

**Vermont Agency of Natural Resources  
Department of Environmental Conservation  
Waste Management Division**

**Vermont Hazardous Waste Generator  
and Facility Closure Guidance**

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## **Vermont Hazardous Waste Generator and Facility Closure Guidance**

### **Section I. What is Closure under the Vermont Hazardous Waste Management Regulations?**

A small or large quantity generator, or a permitted hazardous waste facility, who no longer generates or manages hazardous waste at a site must, within 90 days of cessation of hazardous waste activities, close the site. “Closure” means the removal of all hazardous wastes from the site, the cleaning of buildings to allow for safe reuse, the remediation of any environmental releases or contamination, and the decommissioning of equipment such as tanks, hazardous waste generating equipment, or hazardous waste management units. The general standard for closure is: to minimize the need for further maintenance; to control, minimize or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the groundwater or surface waters or to the atmosphere; and to comply with certain specific state and federal regulatory closure requirements.

### **Section II. Where Closure Performance Standards Will Apply**

A permitted hazardous waste treatment, storage or disposal facility’s operating permit should identify where on the property hazardous wastes and hazardous materials are used, treated, stored or disposed. The permittee is also required to revise its closure plan whenever changes in facility operating plans or design would change the scope of closure or when unexpected events occur during actual closure (Title 40 Code of Federal Regulations (40 CFR) §264.112(c)(2)). Consequently, these areas, and any others on the site where hazardous wastes were managed will be subject to the closure performance standards.

A large quantity or small quantity generator of hazardous waste must determine what portions of its property will be subject to closure performance standards. These areas may include:

- hazardous waste accumulation and storage areas
- manufacturing areas where hazardous materials were used
- raw product storage areas where hazardous materials were stored prior to use
- containers, tanks, piping, equipment, liners and bases that have been in contact with hazardous wastes or hazardous materials
- locations in the facility where spills or releases of hazardous wastes or hazardous materials are known to have occurred

### **Section III. How to Meet the Closure Performance Standard**

A permitted hazardous waste treatment, storage or disposal facility (TSDF) will meet facility closure standards by implementing the Closure Plan contained in its facility operating permit, as modified, at the time of closure. This process includes a third party professional engineer’s certification that the closure plan has been followed and that the closure standards set by the permit and the general performance-based standards have been met.

When large quantity or small quantity generators of hazardous waste no longer produce any hazardous wastes, they are required to certify to the Agency of Natural Resources that they have met the closure requirements of VHWMR Section 7-309(c).

Table 1 and Figure 1, below, summarize the key elements of the closure process. Proof of proper closure may be demonstrated using one or more of the following:

- Basic Certification of Facility Closure (see Section IV and Attachment B)
- Analytical data (see Section V, Table 1, and Attachment A)
- Performance-based measures (see Section VI).

The owner/operator or an independent engineer hired by the owner/operator (if required by the Agency), shall certify in writing:

- what process was used to identify all potential contaminants of concern;
- what portions of the property were subject to closure;
- what decontamination methods were used; and
- that all hazardous waste and hazardous waste residues have been removed, to the maximum extent practicable, from the site.

Materials submitted to the Agency documenting proof of closure must be accompanied by the following signed certification:

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

## **Section IV. Closure Certifications**

### **A. Basic Certification of Facility Closure**

In uncomplicated situations where limited quantities or types of hazardous materials were in use on a site and hazardous wastes were always stored in containers in areas with impermeable surfaces, use of the Basic Certification of Facility Closure (Attachment B) may be appropriate.

In these cases the owner/operator certifies on the form in Attachment B:

- that all hazardous materials have been removed,
- that all hazardous waste have been removed, and
- that all areas subject to closure are clean **or** will continue to be used for the same activities or in a comparable manner by a subsequent owner/operator.

## B. Professional Engineer Certifications

Certification by an independent professional engineer will be required for closure:

- at a certified hazardous waste treatment, storage and disposal facility, as specified in the approved Closure Plan;
- at a site subject to corrective actions undertaken under VHWMR §7-105(c); or,
- at a facility where there have been documented releases of hazardous materials or hazardous wastes to the environment.

## C. Exceptions to Certification of Closure Requirements

Certification that closure standards have been met will not be required for:

- structures, equipment and materials destined for recycling in a manner that will destroy residual contamination (e.g., sold as scrap metal);
- areas on a site where Corrective Actions are being undertaken under VHWMR §7-105(c); or,
- structures or equipment that will continue to be used for the same activities or in a comparable manner by a subsequent owner/operator.

**NOTE: The closure approval standards cited in this document do not preempt other applicable state or federal standards or regulations.**

## Section V. Analytical Demonstrations of Decontamination

In situations where equipment, structures or soils have been contaminated by leaks, spills, or drips of hazardous materials or hazardous wastes, the owner/operator may use one or more of the analytical testing options below to demonstrate that whatever decontamination procedures were used (see Section VII) have been adequate (see Table 1) to remove all contaminants of concern.

- Option 1.** Show that all contaminants of concern do not exceed background levels in all facility areas subject to closure, or are non-detectable either using the lowest published detection limit for analytical methods as published in US EPA SW-846 Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods – which may be found on-line at <http://www.epa.gov/epaoswer/hazwaste/test/main.htm> – or as pre-approved by the Waste Management Division on a site by site basis.
- Option 2.** Demonstrate the following standards have been achieved for the final rinse waters following decontamination of facility areas subject to closure (in order of priority):
- i. Fifteen times the public drinking water maximum contaminant level (MCL) as promulgated in the Vermont Water Supply Rule - Environmental Protection Rules, Chapter 21, **or**
  - ii. If an MCL is not available for a particular contaminant, then fifteen times the Vermont groundwater enforcement standard as promulgated in the Vermont Groundwater Protection Rule & Strategy - Environmental Protection Rules, Chapter 12, **or**

iii. If neither an MCL or a VT groundwater enforcement standard is available for a particular contaminant, then fifteen times the Vermont Health Advisory, as determined by the Vermont Department of Health (DOH) in its Drinking Water Guidance.

- Option 3.** Demonstrate that the Universal Treatment Standards of Title 40 Code of Federal Regulations (40 CFR) §268.48 are met for any contaminated media on site and for final rinse waters following decontamination of facility areas or equipment subject to closure.
- Option 4.** Use the decontamination standards found in 40 CFR §761.79(b) as demonstration of adequate Polychlorinated biphenyl (PCB) decontamination.
- Option 5.** Use protective, site-specific, risk-based media cleanup standards for the site in question. “Protective cleanup standards” means that for an individual to be exposed, on a daily basis, over a lifetime without appreciable risk of deleterious effect, the hazard index should not exceed one (1) for non-carcinogenic effects and not exceed  $10^{-6}$  for carcinogenic effects.

Table 1

**RCRA CLOSURE GUIDANCE FOR SAMPLING AND ANALYSIS**

Objectives	Develop List of Contaminants of Concern (COC) See VHWMR Subchapter 2 for Lists of Hazardous Wastes		
	Wastes	Structures / Equipment	Soil
Number of Samples	One per waste stream	Inorganics: one per 100 ft <sup>2</sup> of surface area but no less fewer than three 3 samples Organics: one per 1000 ft <sup>2</sup> of surface area	Inorganics: one per 100 ft <sup>2</sup> of surface area but no less fewer than three 3 samples Organics: one per 1000 ft <sup>2</sup> of surface area
Method to Select Sample Locations	N/A (sample each container or tank)	Inorganics: Random and Judgemental <sup>1</sup> Organics: Random & Judgemental <sup>1</sup> , may use OVA <sup>2</sup> to screen location	Inorganics: Random and Judgemental <sup>1</sup> Organics: Random & Judgemental <sup>1</sup> , may use OVA <sup>2</sup> to screen location
Sampling Methodology (composite, discrete, chip, wipe)	Compatible wastes: composite Incompatible wastes: discrete	Inorganics: composite chips Organics: discrete chips	Inorganics: composite Organics: discrete
Analytical Parameters/Methods	40 CFR §264 Appendix IX or by process/product knowledge	40 CFR §264 Appendix IX or by process/product knowledge	40 CFR §264 Appendix IX or by process/product knowledge
Analysis of Total/TCLP Extract	Total	Total	Total

Objectives	Identify Contamination of Structures or on Equipment	Identify Extent of Contamination in Soil	
		Lateral	Vertical
Number of Samples	One per 100 ft <sup>2</sup> of surface area	One per 20 ft of circumference, as measured at the outside edge of the contaminated area	One per soil horizon down to clean soil or water table
Method to Select Sample Locations	Random & Judgemental <sup>1</sup>	At or beyond estimated perimeter of contaminated area	At each crack, gap or other conduit to subsoils
Sampling Methodology (composite, discrete, chip, wipe)	Discrete chips or Wipe sample (See Attachment A)	Discrete soil samples	Discrete soil samples
Analytical Parameters	All COCs <sup>3</sup>	All COCs <sup>3</sup> at outermost sample; may use a subset for initial samples	All COCs <sup>3</sup> at deepest sample; may use a subset for upper samples
Analysis of Total/TCLP Extract	Total and Leachate <sup>4</sup>	Total and Leachate <sup>4</sup>	Total and Leachate <sup>4</sup>

Table 1. continued

Objectives	Verify as Clean		
	Soils <sup>5</sup>	Porous Structures <sup>5</sup>	Non-porous Structures or Equipment <sup>5</sup>
Number of Samples	One per 100 ft <sup>2</sup> of surface area; minimum of 3 three samples	One per 100 ft <sup>2</sup> of surface area; minimum of 3 three samples	One per 1000 ft <sup>2</sup> of surface area; minimum of 1 one sample
Method to Select Sample Locations	Random & Judgemental <sup>1</sup>	Random & Judgemental <sup>1</sup>	Judgemental <sup>1</sup>
Sampling Methodology (composite, discrete, chip, wipe)	Discrete soil samples	Discrete chips	Wipe sample (See Attachment A)
Analytical Parameters	All COCs <sup>3</sup>	All COCs <sup>3</sup>	All COCs <sup>3</sup>
Analysis of Total/TCLP Extract	Total and Leachate <sup>4</sup>	Total and Leachate <sup>4</sup>	Total

Table 1 Footnotes:

- 1 Judgmental sample locations are chosen based on process knowledge, waste handling area appearance, spill locations, previous analytical results, OVA readings, etc.
- 2 OVA: portable organic vapor analyzer. NOTE: Not all organic compounds are reliably detected by an OVA.
- 3 COC: contaminant of concern
- 4 Leachate values can be determined by analysis of the Toxicity Characteristic Leaching Procedure (TCLP) extract or estimated as a maximum by calculating:  
[total mass (mg/kg)] divided by 20 yields maximum [leachate (mg/l)]
- 5 Background levels for contaminants of concern may be established by taking samples from comparable, nearby equipment, structural elements or media that have not been exposed to the contaminants of concern.

## Section VI. Performance-Based Demonstrations of Decontamination

In situations where equipment, structures or soils have been contaminated by leaks, spills, or drips of hazardous materials or hazardous wastes, the owner/operator may use one or more of the performance-based options below to demonstrate that all contaminants of concern have been removed. As an alternative to decontamination and analytical testing, the owner/operator may:

- Option 1.** Use physical and chemical decontamination methods such as vibratory finishing, high-pressure steam and water sprays, water washing and spraying, liquid phase solvent extraction, chemical oxidation, and chemical reduction. To be considered adequate a “clean surface” must be exposed. A “clean surface” is a surface that, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste, except for residual staining caused by waste consisting of light shadows, slight streaks, or minor discolorations. (For example: Oil-stained concrete surfaces must be intact and must remain free of oily residues following decontamination.) In limited circumstances, waste in cracks, crevices, and pits may be present provided that the sum of surface staining and wastes in cracks, crevices, and pits may not exceed 5% of the total surface area subject to decontamination and the waste has not passed all the way through the material.
- Option 2.** Use physical decontamination methods including abrasive blasting, scarification, grinding and planing, spalling and vibratory finishing. To be considered adequate, at least 0.6 centimeters of the surface layer of porous materials (e.g., concrete, asphalt paving) shall have been removed **and** a “clean surface” exposed. A “clean surface” is a surface that, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste, except for residual staining caused by waste consisting of light shadows, slight streaks, or minor discolorations. (For example: Oil-stained concrete surfaces must be intact and must remain free of oily residues following decontamination.) In limited circumstances, waste in cracks, crevices, and pits may be present provided that the sum of surface staining and wastes in cracks, crevices, and pits may not exceed 5% of the total surface area subject to decontamination and the waste has not passed all the way through the material.
- Option 3.** Use the self-implementing decontamination procedures found in Title 40 Code of Federal Regulations (40 CFR) §761.79(c) to demonstrate that structures and equipment have been properly decontaminated from PCB exposure.
- Option 4.** With prior approval from the Agency, use immobilization methods for decontamination, such as sealing. To be considered adequate there must be no MCL, Vermont groundwater enforcement standard, or Vermont Health Advisory for the contaminant and appropriate use of physical or chemical decontamination methods has not produced a clean surface.



## Section VII. Examples of Acceptable Decontamination Practices

### A. Physical methods:

#### *Abrasive Blasting:*

Process by using water and/or air pressure to propel a solid media (e.g., steel shot, aluminum oxide grit, plastic beads) such that contaminated surface layers are removed.

#### *Scarification, Grinding and Planing:*

Process by utilizing striking piston heads, saws, or rotating grinding wheels such that contaminated surface layers are removed.

#### *Spalling:*

Process by drilling or chipping holes at appropriate locations and depth in the contaminated surface and applying a tool which exerts a force on the sides of those holes such that the surface layer is removed.

#### *Vibratory Finishing:*

Process by utilizing scrubbing media, flushing fluid, and oscillating energy such that hazardous contaminants or contaminated surface layers are removed.

#### *High Pressure Steam and Water Sprays:*

Process by application of water or steam sprays of sufficient temperature, pressure, residence time, agitation, surfactants, pH, or detergents to remove hazardous contaminants from the surface or to remove contaminated surface layers.

### B. Chemical methods:

#### *Water Washing and Spraying:*

Achieve removal of hazardous contaminants by application of water sprays or water baths of sufficient temperature, pressure, residence time, agitation, surfactant content, pH, or detergents to remove hazardous contaminants from surfaces and surface pores or to remove contaminated surface layers. (The contaminant must be soluble to at least 5% by weight in water solution or 5% by weight in emulsion.)

#### *Chemical Oxidation:*

Obtain chemical or electrolytic oxidation using the following oxidation reagents or combination of reagents - (1) hypochlorite (e.g., bleach); (2) chlorine; (3) chlorine dioxide; (4) ozone or UV (ultraviolet light) assisted ozone; (5) peroxides; (6) persulfates; (7) perchlorates; (8) permanganates; and/or (9) other oxidizing reagents of equivalent destructive efficiency.

#### *Chemical Reduction:*

Obtain chemical reaction utilizing the following reducing reagents or combination of reagents: - (1) sulfur dioxide; (2) sodium, potassium or alkaline salts of sulfites, bisulfites and metabisulfites and polyethylene glycols (e.g., NaPEG and KPEG); (3) sodium hydrosulfide; (4) ferrous salts; and/or other reducing agents of equivalent efficiency.

*Liquid Phase Solvent Extraction:*

Achieve removal of hazardous contaminants from surfaces and surface pores by applying a nonaqueous liquid or liquid solution which causes the hazardous contaminants to enter the liquid phase and to be flushed away from the surface with the liquid or liquid solution while using appropriate agitation, temperature, and residence time. **(Note: The physical and chemical hazards presented by nonaqueous solvents may preclude their use in all but the most extreme circumstances.)**

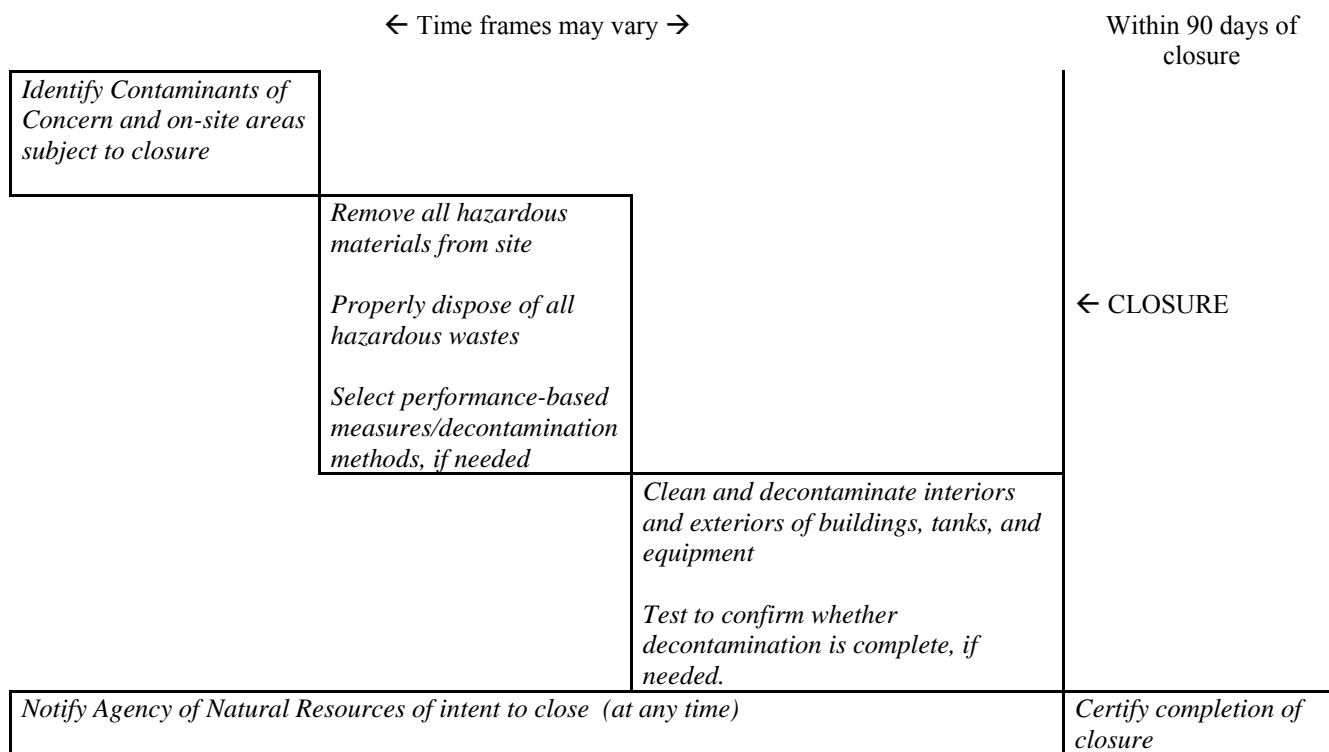
C. Immobilization Methods:

*Sealing:*

Apply an appropriate material, which adheres tightly to the surface to avoid exposure of the surface to direct human contact or to potential leaching media. The sealant must be resistant to degradation by the surface material and its contaminants and any materials into which it may come into contact in the future. When necessary to effectively seal the surface, sealing may also include pretreatment of the surface to remove foreign matter and to clean and roughen the surface. Sealing materials may include epoxy, silicone, and urethane compounds. Latex paint may not be used as a sealant.

\*\*\* NOTE: All wastes generated from decontamination activities must be evaluated to determine whether or not they too are hazardous wastes.

Figure 1 - Closure Process Summary



**ATTACHMENT A****WIPE SAMPLING PROCEDURE**

The following procedure may be used to sample non-porous material to verify that media closure criteria have been achieved after waste removal or decontamination procedures have been completed. Examples of non-porous materials are: steel or fiberglass tanks, structural steel (painted or unpainted), or epoxy-sealed concrete with completely intact sealant surfaces.

1. Select and measure an area of approximately 1/4 square meter in size on the equipment or structure to be tested.
2. For analysis of constituents of concern, saturate a cotton gauze pad with:
  - a. Methanol for volatile organic compounds,
  - b. Hexane-acetone (1:1), or methylene chloride semi-volatile for organic compounds,
  - c. Hexane for PCBs,
  - d. Dilute nitric acid (1:4 nitric acid to distilled water) for metals,
  - e. Dilute sodium hydroxide for cyanide.
3. Wipe the saturated gauze over the entire sampling area repeatedly in a vertical direction, applying moderate pressure. Turn the gauze over and wipe repeatedly in a horizontal direction.
4. Repeat the above procedure for each additional category of contaminant of concern (see 2a through e above) with a new gauze on a newly selected sampling area.
5. Place each gauze in a separate jar with a Teflon seal and submit the samples for the laboratory analysis.
6. Analyze each gauze for the appropriate contaminants of concern using methods recommended in 40 CFR § 264 Appendix IX.

NOTE: The clean closure criterion for wipe samples collected using this method is:

- non-detectable using the lowest published detection limit for analytical methods as published in US EPA SW-846 Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, or as pre-approved by the Waste Management Division on a site by site basis, or
- below background levels for all contaminants of concern.



**ATTACHMENT B  
CERTIFICATION OF FACILITY CLOSURE - BASIC**

Check one:    Complete Closure       Continued Use Closure

Facility Name: \_\_\_\_\_

US EPA ID No:  VT  \_ \_ \_ \_ \_

Owner/Operator \_\_\_\_\_

Property Owner \_\_\_\_\_

Street Address \_\_\_\_\_

Street Address \_\_\_\_\_

Town, State, zip \_\_\_\_\_

Town, State, Zip \_\_\_\_\_

**Listing of Contaminants of Concern:**

Hazardous Materials Used <sup>1</sup>	MSDS <sup>2</sup> Available Y/N	Hazardous Wastes Produced <sup>1</sup>	Conditional Exemption Used? Y/N

1: List additional materials and wastes on the back of this page

2: MSDS = Material Safety Data Sheet(s)

**Cleanout Activities Completed: (check all applicable items)**

- Hazardous materials removed       Hazardous waste(s) removed
- Sweep       Power Wash       Other \_\_\_\_\_
- Laboratory testing       Copy of test results attached

Date of Final Hazardous Waste Shipment: \_\_\_\_\_

Manifest No: \_\_\_\_\_

**Certification:**

I certify that the facility identified above has been closed in accordance with the provisions of Vermont Hazardous Waste Management Regulations Section 7-309(c).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Attachment B, page 2 – Listing of Contaminants of Concern: (continued)

Hazardous Materials Used	MSDS Available Y/N	Hazardous Wastes Produced	Conditional Exemption Used? Y/N

Additional Comments:

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## Attachment C – Generator Closure Standards

### Regulatory Closure Standards Applicable to Hazardous Waste Generators

#### Section 7-309(c) of the Vermont Hazardous Waste Management Regulations (VHWMR)

##### (c) Closure

- (1) A generator who no longer generates or manages hazardous waste at a site must, within 90 days of cessation of hazardous waste activities, close the site in a manner that:
  - (A) Minimizes the need for further maintenance;
  - (B) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the groundwater or surface waters or to the atmosphere; and
  - (C) Complies with the closure requirements of this subchapter including but not limited to the requirements of **40 CFR §§ 265.197, 265.228, 265.258, 265.280, 265.310, 265.351, 265.381, and 265.404.**

An extension to the 90-day closure period may be granted on a case-by-case basis.

- (2) A closure plan must be submitted at least 14 days prior to the commencement of closure activities. Approval of the closure plan from the Secretary is not required. Closure plans should be submitted to:

Chief, Hazardous Waste Management & Prevention Section  
103 South Main Street/West Office Bldg  
Waterbury, Vermont 05671-0404

- (3) A generator who no longer generates or manages hazardous waste at a site shall remove all hazardous waste to a designated facility. Remaining containers, tanks, liners, bases, materials, equipment, structures, soil and debris contaminated with hazardous waste or hazardous waste residues shall be decontaminated or disposed of at a designated facility.
- (4) A generator shall submit to the Secretary, within 90 days of completion of closure, certification that closure was completed in accordance with the provisions of **subsections (c)(1) and (3) of this section**. The generator shall make this certification and the Secretary may also require certification by an independent professional engineer licensed in Vermont.
- (5) Any generator identified as a small or large quantity generator on or after the effective date of these regulations is subject to the requirements of this section regardless of their generator status at the time of closure.
- (6) When a generator closes a portion of a facility, or ceases operations for an indefinite period of time, partial closure shall be conducted. The generator must notify the secretary of any partial closure but need not submit a closure plan. Partial closure must, at a minimum, minimize the need for further maintenance of the facility, or the closed portion of the facility, and ensure that hazardous wastes from discontinued processes and activities are removed to a designated facility.

## **Attachment D – Permitted Hazardous Waste Facility Closure Standards**

### **Regulatory Closure Standards Applicable to Permitted Hazardous Waste Treatment, Storage and Disposal Facilities**

#### **Section 7-504(e) of the Vermont Hazardous Waste Management Regulations (VHWMR):**

- (e) Every hazardous waste treatment, storage, or disposal facility issued a certification under the provisions of this subchapter shall, at a minimum, be designed, constructed, operated, and maintained in accordance with all applicable requirements of:
  - (1) **40 CFR Part 264;**
  - (2) **40 CFR Part 266;**
  - (3) The land disposal restrictions (40 CFR Part 268) incorporated by reference under **§ 7-106;**
  - (4) The large quantity generator standards of **§ 7-308;** and
  - (5) All applicable sections of the Vermont Environmental Protection Rules, Chapters 1 through 19.

#### **The federal standard, 40 CFR Part 264, Subpart G:**

##### **§ 264.111 Closure performance standard.**

The owner or operator must close the facility in a manner that:

- (a) Minimizes the need for further maintenance; and
- (b) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and
- (c) Complies with the closure requirements of this subpart, including, but not limited to, the requirements of §§264.178, 264.197, 264.228, 264.258, 264.280, 264.310, 264.351, 264.601 through 264.603, and 264.1102.