



GUIDELINES FOR SUBMITTING A COMPOST PLANT APPLICATION

NAC 444.670 System to process waste: Compost Plant. (NRS 444.560)

Example Compost Specifications

Indicator	Quality Standard for Finished Compost	
Visual	All material is dark brown (black indicates possible burning). Parent material is no longer visible. Structure is mixture of fine and medium size particle and humus crumbs.	
Physical	Moisture: 30-40%, Fine Texture (all below 1/8" mesh)	
Odor	Smells like rich humus from the forest floor; no ammonia or anaerobic odor.	
Nutrient	Carbon: Nitrogen Ratio	<17:1
	Total Organic Matter	20-35%
	Total Nitrogen	1.0-2.0%
	Nitrate Nitrogen	250-350PPM
	Nitrite Nitrogen	0PPM
	Sulfide	0 PPM
	Ammonium	0 or trace
	pH	6.5-8.5
	Cation Exchange Capacity (CEC)	>60 meq/100g
	Humic Acid Content	5-15%
	ERGS Reading	5,000-15,000 mS/cm
Microbiological	Heterotrophic Plate Count	1×10^8 - 1×10^{10} CFU/gdw
	Anaerobic Plate Count	Aerobes: Anaerobes at 10:1 or greater
	Yeasts and Molds	1×10^3 - 1×10^5 CFU/gdw
	Actinomycetes	1×10^6 - 1×10^8 CFU/gdw
	Pseudomonads	1×10^3 - 1×10^6 CFU/gdw
	Nitrogen-Fixing Bacteria	1×10^3 - 1×10^6 CFU/gdw
	Compost Maturity	>50% on Maturity Index at dilution rate appropriate for compost application.
	Compost Stability	<100 mg O ² /Kg compost dry solids-hour
	E. coli	< 3 E. coli/g
	Fecal Coliforms	<1000 MPN/g of dry solids
	Salmonella	< 3 MPN/4g total solids



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NAC 444.670 System to process waste: Compost Plant. (NRS 444.560)

Example Compost Testing/Performance Criteria

Chemical and Biological Measurements of Quality

There are many chemical and biological measurements used to assess quality. A list of some common measurements and comments on these measurements are given below.

Chemical Measurements

Measurement	Comments
pH and alkalinity	pH plays a large role in the availability of plant nutrients. A basic pH can reduce phosphorous, manganese, and zinc availability, while an acidic pH can cause potassium, calcium, nitrogen, copper and molybdenum deficiency. An optimal pH value depends on the system to which compost is to be applied. A pH < 5 is a good indication that the compost measured is not stable and one which probably contains phytotoxic compounds. Very little is known about the effect of alkalinity in composts, except that a compost with high alkalinity may help buffer the system against large pH changes.
cation exchange capacity (CEC)	The CEC is a measure of the exchangeable cations that a compost can absorb. The higher the CEC of a compost, the more exchangeable cations it can hold. The CEC of compost tends to increase as maturity and humic substances increase. The CEC depends on the pH of the compost, thus care should be taken when comparing the CEC of composts with different pH.
salinity	The desired salinity of a compost will vary depending on the application. The salinity of manure composts is usually higher than composts from yard waste. The salinity is typically measured by preparing a water-based paste of the compost, thus this measurement is a function of the dilution ratio of compost to water. Caution should be taken when comparing salinity values of composts where dilution ratios are unknown or are different.
Carbon to Nitrogen ratio (C/N)	The C/N ratio is a measure of the ratio of the total carbon and nitrogen. This ratio is typically used to assess stability and maturity yet it provides no measure of the biological availability of carbon or nitrogen in a sample. For instance, a compost with a high C/N where lignin represents a large fraction of the carbon may have the same impact on a system as a compost with a lower C/N where cellulose represents a large fraction of the carbon. In general it has been suggested that composts with a large C/N may cause nitrogen immobilization, while composts with a small C/N may result in ammonia toxicity
heavy metals	Measurement of heavy metal concentrations in composts produced at composting facilities may be considered if the source material has been shown to contain heavy metals. Studies have shown composts to reduce leaching of heavy metals, but research is still needed to evaluate the extent of irreversibility of this process.

Plant nutrients such as N, P, and K are also commonly measured for composts. The importance of these values will again depend on the desired application.

Stability

Biological measurements such as stability and plant bioassays are often used to assess the quality of compost. Stability measurements will be mentioned below. Plant growth and disease suppression bioassays are discussed in other sections of these proceedings.

The stability of a compost is often measured to assess potential phytotoxic affects of compost. Stability has also been used in combination with other chemical measurements to assess the degree to which composts suppress plant pathogens. A stability measurement is defined here as a measure of the biological activity within a compost sample which has adequate moisture and oxygen and is not inhibited by high (>50 °C) or low (<20 °C) temperatures. A stability test essentially allows one to gain insight into the rate of decomposition and thus how a "finished" compost may be measured with respect to raw or mature composts.



GUIDELINES FOR SUBMITTING A COMPOST PLANT APPLICATION

NAC 444.670 System to process waste: Compost Plant. (NRS 444.560)

Listed below are four common measurements of stability.

1. Heat production

This test relies on the fact that aerobic microorganisms decomposing the compost produce heat and the heat produced is proportional to microbial activity. This test is typically performed by placing the sample in an insulated container with a thermometer. The temperature rise in the sample is used to assess stability. An important note about this test is that the temperature rise is not only a function of the heat generated from microbial activity, but also on the sample weight and moisture content.

2. Oxygen consumption

This test measures oxygen depletion by microbial activity. The test is usually performed in a controlled-temperature and sealed environment. The rate of oxygen depletion from the environment and/or the change in oxygen within the environment over a given period of time are used to assess stability.

3. Pressure change

If a biologically active compost sample is placed in a sealed container along with a solution which absorbs CO₂, the pressure in the container will drop. As oxygen is consumed by aerobic microbes, CO₂ is produced; absorbing the CO₂ from the gas in the container results in a pressure drop. Stability can be assessed by measuring the pressure drop in the container over a given period of time.

4. CO₂ production

This test measures the CO₂ produced by both anaerobic and aerobic microbial activity. The test is performed in a sealed environment and is usually done with some temperature control. The measured rate of CO₂ production and/or the change in CO₂ within the environment over a given period of time are used to assess stability.

One issue common to the biological measurements of stability is that sufficient time is needed for the microbes within the compost to recover from the perturbation associated with material sampling. Most of the techniques listed above require at least two days for the microbial population within the sample to "adjust" to the new environmental conditions before an accurate assessment of stability can be obtained. The user should be wary of stability tests done in less than 48 hours.

Assessing the Process

Records that must be kept by a composting operation to be in compliance with the Nevada requirements and include compost temperature measurements (temperature history), mixing frequency, and metal and fecal coliform concentrations of the final product. Other measurements often recorded include oxygen and carbon dioxide concentration, moisture and volatile solids content. These measurements can be very helpful to you in assessing compost quality.

Temperature

Temperature plays an important role in stability, pathogen (human and plant) destruction and weed seed inactivation. With respect to temperature the Nevada requirements would include: (1) for an enclosed or within-vessel composting operation, temperatures must equal or exceed 55°C (131°F) for a period of three days, (2) for a windrow operation, temperatures must equal or exceed 55°C (131°F) for a period of 15 days and the windrow must be turned at least 5 times during this period, and (3) for an aerated static pile operation, temperatures must equal or exceed 55°C (131°F) for a period of three days and the compost must be covered with 6-12 inches of insulating material during this period.

Temperatures and temperature histories as required by Nevada are sufficient for both pathogen and weed seed inactivation. This result will only hold when actions have been taken (such as mixing or enclosing the pile) to ensure all portions of the compost have been exposed to high temperatures. Thus, the user would want to verify by analysis of temperature histories at several locations in the process that the compost had been exposed to sufficiently high temperatures.

Some compost piles can reach temperatures as high as 70°C (158°F) if not controlled properly. Temperatures this high can significantly reduce microbial activity and the rate of decomposition. This can result in an unstable product and one which is potentially phytotoxic. The user would want to verify longer processing and curing times for a material exposed to temperatures greater than 65°C (150°F) for long periods of time.

One common rule of thumb regarding temperature and stability is that if the temperature difference between the compost and ambient air is greater than 10°C (15°F), the compost is still fairly unstable.

Oxygen and Aeration

Decomposition in composting is performed by both aerobic and anaerobic microorganisms. Aerobic microorganisms are favored because they decompose organic materials more rapidly than anaerobic organisms and they do not produce the nuisance odors typically associated with composting. Thus, one



GUIDELINES FOR SUBMITTING A COMPOST PLANT APPLICATION

NAC 444.670 System to process waste: Compost Plant. (NRS 444.560)

important management strategy in composting is to increase oxygen transfer within the pile. Oxygen transfer can be enhanced by increasing the porosity (volume fraction of air) and/or by forcing air through the compost. Porosity is increased by the addition of bulking agents, control of moisture and mixing of the pile. Overmixing, however, can reduce the particle size and subsequently the porosity of the compost.

Studies have shown that biological activity within a composting operation begins to decrease when oxygen concentration drops below 10% ($\text{CO}_2 > 11\%$), and is significantly reduced when the oxygen concentration drops below 3% ($\text{CO}_2 > 18\%$). Processes operated with a low oxygen concentration could produce unstable compost. If records of a composting operation show low oxygen or high CO_2 concentrations for long periods of time, the user should verify that the material was composted and cured for an extended period to ensure the product is stable.

Moisture

The balance of moisture within the process is highly coupled to both temperature and oxygen control. Moisture is required by all organisms, yet too much moisture will reduce the amount of oxygen supplied to the process. Not enough oxygen will result in anaerobic activity and a decrease in the rate of decomposition. This decrease could result in an unstable product. Also, a large fraction of the heat generated during the composting process is removed by evaporative cooling. Significant amounts of water can be lost as a result of this cooling, so moisture management must be a key component to any composting process.

The moisture content at which moisture becomes limiting to microbial activity and oxygen transport varies among materials. The lower limit of moisture content is about 35-40% (weight of water x 100/total wet weight) and the upper is about 60-70%. The user would want to verify that if moisture content went below 35-40% during the process, measures were promptly taken to increase the moisture content. If moisture was never adjusted, the product could be unstable. If the moisture content of the material went above 60-70%, the user would want to verify that the material was composted longer to compensate for the reduced oxygen transfer, and thus aerobic microbial activity.

Other issues of importance are feedstocks and how they were processed prior to composting. The importance of these issues depends on how the compost is to be used. The extent to which contaminants such as glass, metals and lumber scraps are removed from the compost plays a large role in the quality of the product. The user would want to look closely at the compost for small pieces of plastic and other contaminants prior to accepting delivery.

Summary

A good composting facility should be able to provide the user with regulatory records as well as other monitored parameters upon request. Below is a summary of some questions the end-user would want to answer upon analysis of facility records.

1. *Were temperatures sufficiently high to ensure pathogen and weed seed destruction?*

The user would check for temperatures greater than 55°C (131°F) at several locations in the pile for:

- 3 days if the process is enclosed or within-vessel
- 15 days if the process is a windrow (also check that the pile was mixed at least five times during the 55°C phase)
- 3 days if the process is an aerated static pile (also check that the pile was insulated)

The user would also want to learn about when temperatures were monitored (time before or after mixing) and the depth at which temperatures were measured. Temperatures measured before mixing would generally be higher than if measured right after mixing. Temperatures measured at greater depths in the pile (> 2 ft) would typically be higher than if measured closer to the surface.

1. *Did temperatures exceed 65°C (150°F) for an extended period of time?*

The user would review temperature records as stated above. If temperatures did exceed 65°C (150°F) for a few weeks, the user would want to check the stability of the final product.

2. *Was oxygen limiting to the process?*

If available, the user would review oxygen and CO_2 data. If the oxygen concentration dropped below 5% or the CO_2 rose above 15% for an extended period of time, the user would want to verify the stability of the product. The oxygen concentration can drop and CO_2 rise significantly with increasing distance into the pile, thus the user would want to ask at what depth oxygen and CO_2 were measured to make an accurate estimate of oxygen limitations.

3. *How was moisture controlled within the process?*

If available, the user would review the moisture content and moisture addition records. If moisture content dropped below 30% for an extended period of time and was not adjusted or if moisture content rose above 70%, the user would want to verify the stability of the product.



GUIDELINES FOR SUBMITTING A COMPOST PLANT APPLICATION

NAC 444.670 System to process waste: Compost Plant. (NRS 444.560)

4. *How were contaminants removed from the raw material and final product?*

The user would request information from the facility operator on actions taken to prevent contaminants including metals, plastics, glass and waste lumber from entering the process and the methods used to remove contaminants from the process. S/he should also look at a few batches of compost for contaminants.

§ 503.8 Sampling and analysis.

(a) Sampling. Representative samples of sewage sludge that is applied to the land, placed on a surface disposal site, or fired in a sewage sludge incinerator shall be collected and analyzed.

(b) Methods. The materials listed below are incorporated by reference in this part. These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. The materials are incorporated as they exist on the date of approval, and notice of any change in these materials will be published in the Federal Register. They are available for inspection at the Office of Water Docket, room L-102, U.S. Environmental Protection Agency, 401 M St., SW., Washington, DC, and at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. Copies may be obtained from the standard producer or publisher listed in the regulation. Methods in the materials listed below shall be used to analyze samples of sewage sludge.

(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", EPA 600/1-87-014, 1987. National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (PB 88-154273/AS).

(4) Inorganic pollutants. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA Publication SW-846, Second Edition (1982) with Updates I (April 1984) and II (April 1985) and Third Edition (November 1986) with Revision I (December 1987). Second Edition and Updates I and II are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (PB-87-120-291). Third Edition and Revision I are available from 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, Virginia 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.



GUIDELINES FOR SUBMITTING A COMPOST PLANT APPLICATION

NAC 444.670 System to process waste: Compost Plant. (NRS 444.560)

40 CFR 503.32 Requirements--To meet the NAC requirements choose one of the following alternatives

Choose either Class A or Class B Alternative depending on end use

§ 503.32 Pathogens.

(a) *Sewage sludge—Class A.* (1) The requirement in §503.32(a)(2) and the requirements in either §503.32(a)(3), (a)(4), (a)(5), (a)(6), (a)(7), or (a)(8) shall be met for a sewage sludge to be classified Class A with respect to pathogens.

(2) The Class A pathogen requirements in §503.32 (a)(3) through (a)(8) shall be met either prior to meeting or at the same time the vector attraction reduction requirements in §503.33, except the vector attraction reduction requirements in §503.33 (b)(6) through (b)(8), are met.

(3) *Class A—Alternative 1.*

(i) 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 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 or material derived from sewage sludge is prepared to meet the requirements in §503.10 (b), (c), (e), or (f).

(ii) 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 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 (2), except when small particles of sewage sludge are heated by either warmed gases or an immiscible liquid.

$$D = \frac{131,700,000}{10^{0.1400t}} \quad \text{Eq. (2)}$$

Where,

D=time in days.

t=temperature in degrees Celsius.

(B) When the percent solids of the sewage sludge is seven percent 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 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 (2).

(C) 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 (2).

(D) 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 (3).

$$D = \frac{50,070,000}{10^{0.1400t}} \quad \text{Eq. (3)}$$

Where,

D=time in days.

t=temperature in degrees Celsius.



GUIDELINES FOR SUBMITTING A COMPOST PLANT APPLICATION

NAC 444.670 System to process waste: Compost Plant. (NRS 444.560)

(4) Class A—Alternative 2.

(i) 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 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 or material derived from sewage sludge is prepared to meet the requirements in §503.10 (b), (c), (e), or (f).

(ii)(A) The pH of the sewage sludge that is used or disposed shall be raised to above 12 and shall remain above 12 for 72 hours.

(B) The temperature of the sewage sludge shall be above 52 degrees Celsius for 12 hours or longer during the period that the pH of the sewage sludge is above 12.

(C) At the end of the 72 hour period during which the pH of the sewage sludge is above 12, the sewage sludge shall be air dried to achieve a percent solids in the sewage sludge greater than 50 percent.

(5) Class A—Alternative 3.

(i) 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 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 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 or material derived from sewage sludge is prepared to meet the requirements in §503.10 (b), (c), (e), or (f).

(ii)(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 (a)(5)(ii)(C) of this section 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 (a)(5)(ii)(C) of this section.

(iii)(A) The sewage sludge shall be analyzed prior to pathogen treatment to determine whether the sewage sludge contains viable helminth ova.

(B) 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.

(C) 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.

(D) After the viable helminth ova reduction in paragraph (a)(5)(iii)(C) of this section 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 (a)(5)(iii)(C) of this section.

(6) Class A—Alternative 4.

(i) 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 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 or material derived from sewage sludge is prepared to meet the requirements in §503.10 (b), (c), (e), or (f).



GUIDELINES FOR SUBMITTING A COMPOST PLANT APPLICATION

NAC 444.670 System to process waste: Compost Plant. (NRS 444.560)

(ii) 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 or material derived from sewage sludge is prepared to meet the requirements in §503.10 (b), (c), (e), or (f), unless otherwise specified by the permitting authority.

(iii) 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 or material derived from sewage sludge is prepared to meet the requirements in §503.10 (b), (c), (e), or (f), unless otherwise specified by the permitting authority.

(7) Class A—Alternative 5.

(i) 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 used or disposed; at the time the sewage sludge is prepared for sale or given away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10(b), (c), (e), or (f).

(ii) Sewage sludge that is used or disposed shall be treated in one of the Processes to Further Reduce Pathogens described in appendix B of this part.

(8) Class A—Alternative 6.

(i) 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 used or disposed; at the time the sewage sludge is prepared for sale or given away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10(b), (c), (e), or (f).

(ii) Sewage sludge that is used or disposed shall be treated in a process that is equivalent to a Process to Further Reduce Pathogens, as determined by the permitting authority.

(b) Sewage sludge—Class B. (1)(i) The requirements in either §503.32(b)(2), (b)(3), or (b)(4) shall be met for a sewage sludge to be classified Class B with respect to pathogens.

(ii) The site restrictions in §503.32(b)(5) shall be met when sewage sludge that meets the Class B pathogen requirements in §503.32(b)(2), (b)(3), or (b)(4) is applied to the land.

(2) Class B—Alternative 1.

(i) Seven representative samples of the sewage sludge that is used or disposed shall be collected.

(ii) The geometric mean of the density of fecal coliform in the samples collected in paragraph (b)(2)(i) of this section shall be less than either 2,000,000 Most Probable Number per gram of total solids (dry weight basis) or 2,000,000 Colony Forming Units per gram of total solids (dry weight basis).

(3) Class B—Alternative 2.

Sewage sludge that is used or disposed shall be treated in one of the Processes to Significantly Reduce Pathogens described in appendix B of this part.

(4) Class B—Alternative 3.

Sewage sludge that is used or disposed shall be treated in a process that is equivalent to a Process to Significantly Reduce Pathogens, as determined by the permitting authority.

(5) Site restrictions. (i) 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.

(ii) 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 prior to incorporation into the soil.

(iii) Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of sewage sludge when the sewage sludge remains on the land surface for less than four months prior to incorporation into the soil.



GUIDELINES FOR SUBMITTING A COMPOST PLANT APPLICATION

NAC 444.670 System to process waste: Compost Plant. (NRS 444.560)

- (iv) Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of sewage sludge
 - (v) Animals shall not be grazed on the land for 30 days after application of sewage sludge.
 - (vi) 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 permitting authority
 - (vii) Public access to land with a high potential for public exposure shall be restricted for one year after application of sewage sludge
 - (viii) Public access to land with a low potential for public exposure shall be restricted for 30 days after application of sewage sludge
- (c) Domestic septage. (1) The site restrictions in §503.32(b)(5) shall be met when domestic septage is applied to agricultural land, forest, or a reclamation site; or
- (2) The pH of domestic septage applied to agricultural land, forest, or a reclamation site shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for 30 minutes and the site restrictions in §503.32 (b)(5)(i) through (b)(5)(iv) shall be met.