

# **15A NCAC 02T .1106 PATHOGEN REDUCTION REQUIREMENTS**

(a) The following pathogen requirements shall be met when biological residuals are applied to the land or placed in a surface disposal unit:

- (1) The Class A pathogen requirements shall be met when bulk biological residuals are applied to a lawn, home garden, or public contact use site or sold or given away in a bag or other container for application to the land.
- (2) Biological residuals placed in a surface disposal unit shall be exempt from meeting the Class A or Class B pathogen requirements if the vector attraction reduction method in Rule .1107(b)(2) of this Section is met.
- (3) Programs involving the land application of biological residuals generated by wastewater treatment facilities treating industrial wastewater only that are operational at the time of this Rule's effective date shall comply with the requirements stipulated in this Rule no later than five years from the effective date of this Rule unless the Permittee is adhering to an established schedule in an individual permit, settlement agreement, special order pursuant to G.S. 143-215.2, or other similar document that establishes a later deadline.

(b) For biological residuals to be classified as Class A with respect to pathogens, the following shall be met:

- (1) The requirements in this Paragraph are met either prior to meeting or at the same time as vector attraction reduction requirements in Rule .1107 of this Section are met, unless the vector attraction reduction methods stipulated in Rule .1107(a)(6), Rule .1107(a)(7), and Rule .1107(a)(8) of this Section are met.
- (2) The biological residuals are monitored at the time that the biological residuals are used or disposed or are prepared for sale or giving away in a bag or other container for application to the land for the density of fecal coliform or Salmonella sp. bacteria to demonstrate the following:
  - (A) the density of fecal coliform is less than 1,000 Most Probable Number per gram of total solids (i.e., dry weight basis), or
  - (B) the density of Salmonella sp. bacteria is less than three Most Probable Number per four grams of total solids (i.e., dry weight basis).
- (3) The biological residuals meet one of the following alternatives:
  - (A) Time/Temperature. The temperature of the biological residuals shall be maintained at a specific value for a period of consecutive time in accordance with the following:

Total Solids (percent)	Temperature (t) (degrees Celsius)	Time	Equation to Determine Minimum Holding Time (D) (days)
≥ 7	≥ 50	≥ 20 minutes	$\frac{131,700,000}{10^{0.1400t}}$
≥ 7	≥ 50	≥ 15 seconds <sup>1</sup>	$\frac{131,700,000}{10^{0.1400t}}$
< 7	≥ 50	≥ 15 seconds <30 minutes	$\frac{131,700,000}{10^{0.1400t}}$
< 7	≥ 50	≥ 30 minutes	$\frac{50,070,000}{10^{0.1400t}}$

1 – when residuals are heated by warmed gases or an immiscible liquid

- (B) Alkaline Treatment. The pH of the biological residuals shall be raised to above 12 and remains above 12 for 72 consecutive hours. The temperature of the biological residuals shall be above 52 degrees Celsius for 12 hours or longer during the period that the pH of the biological residuals is above 12. At the end of the 72-hour period during which the pH is above 12, the biological residuals shall be air dried to achieve a total solids greater than 50 percent.

- (C) Prior Testing for Enteric Viruses/Viable Helminth Ova. The biological residuals shall be analyzed prior to pathogen reduction treatment to determine whether the biological residuals contain enteric viruses or viable helminth ova. The density of enteric viruses prior to pathogen reduction treatment shall be less than one Plaque-forming Unit per four grams of total solids (i.e., dry weight basis) or the density of viable helminth ova shall be less than one per four grams of total solids (i.e., dry weight basis). When the density of enteric viruses or viable helminth ova are equal to or greater than these values, the biological residuals shall be considered to be Class A following pathogen reduction treatment if the resultant densities are less than these values and the operating parameters for the pathogen reduction treatment are documented to the satisfaction of the Division. After this demonstration, the biological residuals shall be considered to be Class A as long as the operating parameters for the pathogen reduction treatment are met and documented to the satisfaction of the Division.
  - (D) No Prior Testing for Enteric Viruses/Viable Helminth Ova. The density of enteric viruses in the biological residuals shall be less than one Plaque-forming Unit per four grams of total solids (i.e., dry weight basis) or the density of viable helminth ova in the biological residuals shall be less than one per four grams of total solids (i.e., dry weight basis) at the time that the biological residuals are used or disposed of or is prepared for sale or giving away in a bag or other contained for application to the land.
  - (E) Process to Further Reduce Pathogens - Composting. The biological residuals shall be composted using either the within-vessel method or the static aerated pile method, during which the temperature of the biological residuals is maintained at 55 degrees Celsius or higher for three consecutive days or longer. Alternatively, the biological residuals shall be composted using the windrow method, during which the temperature of the biological residuals is maintained at 55 degrees Celsius or higher for 15 consecutive days or longer. The windrow shall be turned five times during the period when the biological residuals are maintained at 55 degrees Celsius or higher, Natural decay of the biological residuals under uncontrolled conditions are not sufficient to meet this process.
  - (F) Process to Further Reduce Pathogens - Heat Drying. The biological residuals shall be dried by direct or indirect contact with hot gases to reduce the moisture content of the biological residuals to 10 percent or lower. During the process, either the temperature of the biological residuals particles exceeds 80 degrees Celsius or the wet bulb temperature of the gas in contact with the biological residuals as they leave the dryer exceeds 80 degrees Celsius.
  - (G) Process to Further Reduce Pathogens - Heat Treatment. The biological residuals shall be heated to a temperature of 180 degrees Celsius or higher for 30 minutes. This process is only available to biological residuals that are in a liquid state.
  - (H) Process to Further Reduce Pathogens - Thermophilic Aerobic Digestion. The biological residuals shall be agitated with air or oxygen to maintain aerobic conditions, and the mean cell residence time of the biological residuals shall be 10 days at between 55 and 60 degrees Celsius. This process is only available to biological residuals that are in a liquid state.
  - (I) Process to Further Reduce Pathogens - Beta Ray Irradiation. The biological residuals shall be irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (i.e., approximately 20 degrees Celsius).
  - (J) Process to Further Reduce Pathogens - Gamma Ray Irradiation. The biological residuals shall be irradiated with gamma rays from certain isotopes, such as Cobalt 60 and Cesium 137, at room temperature (i.e., approximately 20 degrees Celsius).
  - (K) Process to Further Reduce Pathogens - Pasteurization. The temperature of the biological residuals shall be maintained at 70 degrees Celsius or higher for 30 minutes or longer.
- (c) For biological residuals to be classified as Class B with respect to pathogens one of the following shall be met:
- (1) Fecal Coliform Density Demonstration. Seven samples of the biological residuals are collected at the time the residuals are used or disposed, and the geometric mean of the density of fecal coliform in the samples collected is less than either 2,000,000 Most Probable Number per gram of total solids (i.e., dry weight) or 2,000,000 Colony Forming Units per gram of total solids (i.e., dry weight basis).
  - (2) Process to Significantly Reduce Pathogens. The biological residuals processed in a process to significantly reduce pathogens. The processes to significantly reduce pathogens are as follows:

- (A) Aerobic Digestion. Biological residuals are agitated with air or oxygen to maintain aerobic conditions for a specific mean cell time at a specific temperature. Values for the mean cell residence time and temperature are between 40 days at 20 degrees Celsius and 60 days at 15 degrees Celsius.
- (B) Air Drying. Biological residuals are dried on sand beds or on paved or unpaved basins for a minimum of three months. During two of the three months, the ambient average daily temperature is above zero degrees Celsius.
- (C) Anaerobic Digestion. Biological residuals are 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 are between 15 days at 35 to 55 degrees Celsius and 60 days at 20 degrees Celsius.
- (D) Composting. Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the biological residuals is raised to 40 degrees Celsius or higher and remains at 40 degrees Celsius or higher for five days. For four hours during the five days, the temperature in the compost pile exceeds 55 degrees Celsius. Natural decay of the biological residuals under uncontrolled conditions is not sufficient to meet this process
- (E) Lime Stabilization. Sufficient lime is added to the biological residuals to raise the pH to 12 after two hours of contact.

*History Note:* Authority G.S. 143-215.1; 143-215.3(a);  
Eff. September 1, 2006.