

**401 KAR 48:205. Technical requirements for petroleum-contaminated soil treatment facilities.**

RELATES TO: KRS 224.01-010, 224.10-100, 224.10-105, 224.20-150, 224.40-100, 224.40-305, 224.40-330, 224.40-605, 224.40-650, 224.70-100, 224.70-110, 224.99-010, 224.99-020, 322

STATUTORY AUTHORITY: KRS 224.10-100(19)(c), (24), 224.40-100, 224.40-305

NECESSITY, FUNCTION, AND CONFORMITY: KRS 224.10-100(19)(c), (24) and 224.40-305 authorize the cabinet to promulgate administrative regulations for the management, processing, and disposal of wastes. KRS 224.40-305 requires that persons engaging in the management, processing, and disposal of solid waste obtain a permit. This administrative regulation establishes requirements for petroleum-contaminated soil treatment facilities.

**Section 1. Definitions.**

(1) "Asphalt plant aggregate dryer" means a low-temperature thermal desorption unit identical in design to a countercurrent rotary dryer that does not have a secondary treatment chamber, typically operates at a soil discharge temperature range from 300 degrees to 600 degrees Fahrenheit, and produces treated soil suitable for use as hot mix asphalt aggregate only.

(2) "Biopile" means a contained vessel or a lined and covered pile used for the biological treatment of petroleum-contaminated soil.

(3) "Conveyor furnace" means a low-temperature thermal desorption unit consisting of a flexible metal belt, which conveys petroleum-contaminated soil through the heating chamber. Soil agitators lift and turn the soil to enhance heat transfer. Organic vapors exiting the chamber are destroyed in an afterburner.

(4) "Low-temperature thermal desorption" means an ex-situ treatment technology that uses heat to physically separate petroleum hydrocarbons from excavated soils that have been screened to remove objects greater than two (2) inches in diameter. Low-temperature thermal desorption units heat soils to temperatures sufficient to volatilize petroleum hydrocarbons and can cause some hydrocarbons to completely or partially decompose. Vaporized hydrocarbons can be additionally treated in a secondary treatment chamber consisting of an afterburner, catalytic oxidation chamber, condenser, or carbon absorption unit.

(5) "Petroleum-contaminated soil" means silt, sand, clay, gravel, or other earthen material; or asphalt, concrete, or absorbent materials containing hydrocarbon concentrations above the levels established in Section 6, Table 3 of this administrative regulation, but does not exhibit a hazardous characteristic or is not a listed hazardous waste as defined in 401 KAR Chapter 31.

(6) "Petroleum-contaminated soil treatment facility" means a solid waste site or facility where petroleum-contaminated soil is treated to reduce contaminant concentrations to or below the levels established in Section 6, Table 3 of this administrative regulation.

(7) "Rotary dryer" means a low-temperature thermal desorption unit that is a cylindrical metal reactor in which soil is brought into contact with heated purge gases, raising the temperature of the soil to physically separate petroleum hydrocarbons from the soil. Soil passing through the unit are lifted and turned to ensure all soil particles are sufficiently heated to adequately vaporize petroleum hydrocarbons out of the soil. Soil can pass through the unit concurrently or countercurrently to the direction of the purge gas flow.

(8) "Thermal screw" means a low-temperature thermal desorption unit consisting of a series of augers that convey, mix, and heat soil to volatilize petroleum hydrocarbons into a purge gas stream, with the exiting organic vapors either collected or destroyed. Heat is

provided indirectly by hot oil or steam circulated through hollow stem augers and the jacketed trough in which each auger rotates.

(9) "Wellhead protection area" means:

- (a) The surface and subsurface area surrounding a water well, well field, or spring, supplying a public water system, through which pollutants are reasonably likely to move toward and reach the water well, well field, or spring; or
- (b) An area defined as a wellhead protection area in a county water supply plan.

#### Section 2. Applicability.

- (1) This administrative regulation establishes minimum standards for the requirements, which shall be met for site selection, design, operation, and closure of a petroleum-contaminated soil treatment facility.
- (2) This administrative regulation applies to a person conducting treatment of excavated petroleum-contaminated soils.

#### Section 3. Siting and Design Requirements for Petroleum-contaminated Soil Treatment Facilities.

- (1) Treatment processes shall include low-temperature: low temperature thermal desorption and biopiles.
- (2)
  - (a) Facility design and operation shall be as established in this administrative regulation and How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites: A Guide for Corrective Action Plan Reviewers (EPA 510-B-94-003; EPA 510-B-95-007; and EPA 510-R-04-002), Chapter IV, Biopiles, and Chapter VI, Low-Temperature Thermal Desorption; and
  - (b) Designs and plans constituting the practice of engineering shall be prepared by a professional engineer licensed in the Commonwealth of Kentucky and shall bear the professional engineer's seal, original signature, and date as established in KRS Chapter 322.
- (3) Siting Considerations.
  - (a) Petroleum-contaminated soil treatment facilities shall maintain buffer zone distances as established in Table 1 of this subsection; and

Table 1. Required buffer zones for a petroleum-contaminated soil treatment facility, minimum distance in feet.

Structure or Feature	Petroleum-contaminated Soil, Closest Boundary (ft)
Residences & occupied buildings	500
Drinking water well	300
Surface water body or wetland	300
Perennial stream	300
Karst feature	300
Public road	50
Intermittent or ephemeral stream	50
Property line	50

- (b) Petroleum-contaminated soil treatment facilities shall not be located in a 100-year floodplain, wellhead protection, area or wetland.

(4)

(a) Storage and preparation of soil to be treated shall be conducted in a roofed enclosure with a concrete floor or in an enclosed container.

(b) Temporary storage of incoming materials, shall not exceed seven (7) days, and shall be:

1. In trucks, trailers, or storage containers with impermeable covers; or
2. On an impermeable pad or synthetic liner with a minimum thickness of thirty (30) mils, with an impermeable cover.

(c) Storage and preparation areas shall be designed to control run-on and run-off.

(5) Biopiles. A biopile treatment system shall include the following:

(a) A liner system with a minimum slope of two (2) percent, designed to contain and capture liquids, that has from bottom to top:

1. A subgrade;
2.
  - a. A twelve (12) inch thick compacted clay liner (CCL) or a twelve (12) inch thick geosynthetic clay liner (GCL) support layer with a maximum remolded coefficient of permeability of  $1 \times 10^{-7}$  centimeters per second in the laboratory; and
  - b. A GCL with a demonstrated hydraulic conductivity less than  $5 \times 10^{-9}$  centimeters per second;
3. A sixty (60) mil thick High-Density Polyethylene (HDPE);
4. A granular leachate collection layer and leachate collection system with an overlain geotextile and an equivalent Synthetic Drainage Layer (SDL) meeting the following requirements:
  - a. The SDL shall not be adversely affected, chemically or physically, by waste placement or leachate; and
  - b. Documentation shall be submitted to ensure chemical compatibility of the SDL chosen; and
5. A twelve (12) inch thick soil layer with a minimum permeability of  $1.0 \times 10^{-3}$  centimeters per second to protect the liner system; or

(b) A reinforced six (6) inch thick concrete pad with a minimum slope of two (2) percent designed to contain and capture liquids that have the following, from bottom to top:

1. The pad shall be overlain by a sixty (60) mil thick HDPE liner;
2.
  - a. A granular leachate collection layer, and leachate collection system with an overlain geotextile; or
  - b. An equivalent SDL; and
3. A twelve (12) inch thick soil layer with a minimum permeability of  $1.0 \times 10^{-3}$  centimeters per second to protect the liner system;

(c) An air inlet and air extraction system with off-gas collection and treatment;

(d) A nutrient and moisture injection system;

(e) A synthetic cover; and

(f) A berm sufficient to control run-on and run-off from a twenty-four (24) hour, 100-year storm event; and

(6) The construction of the liners in paragraphs (a) and (b) of this subsection shall comply with the quality assurance and quality control requirements of 401 KAR 48:206, 48:207, and 48:208.

(7) Low-temperature Thermal Desorption.

(a) A low-temperature thermal desorption facility shall obtain fiscal court approval and an air contaminant source permit from the Division of Air Quality in accordance with

KRS 224.20-150.

(b) The treatment system shall be one (1) of the following:

1. Rotary dryer;
2. Asphalt Plant Aggregate dryer. An Asphalt Plant Aggregate dryer shall operate only in conjunction with a hot mix asphalt operation that uses the treated soil immediately upon being discharged from the treatment unit;
3. Thermal screw; or
4. Conveyor furnace.

(c) The design shall include off-gas collection and treatment system and a particulate collector.

(d) Treated soil shall be stored as established in subsection (4) of this section until analytical results demonstrate compliance with the limits as established in Section 6(1), Table 3 of this administrative regulation.

#### Section 4. Procedures for Excluding the Receipt of Wastes Other than Petroleum-contaminated Soil.

(1)

(a) The permittee shall implement a program at the facility for detecting and preventing the receipt of nonpermitted wastes.

(b) These nonpermitted waste streams include:

1. Household wastes including garbage;
2. Conditionally exempt small quantity generator (CESQG) hazardous wastes;
3. Hazardous waste exempt spill residues;
4. Hazardous wastes as defined in 401 KAR Chapter 31;
5. Polychlorinated biphenyl (PCB) wastes; and
6. Other nonpermitted wastes.

(2) This program shall include:

- (a) Visual inspection of all waste as it is delivered;
- (b) Random inspections of incoming loads;
- (c) Inspection of suspicious loads;
- (d) Records of inspections;
- (e) Training of facility personnel to recognize wastes that are not permitted wastes;
- (f) Procedures for notifying the proper authorities if a hazardous or PCB waste is discovered at the facility;
- (g) Procedures to remove and transport solid or special wastes other than permitted wastes to the proper solid or special waste disposal site or facility; and
- (h) Employee safety, health, training, and personal protective equipment to be used in inspection.

(3) The permittee shall implement the following to meet the requirements of subsection (1) of this section:

(a) The permittee shall have a program, as established in the approved permit, to inspect all waste entering the facility. The program to exclude nonpermitted waste shall include:

1. Random inspections in time, but uniformly distributed to all waste sources based on volume;
2. An inspection record including the following:
  - a. Name of the driver;
  - b. Name of the hauling company;
  - c. Mailing address of the hauling company;
  - d. Source of the waste;
  - e. Volume of the waste; and
  - f. Waste characteristics; and

3. Inspection record maintenance performed by the permittee;
- (b) Upon discovery of hazardous or PCB waste, the permittee shall isolate the load and notify the cabinet within one (1) business day; and
- (c) Upon discovery of non-permitted solid or special wastes, the permittee shall implement the procedures to remove and transport non-permitted solid or special wastes to a permitted solid or special waste landfill.

#### Section 5. Petroleum-contaminated Soil Characterization.

- (1)
  - (a) Petroleum-contaminated soil shall be characterized as established in 401 KAR Chapter 42; or
  - (b) Wastes shall be characterized according to the maximum dry weight concentration of pollutants based on the average concentration in a minimum of two (2) representative samples.
- (2) The permittee shall take representative samples as established in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846, Update IV of the Third Edition.
- (3) Wastes shall be characterized by analyzing the following:

Table 2. Petroleum-contaminated Soil Characterization Parameters

Number	Parameter name
1	Benzene
2	Toluene
3	Ethylbenzene
4	Xylene
5	Chrysene
6	Benzo(a)anthracene
7	Benzo(a)pyrene
8	Benzo(b)fluoranthene
9	Benzo(k)fluoranthene
10	Dibenzo(a,h)anthracene
11	Indeno(1,2,3-cd)pyrene
12	Acenaphthene
13	Acenaphthylene
14	Anthracene
15	Benzo(ghi)perylene
16	Fluoranthene
17	Fluorene
18	Phenanthrene
19	Pyrene
20	Naphthalene
21	Oil and grease (total)
22	Biochemical oxygen demand, 5-day (BOD <sub>5</sub> )
23	pH
24	Electrical conductivity
25	Polychlorinated biphenyls, Total (PCBs)

26	Arsenic (total)
27	Boron (total)
28	Cadmium (total)
29	Calcium (total)
30	Chloride (total)
31	Chromium (total)
32	Copper (total)
33	Lead (total)
34	Mercury (total)
35	Molybdenum (total)
36	Nickel (total)
37	Selenium (total)
38	Sodium (total)
39	Zinc (total)

(4)

(a) The permittee shall characterize chemical and physical waste parameters that are potential surface water or groundwater pollutants not in Table 2 of this section.

(b) The characterization shall include, based on generator knowledge, ingredients, additives, by-products, contaminants, lubricants, cleaning agents, hazardous constituents, and chemicals from the following sources:

1. 401 KAR 47:030, Section 4 and 5, Environmental Performance Standards;
2. 401 KAR 10:031, Surface Water Standards;
3. U.S. EPA Regional Screening Levels (RSLs); and
4. Material safety data sheets.

(5)

(a) Waste analysis shall be reported as the average of at least two (2) representative samples on a dry weight basis.

(b) Dry weight pollutant concentrations shall be calculated by determining the pollutant concentration of the sample, and converting to dry weight (mg/kg) content using the percent solids of the original sample.

(6) The applicant shall obtain a new waste characterization as established in subsections (1) or (2) of this section for each source of petroleum-contaminated soil.

## Section 6. Treatment Standards and Disposition of Treated Soil.

(1)

(a) The applicant shall treat petroleum-contaminated soil to ensure that the following parameters are equal to or less than the concentrations as established in Table 3 below:

Table 3. Petroleum-contaminated Soil Treatment Standards

Benzene	0.01 ppm
Toluene	0.7 ppm
Ethylbenzene	0.9 ppm
Xylene	5.0 ppm
Chrysene	15 ppm
Benzo(a)anthracene	0.15 ppm
Benzo(a)pyrene	0.015 ppm

Benzo(b)fluoranthene	0.15 ppm
Benzo(k)fluoranthene	0.3 ppm
Dibenzo(a,h)anthracene	0.015 ppm
Indeno(1,2,3-cd)pyrene	0.15 ppm
Acenaphthene	10 ppm
Acenaphthylene	10 ppm
Anthracene	10 ppm
Benzo(ghi)perylene	10 ppm
Fluoranthene	10 ppm
Fluorene	10 ppm
Phenanthrene	10 ppm
Pyrene	10 ppm
Naphthalene	3.6 ppm
Methyl-tert-butylether (MTBE)	0.2 ppm
Lead	400 ppm
Arsenic	9.4 ppm
Cadmium	0.78 ppm
Chromium	21.3 ppm
Copper	28.0 ppm
Mercury	0.07 ppm
Nickel	21.7 ppm
Selenium	0.99 ppm
Zinc	57 ppm

(b) For metals, the permittee:

1. May establish background concentrations at the property of origination for each parameter in Table 3 of this section and treat the petroleum-contaminated soil to the background level; and
2. Shall not release treated soil for placement within:
  - a. Four (4) vertical feet of the seasonal high groundwater table; or
  - b. 250 feet of an intermittent or perennial stream.

(2)

(a) The applicant shall take representative samples as established in 401 KAR Chapter 42 or samples as established in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846, Update IV of the Third Edition.

(b) The sample concentration shall comply with subsection (1) of this section prior to release of treated soil from the facility.

(c) If the sample concentration does not meet subsection (1) of this section, the treated soil shall be disposed in a permitted solid waste disposal facility.

(3) The permittee shall provide the following to individuals receiving treated soil:

(a) Copies of the treated soil analyses; and

(b) A brochure explaining the procedures to be utilized in the use of treated soil including setback requirements in subsection (1)(b)2. of this section.

(4) The permittee shall not allow the volume of stored treated soil to exceed three (3) months' treatment capacity, as established in the permit under 401 KAR 47:205.

#### Section 7. Closure Plan and Cost Estimate.

- (1) A closure plan and cost estimate, as required in 401 KAR 47:205, Section 10, shall contain cost estimates for the following:
  - (a) The maximum storage capacity of untreated soil;
  - (b) The maximum amount of soil in the process of being treated;
  - (c) Transportation of petroleum-contaminated soil;
  - (d) Disposal of untreated soil at a permitted disposal facility;
  - (e) Decommissioning of the liner and leachate collection system;
  - (f) Removal of processing equipment;
  - (g) Revegetation of disturbed areas; and
  - (h) Sampling of soils on-site to document that soil parameters comply with Section 6(1) of this administrative regulation.
- (2) The cost estimate for closure under the requirements established in 401 KAR 48:310, Section 2, and KRS 224.40-650.

#### Section 8. Recordkeeping and Reporting.

- (1) The permittee of a petroleum-contaminated soil treatment facility shall retain at the office of the facility for a period of five (5) years, the following information:
  - (a) The source, volume in cubic yards (CY), and date the contaminated soil was received for treatment;
  - (b) The monthly volume of treated soil in CY;
  - (c) The log of recipients who receive more than twenty (20) cubic yards of treated soil in any given month required to be included in the form DEP 5042, Annual Report for a Petroleum Contaminated Soil Treatment Facility;
  - (d) The biopile monitoring log required to be in the form DEP 5042, Annual Report for a Petroleum-contaminated Soil Treatment Facility; and
  - (e) The laboratory analysis reports.
- (2)
  - (a) The operator shall complete and submit to the cabinet by January 31 of each year, for the previous year, typed or printed legibly in permanent ink, the form DEP 5042, Annual Report for a Petroleum-contaminated Soil Treatment Facility.
  - (b) The annual report shall include:
    1. Agency interest and permit number;
    2. Name, address, and contact information for the applicant;
    3. Name and certification number of the certified operator;
    4. Petroleum-contaminated soil information for each waste stream including:
      - a. Property of origination, name of property owner, and name of leaseholder;
      - b. Underground Storage Tank registration number, if applicable;
      - c. Hydrocarbon type;
      - d. Volume in cubic yards (CY); and
      - e. Characterization as required by Section 5 of this administrative regulation;
    5. The volume of treated soils:
      - a. Prepared for distribution;
      - b. Distributed from the facility;
      - c. Disposed at a permitted solid waste disposal facility; or
      - d. Reused on-site as a recovered material;
    6. Treated soil analytical information for each biopile or sample unit;
    7. Copies of laboratory analysis reports for the reporting year; and
    8. The information in subsection (1) of this section for the previous twelve (12) months.

#### Section 9. Incorporation by Reference.

- (1) The following documents are incorporated by reference:



- (a) "How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites: A Guide for Corrective Action Plan Reviewers" (EPA 510-B-94-003; EPA 510-B-95-007; and EPA 510-R-04-002), Chapter IV, Biopiles, and Chapter VI, Low-Temperature Thermal Desorption, October 1994;
  - (b) U.S. EPA "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Update IV of the Third Edition, March 2011;
  - (c) "Petroleum-contaminated Soil Treatment Facility Annual Report", DEP 5042, November 2016; and
  - (d) U.S. EPA "Regional Screening Levels", November 2010.
- (2) This material may be inspected, copied, or obtained, subject to applicable copyright law, at the Division of Waste Management, 300 Sower Boulevard, Frankfort, Kentucky 40601, Monday through Friday, 8 a.m. to 4:30 p.m. This material may also be obtained at the division's Web site [eec.ky.gov/environmental-protection/waste](http://eec.ky.gov/environmental-protection/waste).
- (3)
- (a) The material in subsection (1)(a) of this section may also be obtained at:
    - 1. National Technical Information Service (NTIS); U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; or
    - 2. <http://www.epa.gov/oust/pubs/tums.htm>
  - (b) The material in subsection (1)(b) of this section may also be obtained at:
    - 1. National Technical Information Service (NTIS); U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; or
    - 2. <http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm>
  - (c) The material in subsection (1)(d) of this section may also be obtained at <http://www.epa.gov/region9/superfund/prg/>
- (37 Ky.R. 2778; 38 Ky.R. 556; eff. 10-6-2011; TAm eff. 7-8-2016; TAm eff. 12-21-2016; Crt eff. 8-13-2018; TAm eff. 5-7-2019.)