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DRAFT RCRA CLOSURE GUIDANCE FOR GENERATORS WHO STORE LESS THAN 90 DAYS CONTAINER STORAGE AREAS AND TANK SYSTEMS

INTRODUCTION

This document was developed by the Connecticut Department of Environmental Protection (CTDEP) to guide all persons involved in closing Resource Conservation and Recovery Act ("RCRA") container storage areas and tank systems which have been used to store hazardous waste for **LESS THAN**[1] 90 days.

These facilities, known as RCRA "generators", are subject to the provisions of Section 22a-449(c)-102(a)(2)(K) of the Regulations of Connecticut State Agencies, incorporating 40 CFR 265.111, 40 CFR 265.113(a), (b) and (c), and 40 CFR 265.114.

RCRA generator regulations require closure of hazardous waste storage areas in a manner that is protective of human health and the environment, however these regulations neither require that a closure plan be submitted for review and approval nor do they specify the steps necessary for closure. To address this gap in the regulation, this document provides guidance (not regulations) for generators who wish to close.

Generators who plan to discontinue storing hazardous waste, those who are going out of business, and those relocating a waste storage area within their facility and need to close old area(s) will use this document.

Although a written closure plan is not required by regulation or this guidance, we recommend, and in certain circumstances may require that you document all of your closure activities by photographing or video recording each closure activity, (e.g. decontamination, soil excavation, soil sampling events); maintaining analytical results of samples taken after decontamination or removal of contaminated equipment, structures and soil; and maintaining copies of manifests if decontamination activities generated waste which was disposed of offsite. This documentation may also be helpful in meeting the requirements of the Transfer Act (Section 22a-134 of the Connecticut General Statutes) if you ever sell your property.

[1]For those generators who stored hazardous waste for greater than 90 days, you may be required to close in accordance with more rigorous requirements. See Attachment A for more information.

This guidance describes how, after the hazardous waste inventory has been removed from the storage facility, you must characterize any residual contamination, clean it up, and verify that the clean-up is complete.

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CHARACTERIZE THE CONTAMINATION

Characterize any residual contamination in three steps:

I. Develop a list of **constituents of concern (COCs)**. This is a list of all hazardous constituents that were ever stored at your hazardous waste storage area(s);

II. **Determine if structures or soils are contaminated**;

III. **Determine the extent of contamination in soils** in order to know how much needs to be cleaned up.

Each step is explained in further detail below.

I. Constituents of Concern (COCs)

To develop the COCs for your storage area or tank (regulated unit) you must list all of the hazardous constituents that were ever stored there. Hazardous constituents are those listed in 40 CFR Part 261 Appendix VIII and 40 CFR Part 264 Appendix IX. The following paragraphs A through I are suggested sources of information at your site which can be used for this. You may not have to use every source if one or two sources provide a complete list:

A. Material Safety Data Sheets,

B. Hazardous waste inspection reports,

C. Existing waste analysis records at your facility or the offsite licensed hazardous waste facility which received your waste,

D. Manifests,

E. Other environmental permits in place at the facility, e.g. a waste water permit,

F. Groundwater monitoring parameters, if available,

G. Interview former employees,

H. Review CTDEP hazardous waste and water compliance files.

I. If none of the above are available or adequate, e.g. a site has ceased operation and all records are gone or incomplete, then analyze the waste, structures and/or soil for the constituents listed in **Appendix IX** of 40 CFR Part 264:

1. Analyze the waste (if still on site) for Appendix IX constituents. Table 1 provides guidance on sampling and analysis of wastes in addition to the following:

a. Each waste type must be sampled in accordance with Test Methods for Evaluating Solid Waste, dated November 1986, (SW-846). The samples must be representative of all wastes stored at the regulated unit.

b. Any Appendix IX constituents detected in the waste that are above the lowest analytical detection level ("hits") must be added to the COC list.

2. Analyze porous secondary containment **structures** (e.g., concrete) for Appendix IX constituents. See Table 1 for guidance on sampling and analysis of porous structures. Any Appendix IX hits must be added to the COC list.

3. Analyze surrounding and/or underlying soil for Appendix IX constituents. See Table 1 for guidance on sampling and analysis of soil. Any Appendix IX hits are added to the COC list.

II. Determine if Structures or Soils are Contaminated

If you know structures are contaminated, skip this section and go to the section titled CLEAN UP THE CONTAMINATION THAT IS FOUND. If you know soil is contaminated, skip this section and go to the section titled "Determine the Extent of Contamination in Soils". If you believe that neither structures nor soil are contaminated, use the following guidance to verify that the unit is clean.

A. Definitions

1. **"Contamination"** is defined as any COC which is found on/in structures or soil which is above the media closure criteria as measured by both TCLP and mass analysis of a representative sample.

2. **"Media Closure Criteria"** are risk-based standards for each media (structures, soil); they must be developed for each COC. They can be found in the Risk-Based Concentration Table, EPA Region III or the proposed Connecticut Cleanup Standard Regulations which contain "Numeric Cleanup Criteria". If both sources have an MCC for a given constituent, the most stringent must be used.

B. Structures

Verify that structures (e.g. concrete secondary containment system) are clean. See Table 1 for guidance on sampling and analysis of structures

1. Analyze each sample for all COCs, compare each discrete sample result (no compositing of samples) to the relevant media closure criteria. If any result exceeds the media closure criteria (MCC), then contamination is present and it must be cleaned up and verified so as described in the following sections.

2. If each discrete sample result is below the MCC then the structures can be considered free of contamination requiring remediation. Proceed to the next section on determination of the presence/absence of contamination in soils.

C. **Soils**

Verify that the soils are clean. Inspect the pad for cracks, gaps, slab joints, deteriorating concrete, or anything that could have allowed liquid to pass through to the surrounding or underlying soils. Consider the following:

1. If resurfacing/recoating of pad has concealed cracks, etc. go to step 3 below.

2. Inspect for the above features after a dry sweep of the pad but prior to decontamination,

3. If any of the above features are present, determine if contaminants migrated to the soils using the following procedure:

    a. Bore a 4-inch core through the containment structure at the suspected conduit(s) and remove plug(s),

    b. Inspect each plug cross section,

    c. If feature (e.g. crack) extends through plug, sample each soil horizon down to groundwater or clean soil, whichever comes first, analyze (mass basis) each sample for the indicator COCs or full COC list if indicators are not detected.

    d. If any sample exceeds MCCs in any soil type then determine the extent of the contamination as described in the next section.

    e. If crack does not extend through plug but volatile organics are on the constituent of concern list, use a portable organic vapor analyzer to measure soil vapors in the slab borehole.

        - If volatile organics are detected in the borehole, determine extent of the volatile contamination as described in section **III**.

        - If volatile organics are not detected in the borehole, then further investigation for the extent of contamination in soil (described in the next section) is not necessary.

    f. Regrout boreholes before proceeding with closure.

D. **Soils Contaminated by Tank Systems**

A "tank system" includes the tank, the secondary containment structure, and all ancillary equipment directly connected to the tank or secondary containment structure, including piping, pressure relief valves, instrumentation, valves, level sensors.

If you do not think the tank system leaked, verify its condition by conducting a tank system integrity assessment. If you know the tank system leaked then this

assessment is not necessary; proceed to the section titled **"Determine the Extent of Contamination in Soils"**.

The tank system integrity assessment includes:

1. An assessment of the structural integrity of each tank system which is reviewed and certified by an independent, qualified, registered professional engineer.

2. For non-enterable, underground tank systems including ancillary components, the assessment should include a leak test that meets the requirements of 40 CFR 265.191. If the tank is to be removed as part of closure, a visual inspection could be performed in lieu of a leak test.

3. All integrity assessments must include an inspection of each tank system component for cracks, leaks, corrosion, and erosion.

4. For tank systems which had secondary containment for their entire operating life, review the leak inspections or leak-detection system monitoring data to verify that no leaks ever occurred during the lifetime of the tank system. If this information is not available, conduct an integrity assessment as described above.

5. If the tank integrity assessment indicates that there was a potential for leakage then determine the extent of the contamination as described in the next section.

6. In addition to the integrity assessment, the operating practices, e.g. filling/emptying, must be evaluated for potential sources of contaminant release.

7. If tank system integrity assessment shows no corrosion, cracks, etc. and there were no spills during filling/emptying, subsoils need not be investigated for presence or extent of contamination.

E. **If, after going through the above procedures in paragraphs A through D, no contamination is found, then closure is complete; no further characterization work or subsequent cleanup work is necessary.**

III. Determine the Extent of Contamination in Soils

If contamination is known to be present or was found to be present in soils surrounding or underlying the regulated unit during the previous exercise, the extent of contamination must be determined. Once the extent of contamination is known, you will know how much to clean up.

The following provides guidance on determining the three-dimensional extent of contamination in soils. See Table 1 for further guidance.

A. If the regulated unit has perimeter berms or a similar feature designed to prevent lateral escape of hazardous wastes in the event of a spill, and there are no historic records of spills released beyond these barriers, then **sampling for the lateral extent of contamination beyond these barriers is not required**. Soils directly beneath the unit, however, still must be characterized both laterally and vertically.

B. Estimate the depth and perimeter of the contamination. Sample below and outside this estimated volume.

C. Sample borings should extend to "clean soil" or mean seasonal low groundwater, which ever comes first. Samples should be taken at each soil horizon.

D. General Sampling and Analysis Guidance for Determining the Extent of Contamination:

1. Use of one or two of the prevalent COCs (indicator parameters) for your initial sampling to save on analytical costs is allowed but the full COC list must be analyzed at the sampling round thought to be at the extent of contamination.

2. For sampling of organics in soil, take from 6 inches below the surface to avoid bias due to volatilization.

3. Perform all site characterization sampling prior to decontamination or removal of containment structures.

4. If any sample result is in excess of any MCC then move outward and/or deeper and resample. The extent of contamination requiring remediation is defined by the outermost or deepest set of samples which contain constituents of concern at concentration levels at or below established MCCs. Once this is reached, no further sampling is necessary. Soils requiring remediation are those which lie within this sampling perimeter.

CLEAN UP THE CONTAMINATION THAT IS FOUND

Decontaminate or remove and dispose of all equipment, structures and soils measured (in the previous section) to be in excess of the media closure criteria.

I. General

A. When you are performing the clean up, avoid creating other problems like dust, contaminated run-off, etc.

B. When finished, all equipment used in the cleanup must be decontaminated.

C. Properly dispose of all wastes generated by the cleanup.

D. Backfilling of excavations

1. Clean soil must be used; the location and history of the borrow site must be considered to avoid bringing contaminated material on to the site.

2. Backfilled soil must be compacted when placed in the excavation in such a manner as to prevent post-closure settlement.

E. If you are unable to clean up the contamination that was found due to its nature, extent or location you may contact CTDEP for further guidance.

II. Tank Systems

A. We encourage removing and disposing of all in-ground and underground tanks. You may abandon in-place provided CTDEP approves in writing and the tank is filled with an inert dry sand or equivalent media.

B. For additional information on closing tank systems, see Chapter 12 of the Technical Resource Document For The Storage And Treatment Of Hazardous Waste In Tank Systems, dated December 1986, NTIS #PB87-134391.

VERIFY THAT CLEANUP IS COMPLETE

I. Sample all structures and soils which were contaminated and then cleaned up. Table 1 provides sampling and analysis guidance for soils, porous and non-porous structures.

II. Media closure criteria must be achieved for each COC at each sample point; comparison of a mean concentration to clean-up criteria is *not* acceptable. Repeat the removal or decontamination of structures or soils if media closure criteria is not achieved.

III. If subsoils are removed, the floor and sidewalls of the excavation must be sampled and analyzed.

IV. For tank systems, the tank itself will be non-porous and will require a wipe test (see Attachment B). For tank system piping, triple rinse with an appropriate decontamination solution and analyze the final rinse for all constituents of concern to verify that all media closure criteria have been met.

V. Media closure criteria (clean-up standards) for wipe samples is <u>non-detect</u> for all COCs; in cases where interferences are encountered, e.g. metals detected from a steel tank, develop a background value by sampling a similar material that was unaffected by the waste.

ATTACHMENT A:
DETERMINING CLOSURE REQUIREMENTS FOR GENERATORS WHO STORED HAZARDOUS WASTE GREATER THAN 90 DAYS

In cases where a generator[1] has stored for greater than 90 days, CTDEP may require more rigorous Treatment Storage and Disposal Facility (TSDF) closure requirements. These requirements can be found in the CTDEP draft document titled RCRA Closure Plan Guidance, Container Storage Areas and Tank Systems, dated November, 1993. Some criteria we may use to decide whether to apply TSDF or generator closure requirements to a particular site are as follows:

1. The number of occurrences of greater than 90-day storage;
2. The reason(s) for greater than 90-day storage (e.g. transporter delay, weather delay);
3. The length of time waste was stored beyond the 90th day ;
4. The quantity of hazardous waste that was stored greater than 90 days;
5. The nature of hazardous waste that was stored greater than 90 days;
6. The presence/lack of secondary containment (e.g. concrete floor and berm);
7. The condition of the storage area secondary containment (e.g. presence of cracks, gaps, staining);
8. The presence of leaking containers;
9. The company's overall compliance history;
10. The groundwater classification in the area where the generator is located;
11. Storage area located indoors or outdoors;
12. Other programs involved, e.g. Property Transfer, Corrective Action;
13. Presence of groundwater contamination.

[1]Generators store hazardous waste for 90 days or less

ATTACHMENT B:
WIPE SAMPLING PROCEDURE

The following procedure is used to sample non-porous material to verify that media closure criteria have been achieved after decontamination or removal has been completed. Examples of non-porous material are: steel or fiberglass tanks, structural steel (painted or unpainted).

1. Select an area of 1/4 square meter on the equipment/structure to be tested.
2. For analysis of constituents of concern, saturate a cotton gauze with:
    a. Methanol for volatiles,
    b. Hexane-acetone mix (1:1), or methylene chloride for semi-volatiles,
    c. Hexane for PCBs,
    d. Dilute nitric acid (1:4 nitric acid to deionized water) for metals,
    e. Dilute sodium hydroxide for cyanide.
3. Wipe the saturated gauze over the entire sampling area (1/4 square meter) repeatedly in the vertical direction, applying moderate pressure. Turn the gauze over and wipe repeatedly in the horizontal direction.
4. Repeat the above procedure for each additional category of COCs (a through e above) with new gauze on a newly selected 1/4 square meter sampling area.
5. Place each gauze in a separate jar with a Teflon seal and submit the samples for laboratory analysis.
6. Analyze each gauze for the appropriate contaminants of concern.

Media closure criteria for wipe samples is non-detect for all contaminants of concern. Repeat the decontamination process and resample if necessary.

Consider the potential for interferences from the material being sampled.

TABLE 1:
RCRA CLOSURE GUIDANCE FOR GENERATORS WHO STORE LESS THAN 90 DAYS
SAMPLING AND ANALYSIS GUIDANCE

Objective --->	Develop COCs by Appendix IX Analysis of:			Contamination on Structures	Extent of Contamination in Soil		Verify Clean		
	Waste	Porous Structures	Soil		Lateral	Vertical	Soils	Porous Structures	Non-Porous Structures
Number of Samples	1 per waste type	Inorganics: 1/100 ft^2 surface area but no less than 3 Organics: 1/1000 ft^2 surface area	Inorganics: 1/100 ft^2 surface area but no less than 3 Organics: 1/1000 ft^2 surface area	1/100 ft^2 surface area	1 per 20 ft of circumference outside of contaminated area, minimum 4	1 per each soil horizon down to clean soil or ground water	1/100 ft^2 surface area; minimum 3	1/100 ft^2 surface area; minimum 3	1/1000 ft^2 surface area; minimum 1
Method to Select Sample Locations	N/A (Sample Containers and/or Tanks)	Inorganics: Random & Judgmental[1] Organics: Use OVA[2] to screen location	Inorganics: Random & Judgmental[1] Organics: Use OVA[2] to screen location	Random & judgmental[1]	At or beyond estimated perimeter of contaminated area	At each crack, gap, or other conduit to subsoils	Random & Judgmental[1]	Random & Judgmental[1]	Judgmental[1]
Sampling Methodology (Composite, Discrete, Chip, Wipe)	Compatible wastes: Composite Incompatible: discrete	Inorganics: Composite Chips Organics: Discrete Chip	Inorganics: Composite Organics: Discrete	Discrete chips	Discrete Soil Samples	Discrete Soil Samples	Discrete Soil Samples	Discrete chip samples	Wipe sample (See Attachment B)
Analytical Parameters	Parameters listed in 40 CFR 264 Appendix IX	Parameters listed in 40 CFR 264 Appendix IX	Parameters listed in 40 CFR 264 Appendix IX	All COCs	All COCs at outermost sample; may use subset for initial samples	All COCs at deepest sample; may use subset for upper samples	All COCs	All COCs	All COCs
Analysis of Mass or Extract from Leach Procedure	Mass	Mass	Mass	Mass and leach[3]	Mass and leach[3]	Mass and leach[3]	Mass and leach[3]	Mass and leach[3]	Mass

[1]Judgmental sample locations are chosen based on appearance, spill locations, previous analytical results, OVA readings, etc.
[2]OVA: portable organic vapor analyzer
[3]Leach values can be determined by analysis or by calculating: [Mass(mg/kg)) 20] = leach(mg/l)