

401 KAR 45:100. Landfarming and composting of special waste.

RELATES TO: KRS 224.01, 224.10, 224.40, 224.50, 7 U.S.C. 136 et seq.

STATUTORY AUTHORITY: KRS 224.10-100, 224.40-100, 224.40-305, 224.50-760, 7 U.S.C. 136 et seq.

NECESSITY, FUNCTION, AND CONFORMITY: KRS Chapter 224 requires the cabinet to adopt administrative regulations for the management, processing, and disposal of special wastes. KRS 224.40-305 requires persons who establish, construct, operate, maintain or permit the use of a waste site or facility to obtain a permit. This chapter establishes the permitting standards for special waste sites or facilities, and the standards applicable to all special waste sites or facilities. This administrative regulation sets forth requirements for special waste landfarming sites or facilities and special waste composting sites or facilities.

Section 1. Applicability. The requirements in this administrative regulation apply to any person disposing of or treating special waste by landfarming or composting.

Section 2. Classifications of Special Waste Landfarming and Composting Sites or Facilities. A special waste landfarming or composting site or facility is classified as a Type A or Type B facility after the cabinet reviews the Notice of Intent filed pursuant to Section 3 of this administrative regulation. The classification is based on the type and quantity of sludge or other special waste to be accepted at the landfarm or composting site or facility. The following classifications are established:

(1) A Type A landfarm or composting facility is a site or facility that accepts Type A wastewater treatment sludge or other special waste. Type A wastewater treatment sludge is sludge with the following parameters:

Cadmium Greater than 10 mg/kg;
Copper Greater than 450 mg/kg;
Lead Greater than 250 mg/kg;
Nickel Greater than 50 mg/kg;
Zinc Greater than 900 mg/kg.

(2) A Type B landfarm or composting facility is a site or facility that accepts Type B wastewater treatment sludge or other special waste. Type B wastewater sludge is sludge with the following parameters:

Cadmium Less than or equal to 10 mg/kg;
Copper Less than or equal to 450 mg/kg;
Lead Less than or equal to 250 mg/kg;
Nickel Less than or equal to 50 mg/kg;
Zinc Less than or equal to 900 mg/kg.

The maximum amount of wastewater treatment sludge that may be processed by a Type B landfarm or composting site or facility is 250,000 gallons or 250 tons (dewatered) per calendar year. If the owner or operator is processing Type B sludge and exceeds this volume limitation, then the site or facility shall be classified as a Type A landfarm or composting facility. Unless otherwise required by the cabinet, an applicant for a Type B landfarming or composting permit shall be exempt from the requirements of publishing a public notice, the posting of financial assurance, the monitoring of groundwater, and postclosure care.

- (3) One (1) time only disposal. An applicant for one (1) time only disposal of special waste by landfarming or composting methods shall submit an application for a Type B landfarming or composting facility unless otherwise directed by the cabinet.
- (4) Other special waste. An application to landfarm or compost special waste other than municipal wastewater treatment sludge shall be classified using the parameters set forth in subsections (1) and (2) of this section and additional parameters based upon the source, chemical and physical characteristics of the waste, the volume of waste, and the waste potential for adverse impact on human health or the environment. After review of the notice of intent filed pursuant to Section 3 of this administrative regulation, the cabinet shall classify the site or facility as either a Type A or Type B landfarming or composting facility. The applicant shall comply with all requirements in this chapter for the designated type of landfarming or composting facility.
- (5) A facility composting a Type A wastewater sludge may, at the discretion of the cabinet, be classified as a Type B facility depending upon the volume of special waste received, methods of composting and siting considerations.
- (6) A special waste landfarm or composting site or facilities classification under this section shall be reevaluated based upon the annual analyses submitted under Section 6(19) or 9(5) of this administrative regulation. The cabinet may reassign a landfarming or composting site or facility classification based on this submittal and require the owner or operator of the landfarm or composting site or facility to modify the permit accordingly.
- (7) Classification under this section shall be based on the average concentration of these metals in a minimum of two (2) consecutive samples taken no closer than thirty (30) days apart. Metal concentration values shall be determined on a dry weight basis. Analysis shall be accomplished by determining the heavy metal concentration of the undried sample (wet weight) and converting to dry weight using percent solids. The following formula shall be used: $\text{mg/L or mg/kg (wet weight)} \div (\text{percent solids}/100) = \text{mg/kg dry weight}$. A single metal parameter shall be sufficient to require a sludge to be classified as Type A.

Section 3. Application Procedure for a Special Waste Landfarming or Composting Permit.

- (1) Notice of intent to apply. An applicant for a special waste landfarming or composting permit shall submit a notice of intent to apply as required under Section 8(1)(b) or (c) of 401 KAR 45:030. Upon review of the notice of intent to apply, the cabinet shall notify the applicant of the waste classification determination and designate the landfarming or composting facility as either a Type A or Type B facility. An applicant may be exempt from submitting a notice of intent prior to submitting the permit application required in subsection (2) of this section if the applicant is classifying itself as a Type A facility. However, the applicant is required to submit a notice of intent form with the permit application specified in subsection (2) of this section.
- (2) Contents of landfarming or composting permit application. Upon determination of a waste classification, a person shall submit the designated permit application for a special waste landfarming or a composting facility as specified in Section 8(1)(b) or (c) of 401 KAR 45:030 to the cabinet. A landfarming application may include parcels of land that are not located contiguously.
- (3) An applicant for a landfarming or composting facility permit shall comply with applicable requirements for a formal permit as specified in 401 KAR 45:030. An applicant for a Type A landfarming or composting facility shall also comply with the public notice requirement in 401 KAR 45:050, the financial assurance requirements of 401 KAR 45:080, the surface and groundwater requirements of 401 KAR 45:160, and the postclosure requirements of Section 4 of this administrative regulation.
- (4) Upon examination of geological aspects and other relevant factors in the permit application by the cabinet, the applicant may be required to prepare a groundwater

monitoring plan to include location and specifications of wells, monitoring parameters and monitoring schedules in accordance with 401 KAR 45:160. This plan shall be required for Type A landfarms or composting facilities.

(5) The cabinet shall not allow landfarming or composting practices that may present a threat to human health or the environment. The cabinet shall base a decision as to the land application or composting suitability of a particular special waste upon the ability of the waste to biodegrade in the environment, the potential for the waste to be managed in a manner consistent with 401 KAR 30:031, the likelihood that waste constituents will contaminate surface water or groundwater, the potential for nuisances from odors or unsightly conditions, and the potential for the waste to harm human health or the environment.

Section 4. Closure and Postclosure of Landfarming and Composting Facilities.

(1) An owner or operator permanently ceasing to accept waste at a Type A or Type B special waste landfarming or composting site or facility shall submit to the cabinet a closure report that includes:

(a) The results of final soil samples taken in accordance with the construction/operation permit within eighteen (18) months following the last application of waste;

(b)

1. Landfarming sites or facilities shall submit a historical summary of all landfarming, by subplot, showing the allowable and actual rates of special waste application, heavy metals and nitrogen, incorporating the annual landfarming review as set forth in Section 6(19) of this administrative regulation; or

2. Composting sites or facilities shall prepare a historical summary of composting activities at the site incorporating the annual composting review report as set forth in Section 9(5) of this administrative regulation.

(c) A certification from the owner or operator that the site or facility is closed and is in compliance with 401 KAR 30:031; and

(d) Any additional information required by the cabinet in the original landfarming or composting permit.

(2) The cabinet shall review the closure report and determine whether any additional monitoring or information shall be required to assure compliance of the site or facility with 401 KAR 30:031. If the site is not in conformance with 401 KAR 30:031 or the requirements of this chapter, the cabinet may take appropriate enforcement actions for violations of this chapter or KRS Chapter 224.

(3) A two (2) year postclosure monitoring maintenance period commencing on the first day after the facility permanently ceases accepting waste is required for all Type A landfarming and composting facilities and for any other landfarming or composting facility required to conduct groundwater or surface water monitoring under 401 KAR 45:160. During the postclosure monitoring and maintenance period, the owner or operator shall conduct groundwater and surface monitoring as required by 401 KAR 45:160, the facility's approved groundwater and surface water monitoring plans, and the terms of the facility's special waste permit.

(4) At the conclusion of the two (2) year postclosure monitoring and maintenance period, the owner or operator shall submit a certification that postclosure is complete and that the site or facility is in compliance with 401 KAR 30:031 and the terms of this chapter. The cabinet shall review the postclosure certification and if no additional monitoring or information is required and the site or facility is not subject to any enforcement actions for violations of this chapter or KRS Chapter 224, then the cabinet shall accept the owner's or operator's certification of postclosure.

(5) Upon acceptance of certification of postclosure, the cabinet shall release the financial assurance bond.

(6) The two (2) year postclosure monitoring and maintenance period may be extended if groundwater contamination as specified in Section 5 of 401 KAR 45:160 is documented and the owner or operator is required to submit a groundwater assessment plan.

(7) Any necessary environmental remediation steps or corrective action for groundwater contamination required under 401 KAR 45:160 shall be performed before the special waste landfarm or composting site or facility postclosure is certified as complete and financial assurance is released.

Section 5. Siting Requirements for Landfarming. Special waste landfarming sites or facilities shall comply with the following siting requirements:

(1) Waste shall not be applied in the 100-year floodplain unless the waste is injected or incorporated;

(2) Land application units shall have a minimum of four (4) feet of soil between the soil surface and both the seasonal high water table and bedrock;

(3) Waste shall not be applied on soils with a permeability rate greater than six (6) inches per hour or less than two-tenths (0.2) inches per hour; and

(4) Land application units shall not be located on land with a slope greater than fifteen (15) percent.

(5) All landfarming facilities shall comply with 401 KAR 30:031 and shall maintain the following buffer zones:

Required Buffer Zones Minimum Distance in Feet From the Boundary of the Application Zone		
Structure or Object	Subsurface Injection or Incorporation	Surface Application
Residences & occupied Buildings	200	300
Water Well	200	300
Surface Water Body	200	300
Karst Feature	200	300
Perennial Stream	200	300
Intermittent Stream	30	50
Ephemeral Stream	30	50
Property Line	30	50
Public Road	30	50

Section 6. Operating Requirements for Special Waste Landfarming Facilities. Special waste landfarming sites or facilities shall comply with the following:

(1) Prior to applying sludges to the land, all sludges shall be processed to significantly reduce pathogens as specified in Section 11 of this administrative regulation.

(2) An operator certified in accordance with 401 KAR 45:090 shall be available at the landfarming site during special waste application. All sludge applications shall be accomplished under the direction of a certified landfarming operator.

(3) When surface application is used in conjunction with soil incorporation methods, incorporation shall occur within forty-eight (48) hours of sludge application.

(4) Surface application without incorporation into the soil shall not be used on land without established vegetative cover or crop residue of at least seventy-five (75) percent.

(5) No hazardous wastes or mixtures of hazardous and solid waste shall be disposed at, discharged to, or placed in a landfarming site.

- (6) No toxic wastes or mixtures of toxic and nontoxic wastes regulated under 7 USC 136 et seq. (the Toxic Substances Control Act) shall be disposed at, discharged to, or placed in a landfarming site.
- (7) The following agricultural use restrictions shall apply:
- (a) Land spreading shall not occur on land where leafy vegetables or root crops for human consumption will be harvested within twelve (12) months;
 - (b) Land spreading shall not occur on land where crops for direct human consumption will be harvested within two (2) months;
 - (c) Dairy grazing shall be prohibited for six (6) months after land spreading. Other livestock grazing shall be prohibited for three (3) months;
 - (d) If the annual application rate of cadmium exceeds 0.44 pound per acre, food chain crops shall not be utilized in the cropping season following land application; and
 - (e) Special waste shall not be land spread where tobacco is to be harvested within five (5) years of waste application, if the annual application rate of cadmium from the sludge exceeds 0.44 pound per acre at any time during the life of the site.
- (8) The general public shall be restricted from the application zone for a period of twelve (12) months after each application, unless the waste has undergone a process to further reduce pathogens in accordance with Section 12 of this administrative regulation.
- (9) Waste shall not be land spread on frozen, snow-covered, ice-covered, or water-saturated soil, or during any precipitation event.
- (10) No waste shall be applied in excess of schedules and rates of waste application approved by the cabinet.
- (11) No raw or unstabilized waste shall be landfarmed. The permittee shall maintain compliance with the ambient air quality standard for odor, as set forth in 401 KAR 53:010.
- (12) The amount of any single surface application shall not be greater than an average one-half (1/2) inch in thickness.
- (13) High pressure spray irrigation of sludge which produces aerosols shall be prohibited.
- (14) Subplots shall be staked or otherwise clearly marked in the field.
- (15) The owner or operator shall have a sign located at the entrance to the landfarming facility. The sign shall indicate the source and type of waste and the type of operation, the name of operator, the permit number, the contact person and the emergency telephone number.
- (16) Surface water or waste ponding within the application zone shall be prohibited.
- (17) Surface run-off and run-on shall be controlled to minimize the possibility of applied waste contaminating nearby surface water or adjacent land areas.
- (18) Records of all landfarming activities shall be maintained on forms provided by the cabinet throughout the operation of the site. The records shall at a minimum contain the schedules and rates of waste application and all laboratory analyses. Records shall be made available to the cabinet upon request.
- (19) Each landfarming owner or operator shall submit an annual report of landfarming activities to the cabinet sixty (60) days prior to the anniversary date of the permit issuance. The report shall be submitted on form DEP 7048 entitled "Annual Landfarming Review" (November 2016). The requirements contained in the annual landfarming review are incorporated in this administrative regulation by reference. The review may be obtained from the Division of Waste Management, 300 Sower Boulevard, Frankfort, Kentucky 40601, (502) 564-6716, between the hours of 8 a.m. to 4:30 p.m., Eastern Time, Monday through Friday, or from the Web site at eec.ky.gov/environmental-protection/waste.
- (20) Operational monitoring shall be performed on the following schedule:
- (a) Soil shall be sampled annually in accordance with the soil monitoring plan in the approved permit application; and

(b) Waste from municipal wastewater treatment, municipal water treatment facilities shall be sampled in accordance with the following table, or more frequently if required by the cabinet. Other waste shall be sampled in accordance with a schedule approved by the cabinet. Waste shall be analyzed for solids content, pH, ammonium nitrogen (NH₄-N), nitrate nitrogen (NO₃-N), total Kjeldahl nitrogen, total phosphorus, total potassium, PCBs, chromium, copper, zinc, nickel, lead, and cadmium. Laboratory analysis results shall be reported in milligrams per kilogram wet and dry weight.

Required Sampling Schedule	
Design Treatment Capacity (gallons per day)	Samples Per Year
Less than 1,000,000	2
1,000,001 - 10,000,000	4
More than 10,000,000	12

(21) Soil pH shall be maintained at six and five-tenths (6.5) or greater during crop production, hay production, or grazing.

(22) Special waste containing concentrations of PCBs greater than one (1) milligram per kilogram shall not be landfarmed.

(23) The maximum amount of metals from special waste that may be applied during the life of the site shall be based upon the cation exchange capacity (CEC) of the soil and shall be as follows:

Maximum Amount of Metals Cation Exchange Capacity (meq/100g)			
Parameter	0-5	5-15	15+
Lead	500 lbs/ac.	1000 lbs/ac.	2000 lbs/ac.
Cadmium	4.46 lbs/ac.	8.92 lbs/ac.	17.84 lbs/ac.
Copper	125 lbs/ac.	250 lbs/ac.	500 lbs/ac.
Nickel	50 lbs/ac.	100 lbs/ac.	200 lbs/ac.
Zinc	250 lbs/ac.	500 lbs/ac.	1000 lbs/ac.

The following equation shall be used to determine the maximum number of tons of waste per acre that may be land spread without exceeding the above limitations:

$$\text{Tons waste / acre} = \frac{(\text{lbs per acre for each parameter Table 4})}{(\text{dry mg / kg of metal in waste sample}) \times 0.002}$$

(24) The amount of nitrogen land spread shall not exceed the nitrogen utilization rate of the vegetative cover in the application zone.

(25) If the laboratory analyses and calculations to determine quantities of metals applied to the soil discloses that the cumulative concentration of a contaminant is above the maximum level permitted under subsection (23) of this section, a written notice shall be given to the cabinet within ten (10) days of receipt of the monitoring results. The owner or operator shall cease further landfarming and submit to the cabinet within forty-five (45) days a report describing proposed corrective actions to be taken by the owner or operator. A notice shall be recorded on the property deed within forty-five (45) days of receipt of the monitoring results stating that the property has received special waste at

concentrations exceeding permitted levels, and that food chain crops shall not be grown due to possible health hazards.

(26) In addition to the operating requirements in this section, the owner or operator who is landfarming Type A sludge shall sample surface water quarterly. Parameters to be monitored shall include pH, ammonium nitrogen (NH₄-N), fecal coliform bacteria, chromium, biological oxygen demand, total organic carbon, and total dissolved solids. A minimum of one (1) upgradient and one (1) downgradient sampling point shall be required.

(27) Owners and operators of Type A landfarming or composting facilities and all other designated facilities shall conduct groundwater monitoring in accordance with 401 KAR 45:160.

(28) If heavy metal applications exceed the amounts listed in subsection (23) of this section, the owner or operator shall immediately commence closure of the facility and immediately submit a closure report containing the information required by Section 4(1) of this administrative regulation. The report shall also include a copy of the notice in the deed advising all future landowners in perpetuity that heavy metal concentrations exceed those allowed by this administrative regulation.

(29) Landfarming sites and facilities shall comply with all requirements set forth in 401 KAR 45:140.

Section 7. Application Rates for Landfarming Sites or Facilities.

(1) The annual application rate shall be the lesser of the application rates as determined for cadmium and for nitrogen utilization.

(2) Determine the percent of available organic nitrogen in the special waste using the following calculation: Percent available organic N = (percent total N) - (percent NH₄-N) - (percent NO₃-N).

(3) Determine the amount of nitrogen that shall be available for plant uptake at the landfarming site using one (1) of the following calculations depending on the application method:

(a) Incorporation: Lbs available N/ton = (percent NH₄-N x 20) + (percent NH₃-N x 20) + (percent available organic N x 4).

(b) Surface application: Lbs available N/ton = (percent NH₄-N x 10) + (percent NO₃-N x 20) + (percent available organic N x 4).

$$\text{Tons/acre} = \frac{\text{Nitrogen utilization rate of the vegetative cover}}{\text{Lbs available organic N/ton}}$$

(4) The annual application rate of cadmium from special waste shall not exceed 0.44 pound per acre. The annual application rate shall be determined using the following calculation:

$$\text{Tons/acre} = \frac{\text{pounds of allowable cadmium per acre}}{(\text{mg per kg of cadmium in sample}) \times 0.002}$$

Section 8. Sludge Giveaway Program. A municipal water or wastewater treatment sludge generator may give away sludge equal to or less than the metal concentration limitation specified in Section 2(2) of this administrative regulation to persons for subsequent use as a soil conditioner. This program shall be operated under a registered permit-by-rule in accordance with this administrative regulation and 401 KAR 45:070. The maximum amount

of sludge that may be distributed annually to any person is limited to 2000 pounds (dry weight).

- (1) During operation of the giveaway program the generator shall:
 - (a) Maintain a list of names and addresses of all persons receiving the sludge;
 - (b) Submit annually to the cabinet the sludge analysis performed in accordance with the schedule contained in Section 6(20) of this administrative regulation, and a copy of the distribution log;
 - (c) Provide to persons receiving waste, copies of the sludge analyses and a brochure, approved by the cabinet, explaining the proper procedures to be utilized in the landfarming of sludge; and
 - (d) Use a process to significantly reduce pathogens in accordance with Section 11 of this administrative regulation.
- (2) Unless the sludge has undergone a process to further reduce pathogens in accordance with Section 12 of this administrative regulation, it shall not be used in a manner likely to allow direct human contact for a period of twelve (12) months from the date of application.
- (3) The sludge generator shall maintain another approved means of sludge disposal.

Section 9. Operating Requirements for Composting Facilities. Composting facilities shall comply with the following:

- (1) The owner or operator shall dispose in a permitted waste management facility any materials that do not meet standards for distribution within one (1) month of such a determination;
- (2) After the compost has completed the curing process, at least seventy-five (75) percent of the compost shall be distributed within one (1) year;
- (3) Use one (1) or more processes to further reduce pathogens in accordance with Section 12 of this administrative regulation;
- (4) Process and store compost on an impermeable pad, or provide information on soils at the facility and a groundwater quality assurance plan;
- (5) Each composting owner or operator shall submit an annual report to the cabinet sixty (60) days prior to the anniversary date of the permit issuance. The report shall be submitted on form DEP 7048A entitled "Annual Composting Review" (November 2016). The requirements contained in the annual composting review are incorporated in this administrative regulation by reference. The review may be obtained from the Division of Waste Management, 300 Sower Boulevard, Frankfort, Kentucky 40601 (502) 564-6716, between the hours of 8 a.m. to 4:30 p.m., Eastern Time, Monday through Friday, or from the Web site at eec.ky.gov/environmental-protection/waste; and
- (6) Composting sites or facilities shall comply with all requirements set forth in 401 KAR 45:140.

Section 10. Usage of Composted and Treated Special Waste.

- (1) Composted special waste and treated special waste that has undergone additional treatment to a level of a process to further reduce pathogens, as described in Section 12 of this administrative regulation, shall meet the following criteria in order to be distributed or marketed to the general public:
 - (a) The final product shall not exceed Type B metals concentration limits as specified in Section 2(1)(b) of this administrative regulation.
 - (b) A brochure shall accompany all compost or treated special waste sold or given away. The brochure shall be subject to cabinet approval and shall contain, at a minimum, the following information:
 1. The source or sources of the original material;
 2. A recent analysis within six (6) months of the finished product; and
 3. Suggested uses and application rates for the product; and

(c) The quantity distributed shall be limited to fifty (50) tons per person per year for composted special waste and fifteen (15) tons per person per year for treated special waste.

(2) A final product that exceeds metals concentration limits or exceeds the quantity limitation set forth in subsection (1) of this section shall be disposed or distributed in accordance with the facility's permit or otherwise directed by the cabinet.

Section 11. Processes to Significantly Reduce Pathogens. processes to significantly reduce pathogens shall include one (1) or more of the following:

(1) Aerobic digestion. The process shall be conducted by agitating sludge with air or oxygen to maintain aerobic conditions at residence times ranging from sixty (60) days at fifteen degrees Celsius (15°C) to forty (40) days at twenty degrees Celsius (20°C), with a volatile solids reduction of at least thirty-eight (38) percent.

(2) Air drying. Liquid sludge shall be allowed to drain or dry on under-drained sand beds, or paved or unpaved basins in which the sludge shall be at a depth of nine (9) inches. Air drying shall be conducted for a minimum of three (3) months, with two (2) months of temperatures which average on a daily basis above zero degrees Celsius (0°C).

(3) Anaerobic digestion. The process shall be conducted in the absence of air at residence times ranging from sixty (60) days at twenty degrees Celsius (20°C) to fifteen (15) days at thirty-five degrees Celsius (35°C) to fifty-five degrees Celsius (55°C), with a volatile solids reduction of at least thirty-eight (38) percent.

(4) Composting. Using the within-vessel, static aerated pile or windrow composting methods, the special waste shall be maintained at minimum operating conditions of forty degrees Celsius (40°C) for five (5) days. For four (4) hours during this period, the temperature shall exceed fifty-five degrees Celsius (55°C).

(5) Lime stabilization. Sufficient lime shall be added to produce a pH of twelve (12) for two (2) hours of contact time.

(6) Other methods. Other methods or operating conditions may be acceptable if pathogens and vector attraction of the waste (volatile solids) are reduced to an extent equivalent to the reduction achieved by any of the above methods.

Section 12. Processes to Further Reduce Pathogens. Processes to further reduce pathogens shall include one (1) or more of the following:

(1)

(a) Composting.

1. Using the within-vessel composting method, the waste shall be maintained at operating conditions of fifty-five degrees Celsius (55°C) or greater for three (3) days.

2. Using the static aerated pile composting method, the waste shall be maintained at operating conditions of fifty-five degrees Celsius (55°C) or greater for three (3) days.

3. Using the windrow composting method, the waste shall attain a temperature of fifty-five degrees Celsius (55°C) or greater for at least fifteen (15) days during the composting period. Also, during the high temperature period, there shall be a minimum of five (5) turnings of the windrow.

(b) Heat drying. Dewatered sludge cake shall be dried by contact with hot gases, and moisture content shall be reduced to ten (10) percent or lower. Sludge particles shall reach temperatures in excess of eighty degrees Celsius (80°C), or the wet bulb temperature of the gas stream in contact with the sludge at the point when it leaves the dryer shall be in excess of eighty degrees Celsius (80°C).

(c) Heat treatment. Liquid sludge shall be heated to 180 degrees Celsius (180°C) for thirty (30) minutes.

(d) Thermophilic aerobic digestion. Liquid sludge shall be agitated with air or oxygen to maintain aerobic conditions at residence times of ten (10) days at fifty-five to sixty degrees Celsius (55° - 60° C), with a volatile solids reduction of at least thirty-eight (38) percent.

(e) Other methods. Other methods or operating conditions may be acceptable if pathogens and vector attraction of the waste (volatile solids) are reduced to an extent equivalent to the reduction achieved by any of the methods in paragraphs (a) to (d) of this subsection.

(2) Any of the processes described in paragraphs (a) to (d) of this subsection, if added to the processes described in Section 11 of this administrative regulation, further reduce pathogens. Because the processes listed in paragraphs (a) to (d) of this subsection, on their own, do not reduce the attraction of disease vectors, they are only add-on in nature:

(a) Beta ray irradiation. Sludge shall be irradiated with beta rays from an accelerator at dosages of at least one (1.0) megarad at room temperature, approximately twenty degrees Celsius (20°C).

(b) Gamma ray irradiation. Sludge shall be irradiated with gamma rays from certain isotopes, such as Cobalt-60 and Cesium-137, at dosages of at least one (1.0) megarad at room temperature, approximately twenty degrees Celsius (20°C).

(c) Pasteurization. Sludge shall be maintained for at least thirty (30) minutes at a minimum temperature of seventy degrees Celsius (70°C).

(d) Other methods. Other methods or operating conditions may be acceptable if pathogens are reduced to an extent equivalent to the reduction achieved by any of the methods described in paragraphs (a) to (c) of this subsection.

(18 Ky.R. 3097; 3442; eff. 6-24-1992; TAm eff. 7-8-2016; TAm eff. 12-21-2016; Crt eff. 9-5-2018; TAm eff. 5-7-2019.)