

SUGGESTED SUBSTITUTE – TO AMENDED AFTER COMMENTS VERSION

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**ENERGY AND ENVIRONMENT CABINET
Department for Environmental Protection
Division of Waste Management**

401 KAR 45:160. Surface and groundwater monitoring and corrective action for special waste sites or facilities.

RELATES TO: KRS 224.1[224.01], 224.10, 224.40, 224.46, 224.50, 224.99, Chapter 322A, 40 C.F.R. 302.4, Appendix A

STATUTORY AUTHORITY: KRS 224.10-100, 224.40-305, 224.50-760(1)(d), 40 C.F.R. 302.4

NECESSITY, FUNCTION, AND CONFORMITY: KRS 224.50-760(1)(d) authorizes[~~Chapter 224 requires~~] the cabinet to promulgate[~~adopt~~] administrative regulations for the treatment, management, processing, or disposal of 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 establishes[~~sets forth~~] the standards for groundwater and surface water monitoring and corrective action at special waste sites or facilities. This administrative regulation does not establish requirements for surface or groundwater monitoring of special waste sites or facilities where biosolids from the treatment of domestic sewage or sewage sludge from a treatment facility have been land applied, except as it applies to biosolid permit corrective action plans.

Section 1. Applicability.

(1) The requirements of this administrative regulation apply to owners and operators of special waste landfills, Type A special waste landfarming or composting sites or facilities, other special waste sites or facilities at which the cabinet determines groundwater and surface water monitoring shall be required pursuant to 401 KAR 45:100, Section 3(3), and special waste sites or facilities required to perform corrective action as a result of documented groundwater contamination.

(2) Designs, reports, and plans constituting the “public practice of geology”, as defined by[~~in~~] KRS 322A.010(3), shall be developed by a person registered pursuant to KRS Chapter 322A, except as established in[~~provided for~~] by KRS 322A.080.

(3)(a) Landfarming and composting sites or facilities required to monitor surface water shall comply with [~~Section 6(26) of~~] 401 KAR 45:100, Section 6(26).

(b) Landfarming and composting sites or facilities required to perform corrective action shall comply with Section 5 of this administrative regulation.

(c) The owner or operator shall satisfy the requirements of this administrative regulation for all wastes and waste constituents contained in the site or facility.

(d) The cabinet may waive baseline groundwater characterization and groundwater monitoring, in accordance with[~~subject to~~] the provisions of 401 KAR 30:020.

Section 2. Design Requirements for Groundwater Monitoring Systems. (1) The groundwater quality monitoring system to be utilized in the groundwater monitoring plan shall accurately analyze groundwater quality and characterize regional and local groundwater flow and flow systems. The monitoring system shall include[~~consist~~] at a minimum, of the monitoring requirements established in paragraphs (a) and (b) of this subsection.[~~following:~~]

~~(a)(1)~~ Background wells shall be located so that they will not be affected by groundwater contamination from the disposal area. Background wells shall be placed as **established[described]** in **subparagraphs 1. and 2.[paragraphs (a) and (b)]** of this **paragraph[subsection]**.

~~1.(a)~~ At least one (1) background well **shall be placed** at a point hydraulically upgradient from the disposal area in the direction of increasing static head that is capable of providing data representative of groundwater not affected by the special waste site or facility.

~~2. If(b) When~~ the special waste site or facility occupies the most upgradient position in the flow system or the upgradient area is not representative, sufficient downgradient or side gradient monitoring wells shall be placed to accurately characterize the groundwater quality and regional and local groundwater flow systems[Background wells shall be located so that they will not be affected by groundwater contamination from the disposal area]; and

~~(b)1.(2)~~ At least two (2) monitoring wells **shall be placed** at points hydraulically downgradient in the direction of decreasing static head from the area in which special waste has been or will be disposed.

~~2.~~ The cabinet may allow springs for monitoring points if the springs are hydraulically downgradient from the area in which special waste has been or will be disposed, if the springs are developed and protected in a manner approved by the cabinet, and if the springs are capable of detecting any contamination from the disposal facility.

~~3.~~ Downgradient monitoring wells shall be located so that they will provide early detection of groundwater contamination and progressive monitoring of the phases and units of the site or facility.

~~(2)(3)~~ An alternative monitoring plan may be proposed in an application for a special waste site or facility in accordance with **[Section 3(2) of]401 KAR 45:110, Section 3(2)**.

Section 3. Requirements for Monitoring Well Construction.

(1)~~(a)~~ Precautions shall be taken during drilling and construction of monitoring wells to avoid introducing contaminants into the borehole.

~~(b)~~ Only potable water shall be used in drilling monitoring wells[**unless otherwise approved by the cabinet**].

~~(c)~~ Drilling muds shall not be used except with prior approval of the cabinet.

~~(d)~~ Air systems and drilling lubricants shall not introduce contaminants into the boreholes.

(2) Decontamination of all equipment to be placed into the boring shall be performed before use at the site and between boreholes. **If[Where]** possible, upgradient wells shall be drilled first.

(3) Monitoring wells shall be cased as follows:

(a) In a manner to ensure the integrity of the monitoring well borehole by isolating water bearing units which are sampled by each well;

(b) With a minimum casing diameter of four (4) inches, unless otherwise approved by the cabinet in writing;

(c) With screens and appropriate gravel or sand where necessary, to enable collection of samples at depths where appropriate aquifer flow zones exist;

(d) To allow the casing to protrude at least one (1) foot above ground;

(e) To provide a drill hole diameter that is a minimum of four (4) inches larger than the outside diameter of the well casing;

(f) To produce an annular space above the sampling depth that is sealed to prevent contamination of samples and the groundwater; and

(g) If plastic casing is used, it shall be threaded and gasket sealed to preclude potential sample contamination from solvent welded joints, unless otherwise provided by the cabinet in the permit.

(4) Monitoring well casings shall be enclosed in a protective cover that shall:

- (a) Be of sufficient strength to protect the well from damage by heavy equipment and vandalism, and also include protective barrier steel posts at the corners of the concrete pad;
 - (b) Be installed into firm rock, unless otherwise approved by the cabinet;
 - (c) Be grouted and placed with a cement collar below the frost line to hold it firmly in position, unless otherwise approved by the cabinet;
 - (d) Be numbered and painted in a highly visible color;
 - (e) Protrude at least one (1) inch higher above grade than the monitoring well casing;
 - (f) Have a locking cap; and
 - (g) Be made of steel or any other material of equivalent strength.
- (5) Each monitoring well shall have a concrete pad extending two (2) feet around the well and sloped away from the well.

Section 4. Sampling and Analysis.

- (1) Parameters listing. Owners or operators of special waste sites or facilities that require groundwater monitoring shall conduct sampling and analysis from each monitoring well for the parameters **established[listed]** in Section 8 of this administrative regulation.
- (2) Reporting of analysis results. Analyses of data required by this section shall be submitted to the cabinet. **The reporting may be submitted** on a form provided by the cabinet **or in another format.** **The report shall be submitted** within sixty (60) days of sampling or fifteen (15) days after completion of analyses, whichever is sooner, unless the cabinet approves another time period in the permit. Frequency of sampling shall be as **established[indicated]** in Section 8 of this administrative regulation.
- (3) If analysis of the sample results indicates contamination, the owner or operator shall notify the cabinet within forty-eight (48) hours of receiving the analysis results and shall arrange for the cabinet to split a sample no later than ten (10) days from the receipt of the results.

Section 5. Groundwater Contamination Assessment and Corrective Action.

- (1) The owner or operator of a special waste site or facility shall prepare and submit a groundwater assessment plan if laboratory analyses of one (1) or more public or private water supplies or monitoring wells at the site or facility shows the presence of one (1) or more parameters **established[listed]** in 40 C.F.R. 302.4 Appendix A [~~as of September 1994~~], above the maximum contaminant level (MCL) as **established[specified]** in 401 KAR 30:031 or significant increase over established background levels for parameters that have no MCL. For parameters that have no maximum contaminant levels, a significant increase over background shall be determined using a statistical test as **established[specified]** in Section 6 of this administrative regulation.
- (2) Confirmation sampling. The owner or operator of a special waste site or facility shall not be required to submit a groundwater assessment plan if ~~**the following conditions are met**~~:
 - (a) Within ten (10) days after receipt of sample results showing groundwater contamination the owner or operator resamples the affected wells; and
 - (b) Analysis from resampling **establishes [shows to the cabinet's satisfaction]** that groundwater contamination has not occurred.
- (3) The owner or operator of a special waste site or facility shall ~~**be required to**~~ provide alternate water supplies to affected parties within twenty-four (24) hours of notification of the cabinet that sample results indicate contamination of a drinking water supply if it has been determined that the special waste site or facility is the probable source of contamination.
- (4) The groundwater assessment plan shall be submitted to the cabinet within thirty (30) days of the occurrence of the conditions **established[described]** in subsection (1) of this section. The assessment plan shall **state[specify]** the manner in which the owner or operator will determine the existence, quality,

quantity, areal extent, and depth of groundwater degradation, and the rate and direction of migration of contaminants in the groundwater. The assessment plan shall be prepared by a registered geologist pursuant to ~~[subsection (2) of]~~ Section 1(2) of this administrative regulation [qualified professional in the field of hydrogeology] and shall be implemented upon approval by the cabinet in accordance with the approved implementation schedule. The assessment plan shall be implemented within sixty (60) days after approval by the cabinet. The plan shall contain, at a minimum, ~~[the following information]:~~

- (a) The number, location, size, casing type and depth of wells, lysimeters, borings, pits, piezometers, and other assessment structures or devices to be used;
- (b) Sampling and analytical methods for the parameters to be evaluated;
- (c) Analyses of all parameters listed in the approved monitoring plan in the permit application, and any other parameter required by the cabinet; and
- (d) Evaluation procedures, including the use of previously gathered groundwater quality information, to determine the concentration, rate, and extent of groundwater degradation or pollution from the facility.

(5) For public or private water supplies that **could[may]** be adversely affected by the facility, the owner or operator shall submit a detailed hydrogeologic study addressing the potential effect of the site or facility on the water supply.

(6) If the ~~[cabinet determines that the]~~ assessment plan is inadequate, the cabinet may modify the plan and approve the plan as modified.

(7) Within ninety (90) days after the implementation of the groundwater assessment plan, the owner or operator shall submit a groundwater assessment report containing the new data collected, analysis of the data, and recommendations on the necessity for abatement.

(8) The cabinet may require abatement measures prior to approval of the groundwater assessment plan. **These are conditions that require the declaration of a secretary's emergency, as established in KRS 224.01-400, or impacts to offsite receptors, including to the public or the environment.**

(9) Within ninety (90) days of cabinet approval of the groundwater assessment report, but no later than one (1) year from the event **established[specified]** in subsection (1) of this section, the owner or operator shall submit a remedial action plan to include ~~[the following]:~~

- (a) The specific methods or techniques to be used to abate groundwater contamination from the facility;
- (b) The specific methods or techniques to be used to prevent further groundwater contamination from the facility; and
- (c) A description of the means used to restore or replace public or private water supplies affected by contamination from the special waste facility.

(10) The owner or operator of a special waste site or facility shall take any other steps deemed necessary by the cabinet to ensure protection of human health and the environment.

(11) Corrective action measures under this administrative regulation shall be initiated and completed within a period of time as **established[specified]** by the cabinet considering the extent of degradation determined pursuant to subsection (1) of this section.

(12) Corrective action measures under this administrative regulation may be terminated upon approval of the cabinet **if[when]** the owner or operator demonstrates that concentrations have been reduced to levels below the maximum contaminant level or naturally occurring background.

Section 6. Statistical Methods for Groundwater Analysis. The owner or operator of a special waste site or facility shall use the following statistical procedure in determining **if[whether]** background values or concentration limits have been significantly exceeded:

(1) If the level of a parameter is to be compared to the parameter's background value and that background value has a sample coefficient of variation less than one (1.00):

(a) The owner or operator shall take at least four (4) portions from a sample at each well and determine whether the difference between the mean of the parameter at each well, using all portions taken, and the background value for the parameter is significant at the 0.05 level using the Cochran's Approximation to the Behrens-Fisher Students' t-test. If the test indicates that the difference is significant, the owner or operator shall repeat the same procedures, with at least the same number of portions as used in the first test, with fresh samples from the monitoring wells. If this second round of analyses indicates that the difference is significant, the owner or operator shall conclude that a statistically significant change has occurred; or

(b) With prior approval from the cabinet, the owner or operator may use an equivalent statistical procedure for determining ***if[whether]*** a statistically significant change has occurred. The cabinet shall approve ***the[such-a]*** procedure in the permit if it is found that the alternative procedure reasonably balances the probability of falsely identifying a noncontaminating facility and the probability of failing to identify a contaminating facility in a manner that is comparable to that of the statistical procedure ***established[described]*** in paragraph (a) of this subsection; ***and[.]***

(2) In all other situations, the owner or operator shall use a statistical procedure approved in the permit ***that[which]*** provides reasonable confidence that the migration of contamination from a special waste site or facility into and through the groundwater will be indicated. The cabinet shall approve a statistical procedure in the permit that:

(a) Is appropriate for the distribution of the data used to establish background values or concentration limits; and

(b) Provides a reasonable balance between the probability of falsely identifying a noncontaminating facility and the probability of failing to identify a contaminating facility.

Section 7. Baseline Groundwater Quality Characterization Parameters. For special waste sites or facilities that require groundwater monitoring, the following parameters are to be analyzed and the resulting data submitted in the permit application:

(1) For all landfarming or composting sites or facilities required to monitor groundwater, the characterization shall be based on the following ~~[dissolved-]~~metals and other waste analysis based parameters:

- (a) 1. Specific conductance;
2. Chemical oxygen demand;
3. Total organic carbon;
4. Chloride;
5. Iron;
6. Manganese;
7. Sodium;
8. Total nitrogen;
9. Nitrate nitrogen;
10. Chromium;
11. Cadmium;
12. Coliform bacteria;
13. pH;
14. Calcium;
15. Magnesium;

- 16. Potassium;
- 17. Sulfate Bicarbonate; and
- 18. Carbonate.

(b) Groundwater elevation in monitoring wells recorded as a distance from the elevation at the well head referenced to mean sea level based on a United States Geological Survey (USGS) datum; **[.]**

(2) For special waste landfills, used solely for the disposal of coal combustion by-products, the characterization shall be based on the following dissolved metals and other parameters:

- (a) 1. Chloride;
- 2. Chemical oxygen demand;
- 3. Total dissolved solids;
- 4. Total organic carbon;
- 5. Specific conductance;
- 6. pH;
- 7. Copper;
- 8. Nickel;
- 9. Zinc;
- 10. Iron;
- 11. Sodium;
- 12. Arsenic;
- 13. Cadmium;
- 14. Lead;
- 15. Mercury;
- 16. Selenium;
- 17. Calcium;
- 18. Magnesium;
- 19. Potassium;
- 20. Sulfate;
- 21. Bicarbonate; and
- 22. Carbonate.

(b) Groundwater elevations recorded as a distance from the elevation at the well head referenced to mean sea level based on a United States Geological Survey (USGS) datum; **and [.]**

(3) For special waste sites or facilities other than those ***established[specified]*** in subsections (1) and (2) of this section, the characterization shall be for parameters determined by the cabinet based on a review of the chemical analysis of the waste provided in the application.

Section 8. Groundwater Monitoring Parameters.

(1) Owners or operators of landfarming or composting sites or facilities requiring groundwater monitoring shall monitor for the following parameters on a semiannual basis:

- (a) 1. Chemical oxygen demand;
- 2. Total organic carbon;
- 3. Total nitrogen;
- 4. Nitrate nitrogen;
- 5. Lead;
- 6. Chromium;
- 7. Cadmium; and
- 8. Coliform bacteria; **[.]**

- (b) Groundwater elevations in monitoring wells recorded as a distance from the elevation at the well head referenced to mean sea level based on a USGS datum; and
- (c) Monitoring of additional parameters ***that*** may be required by the cabinet based on the waste analysis.

(2)(a) Owners or operators of special waste landfills used solely for the disposal of coal combustion by-products shall monitor semiannually for ~~the following~~:

1.1(a)

- a.1.1*** Chloride;
- b.1.2*** Chemical oxygen demand;
- c.1.3*** Total dissolved solids;
- d.1.4*** Total organic carbon;
- e.1.5*** Specific conductance;
- f.1.6*** pH; and
- g.1.7*** Copper;

2.1(b) Groundwater elevations in monitoring wells recorded as a distance from the elevation at the well head referenced to mean sea level based on a USGS datum; ***and***

3.1(c) Monitoring of additional parameters ***that*** may be required by the cabinet based on a significant increase from the baseline characterization.

(b)1(d) If, after four (4) initial monitoring events, analysis for the parameters in ***paragraph (a)1. through 3.1(paragraphs (a) to (c))*** of this subsection indicates no exceedances above levels ***established/specified*** in Section 5(1) of this administrative regulation, the owner or operator may, upon request, be granted permission from the cabinet to reduce the monitoring parameters to those ***established/listed*** in paragraph (a) of this subsection.

(3) Owners or operators of special waste sites or facilities other than those referenced in subsections (1) and (2) of this section shall monitor quarterly for parameters to be determined by the cabinet based upon chemical analysis of the waste to be disposed.

Section 9. Surface Water Monitoring and Corrective Action.

(1) Special waste sites or facilities required to monitor surface water shall do so in accordance with a plan provided in the permit application. The plan shall be sufficient to characterize the quality of surface water unaffected by the site or facility and to determine if water leaving the site or facility has been contaminated.

(a) Baseline sampling shall include a minimum of two (2) samples collected at no less than thirty (30) day intervals and shall be sufficient to characterize baseline conditions.

(b) Operational surface water monitoring shall be completed in accordance with the surface water monitoring plan approved in the permit application and shall be sufficient to determine if the site or facility is contaminating surface water.

(2) Corrective action shall be completed by a special waste site or facility owner or operator as necessary to comply with 401 KAR 30:031.

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