15A NCAC 02T .1106 PATHOGEN REDUCTION REQUIREMENTS

(a) Class A biological residuals shall meet the following requirements:

(1) The requirements in this Paragraph shall be met no later than meeting the vector attraction reduction requirements in Rule .1107 of this Section, unless the vector attraction reduction methods in Rule .1107(a)(6), Rule .1107(a)(7), and Rule .1107(a)(8) of this Section are met.

(2) Biological residuals shall be monitored for the density of fecal coliform or Salmonella sp. bacteria at the time that the residuals are used or disposed, or at the time they are prepared for sale or giving away in a bag or other container for land application, to demonstrate that:

(A) the density of fecal coliform is less than 1,000 Most Probable Number per gram of total solids on a dry weight basis; or

(B) the density of Salmonella sp. bacteria is less than three Most Probable Number per four grams of total solids on a dry weight basis.

(3) The biological residuals meet one of the following requirements:

(A) Time and 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[1]	$\frac{131{,}700{,}000}{10^{0.1400t}}$
< 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 shall remain 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 or 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 on a dry weight basis or the density of viable helminth ova shall be less than one per four grams of total solids on a 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 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. After this demonstration, the biological residuals shall be considered Class A if the operating parameters for the pathogen reduction treatment are met and documented;

(D) No Prior Testing for Enteric Viruses or 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 on a 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 on a dry weight basis 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 land application;

(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 shall not be deemed to comply with these composting requirements;

(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 shall exceed 80 degrees Celsius or the wet bulb temperature of the gas in contact with the biological residuals as they leave the dryer shall exceed 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 shall be applied only 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 shall be applied only 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, 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, approximately 20 degrees Celsius; or

(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.

(b) Class B biological residuals shall meet one of the following requirements:

(1) Fecal Coliform Density Demonstration. Seven samples of the biological residuals shall be collected at the time the residuals are used or disposed, and the geometric mean of the density of fecal coliform in the samples collected shall be less than either 2,000,000 Most Probable Number per gram of total solids on a dry weight basis or 2,000,000 Colony Forming Units per gram of total solids on a dry weight basis.

(2) Process to Significantly Reduce Pathogens. The biological residuals meet one of the following requirements:

(A) Aerobic Digestion. Biological residuals shall be 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 shall be between 40 days at 20 degrees Celsius and 60 days at 15 degrees Celsius;

(B) Air Drying. Biological residuals shall be dried on sand beds or on paved or unpaved basins for three months. During two of the three months, the ambient average daily temperature shall be above zero degrees Celsius;

(C) Anaerobic Digestion. Biological residuals shall be 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 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 shall be raised to 40 degrees Celsius or higher and shall remain at 40 degrees Celsius or higher for five days. For four hours during the five days, the temperature in the compost pile shall exceed 55 degrees Celsius.

Natural decay of the biological residuals under uncontrolled conditions shall not be deemed to comply with these composting requirements; or

(E) Lime Stabilization. Sufficient lime shall be added to the biological residuals to raise the pH to 12 after two hours of contact.

(c) 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 method in Rule .1107(b)(2) of this Section is met.

(d) The pathogen reduction requirements in Subparagraph (a)(2) and Paragraph (b) of this Rule shall not apply for biological residuals generated from treatment of waste to not contain pathogens.

History Note: *Authority G.S. 143-215.1; 143-215.3(a);*
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