment process, the percent solids shall be equal to or greater than 90 percent based on the moisture content and total solids before mixing with other materials.

(I) Injection of Sewage Sludge.

1. Sewage sludge shall be injected below the surface of the land.

2. No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected.

3. Class A sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen treatment process.

(j) Incorporation of Sewage Sludge.

1. Sewage sludge shall be incorporated into the soil within six hours after land application.

2. Class A sewage sludge that is to be incorporated into the soil shall be applied to the land within eight hours after being discharged from the pathogen treatment process.