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

Vermont Hazardous Waste Generator and Facility Closure Guidance

Draft of 08/04/06

Vermont Department of Environmental Conservation
Waste Management Division – Hazardous Waste Program
103 South Main Street / West Office Building
Waterbury, Vermont 05671-0404
Phone: (802) 241-3888
FAX: (802) 241-3296
Web: http://www.anr.state.vt.us/dec/wmd.htm

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A. Introduction

What is Closure? Under the VHWMR, 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 (VHWMR §7-309(c)). "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 closure performance standard 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 – VHWMR §7-309(c)(1)(C).

A detailed closure plan, for facilities, must be formally submitted as part of the permit application. Generators must create a closure plan addressing how they will comply with the closure requirements in VHWMR §7-309(c), but generally do not have to include the same level of detail that a permitted facility would include.

Partial closure must be conducted when a generator closes a portion of a facility, or ceases operations for an indefinite period of time. 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. (VHWMR §7-309(c)(6))

What is this Document? This is a guidance document and is not intended to serve as a "how-to" manual for generator and facility closure. It does provide a discussion of the factors that should be taken into consideration during closure. Following the guidance in this document should help hazardous waste generators and facilities and their consultants/contractors comply with the closure requirements found in the Vermont Hazardous Waste Management Regulations (VHWMR). This document may also be used as guidance for realtors dealing with real property sales.

Generators and facility owners must understand that even though the Vermont Department of Environmental Conservation (DEC) may acknowledge that closure requirements are met, it is the generator or facility owner who may be liable for future problems associated with any residual contamination that may not have been detected or adequately addressed during closure or partial closure.

The closure process may be complicated depending on the situation. It is imperative that the generator or facility begins closure preparations far in advance of the expected closure date or

property sale date. This guidance document is intended to assist the generator and facility in that initial preparation.

The format of this guidance document is designed to guide a generator and facility through a top-down approach: from the question of applicability, to the questions to be evaluated upon the initial closure decision, to the means of meeting the closure performance standard, and finally to closure certification.

The following DEC documents may assist in complete closure activities.

- Corrective Action Guidance
- Underground Storage Tank and Site Assessment Requirements
- Agency Guidelines for Petroleum Contaminated Soil and Debris
- Procedures for Reimbursement From the Petroleum Cleanup Fund
- Site Investigation Procedure
- Vermont Hazardous Waste Management Regulations

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

Does Closure Apply to Me? Both generators and facilities must comply with the same closure performance standard. The formalness of the closure proceedings depends on whether you are a generator or a permitted facility.

B. Closure for Permitted Facilities

Each permitted facility formally submits a closure plan as part of their facility permit application. To ensure all pertinent information is in the closure plan, a facility may refer to the DEC's **Post-Closure Facility Requirements** checklist. In addition, the facility may want to review VHWMR Subchapter 5. A permitted 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.

The closure plan must identify all necessary information as to how the facility will comply with the closure requirements set forth in §7-309(c). However, the typical, five primary components of a closure plan are as follows:

1) Facility Description and History;
2) Waste Removal and Decontamination Procedures;
3) Waste Sampling and Analysis Procedures;
4) Closure and Inspection Schedule; and
5) Closure Cost Estimate and Financial Assurance Demonstration.

C. Closure for Generators

A permit is not needed for small and large quantity generators (who do not treat, store, or dispose of hazardous waste) complying with the closure management standards as specified in §7-309(c). The generator closure process is self-implementing, such that it is the responsibility of the generator to initiate specific closure activity requirements prior to closure. 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, but are not limited to:

- 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; and /or
- locations in the facility where spills or releases of hazardous wastes or hazardous materials are known to have occurred.

Once the closure areas are determined, the VHWMR require generators to write a closure plan that addresses the means of complying with the closure performance standards identified in VHWMR §7-309(c)(1) and (c)(3).

NOTE: If a generator has conducted improper disposal practices onsite without a hazardous waste permit, the generator closure rules do not apply to the closure of that area of disposal. Under such circumstances, the generator would be subject to and may be required to close the area in accordance with the requirements of VHWMR Subchapter 5. A generator that needs information regarding permitted facility closure should consult the DEC.

II. Preparation for Closure Process

If the generation site property is being sold or leased to a new party, it is important that the owner/operator of a facility seeking closure determine the appropriate level of detail to comply with closure requirements. For example, if an industrial facility is being closed and sold to a company who is installing offices and a day-care, a higher level of standard is expected in closure than if the property was sold to another industrial company.

A. Permitted Facilities

Any closure or partial-closure process preparation associated with permitted facilities would be identified in the approved closure plan that was part of the facility's permit application. Permitted facilities should refer to their approved closure plan.

B. Generators

When a generator chooses to partially close a *portion* of hazardous waste activities, VHWMR require notification to the DEC; however, a closure plan is not required. 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.

For complete cessation of hazardous waste activities, to help ensure timeliness of closure, generator preparation for the closure process consists of answering questions designed to assist the generator in complying with the VHWMR, and notifying the DEC. Please be advised that this list of questions is not intended to be limiting – these are suggested questions to prompt an appropriate level of evaluation and there may be additional aspects to evaluate as well, on a case-by-case basis.

As mentioned previously, VHWMR require a generator to submit a closure plan. A typical process for closure activities is as follows:

NOTE: *While not entirely necessary, it is strongly suggested for the generator to begin closure preparation and the assembly of a closure plan prior to cessation of hazardous waste activities.*

1. Generator makes decision to cease/shut-down the entire hazardous waste operations. *(At the actual point of hazardous waste activity cessation, the generator has 90 days to complete all closure process activities.)*
2. Generator begins closure plan preparation and development.
    a. At this point, the generator may choose to hire a consultant.
    b. The generator answers the questions in Table 1.
    c. Based upon the answers obtained in Table 1, the generator decides what activities will suffice for closure of the operations (refer to section on physical, chemical, etc. means.) as required by VHWMR §7-309(c).
3. Generator submits closure plan to Vermont DEC. *(The generator must submit this closure plan to DEC at least 30 days prior to commencing closure activities.)*
4. Prior to implementation of closure plan, the generator should check with DEC to confer on the appropriateness of the plan.
5. 30 days after the generator has submitted the closure plan to DEC, the generator commences closure activities as identified in the closure plan.
    a. Generator performs closure activities identified in plan.
    b. Generator must certify, and sign in accordance with VHWMR §7-108, closure was completed in accordance with VHWMR §7-309(c)(1) and (3). *(DEC may require the generator to obtain the certification from an independent professional engineer licensed in Vermont.)*
6. Within 90 days of completing closure activities, the generator submits the certification to the Secretary of DEC.

NOTE: *If a generator has or has had a release to the environment and did not subsequently notify the DEC, the generator is consequently bound to address the potential effects of that release(s). If this is not addressed accordingly, it may potentially delay or negatively impact the sale of property or closure attempts.*

Table 1. Closure Preparation Questions

Item #	Question		Generator Answer (Y, N, N/A) "NO" – Proceed to next question. "Yes" – See Closure Plan Requirements	Closure Plan Input
1	Are there maps, drawings, records, etc. associated with the site?			Include all maps, drawings, records, etc. in the closure plan.
2	Is there a Contingency Plan for the facility? If so, has it been implemented?			If implemented, include all relevant information relating to the implementation.
3	Is there a Spill Prevention Control and Countermeasures (SPCC) Plan for the facility? If so, has it been implemented with regards to a spill or release?			If implemented, include all relevant information relating to the implementation.
4	Is there a history of a release(s) either documented or knowledge of; or is there speculation to believe there could have been a release(s)?			A complete site assessment. Typically requires extensive sampling. Include any information available.
5	Is there a history of spill(s) of hazardous wastes/materials within the building(s) either documented or knowledge of; or is there speculation to believe there could have been a spill(s) of hazardous wastes/materials?			A complete site assessment. Typically requires extensive sampling. Include any information available.
6	**Underground Storage Tanks (USTs)**	Are there any underground storage tanks (USTs) on site?		Describe tank status: contents, structural integrity, associated transfer records.
7		Are there any USTs that are part of the process that are to be shut down?		Describe tank status: contents, structural integrity, associated transfer records. RCRA Closure required.
8		If commercial property, do you have a heating oil tank that is greater than 1,100 gallons?		Describe tank status: contents, structural integrity, associated transfer records.
9		Are there any existing or historical petroleum (i.e., gasoline, kerosene, diesel, oil) USTs/containers/spills?		Describe tank status: contents, structural integrity, associated transfer records. Include any information available.

			Generator Answer (Y, N, N/A) "NO" – Proceed to next question.	
10	**Aboveground Storage Tanks (ASTs)**	For the AST, are there any signs of spills around the fill pipe?		Describe tank status: contents, structural integrity, associated transfer records.
11		For the AST, do the oil lines run either under concrete or aboveground without being encased in protective tubing?		Describe status, contents, and structural integrity.
12		Are there any ASTs that are part of the process that are to be shut down?		Describe tank status: contents, structural integrity, associated transfer records. RCRA Closure required.
13		For the AST, do you see rust, weeps, wet spots, or excessive dents on the tank's surface, valves, filters?		Describe status, contents, and structural integrity.
14		If commercial property, do you have a heating oil tank that is greater than 1,100 gallons?		Describe tank status: contents, structural integrity, associated transfer records.
15		Do you have an aboveground petroleum tank?		Describe tank status: contents, structural integrity, associated transfer records. Include any information available.
16	Are there any floor drains?			List the activities that involved the floor drains and the drawings, if possible, of the outflow location. Samples for analytical analysis may be needed to determine contamination level. Discuss with DEC contact.
17	If there are floor drains, have they been properly closed?			Include drawings or descriptions.
18	Are there any field lines on the property, including sewage and industrial?			Include drawings or descriptions.
19	Are there any man-made earth surface -depressions on the property?			Include drawings and descriptions of why the depressions were made and what they were used for.
20	Are there cracks in floor where hazardous waste operations existed?			Discuss with DEC contact. Depending on structure evaluation, analytical sampling may be required in addition to applying a floor sealant.
21	Are there any French drains or trenches in the proximity of existing or previous hazardous waste operations?			Determine if they are plugged. If so, indicate when plugged in relation to hazardous waste activities. Discuss with DEC contact.

		Generator Answer (Y, N, N/A) "NO" – Proceed to next question.	
22	Are there any unidentifiable containers, of any size, on the site?		Sample for analytical analysis for hazardous waste characterization. Determine appropriate disposal pathway.
23	Is there hazardous waste in storage or accumulating on site at this time?		Determine appropriate disposal pathway.
24	Are there any drip pads, pans, or pigs on site?		Inspect for spills outside of these containment devices. Determine appropriate disposal pathway.
25	Are there any stains or markings on any building surface (i.e., floors, ceilings) that are not typical of normal wear-and-tear?		Describe markings and determine method for decontamination, if necessary. Identify what operations existed in area.
26	Does there appear to be any contamination to soil or debris from petroleum or hazardous material?		Identify operations conducted in area; take pictures; look through files for relevant information.
27	Are there or have there been any on site oil space heaters or oil burners?		Include information stating locations and quantity of oil used.

III. Closure Process Timeline

A. Permitted Facilities

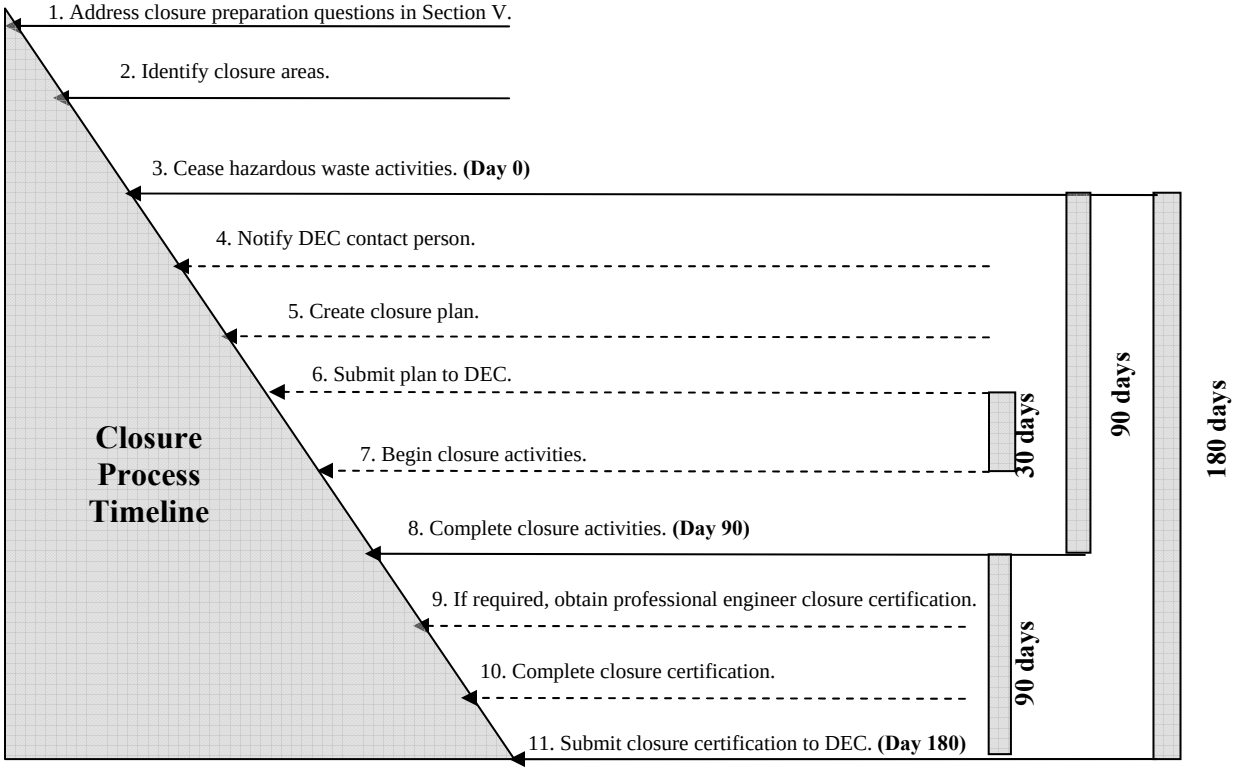
The closure process timeline associated with permitted facilities is identified in the approved closure plan that was part of the facility's permit application. Permitted facilities should refer to their approved closure plan.

B. Generators

DEC recommends to the generator that the generator accumulation area (particularly hazardous waste accumulation areas which are compromised or that are located directly on soil) be closed as soon as possible in order to avoid future problems. If a generator decides not to close an accumulation area when it is no longer used to store hazardous waste, any future contamination that occurs in that area may be attributed to the accumulation of hazardous waste. The longer a generator waits to close a hazardous waste accumulation area, the more complicated the closure may become due to the possibility of contamination spreading into, or out of the unit. Therefore, in the best interest of the generator, the accumulation area should be closed as soon as possible when hazardous wastes are no longer managed in the area. *As a matter of law, a generator must close their site within 90 days of cessation of hazardous waste activities (VHWMR §7-309(c)).*

NOTE: *An extension to the 90-day closure period (cessation of hazardous waste activities to completion of closure activities) may be granted by DEC on a case-by-case basis.*

Figure 1. Closure Timeline for Generators



IV. Closure Activities

A. What Are Closure Performance Standards?

Closure performance standards are the baseline for determining whether a facility or generator has closed hazardous waste operations in such a manner that meets the requirements of VHWMR §7-309(c).

A generator must close the site in a manner that:

- Minimizes the need for further maintenance;
- Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape to the groundwater or surface waters or to the atmosphere of:
- Hazardous waste,
- Hazardous constituents,
- Leachate,
- Contaminated run-off, and/or

- Hazardous waste decomposition products; and
- Comply 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.

A generator who no longer generates or manages hazardous waste at a site shall:

- Remove all hazardous waste to a designated facility; and
- Decontaminate, or dispose of at a designated facility, any of the following that are contaminated with hazardous waste or hazardous waste residues:
- Containers,
- Tanks,
- Liners,
- Materials,
- Equipment,
- Equipment bases,
- Structures, and
- Soil and debris.

B. How to Comply with Closure Performance Standards

1. Understanding Closure Strategies

Permitted Facilities. A permitted facility will meet facility closure standards by implementing the approved closure plan contained in its facility operating permit, as modified, at the time of closure. This process includes an independent, Vermont 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.

Generators. Depending on the answers from the closure preparation stage (Table 1), the level of detail in a closure plan will be site specific and determined on a case-by-case basis. The methodology used to ensure compliance with closure requirements is to be determined by the generator and the owner of the property, if the generator is leasing the property, and the approval of the DEC. Because the DEC will ultimately be approving closure, it is strongly suggested for the generator to maintain open lines of communication with DEC when determining an appropriate closure strategy.

2. Unique Closure Situations

In some cases, there may be areas on a site where Corrective Actions are being performed under VHWMR §7-105(c). See DEC's **Corrective Action Guidance** for information regarding Corrective Action. Generators may complete closure activities and certification while Corrective Actions continue to be carried out. These Corrective Actions may extend, time-wise, beyond closure approval. In the event the generator, if the owner, or the owner sells the property, Corrective Actions would continue with DEC oversight.

In cases where the property is being sold and the structures and/or equipment will continue to be used in the same or comparable manner by a subsequent owner/operator for the same activities as those performed by the previous generator, closure of equipment and structures will be held to a lesser standard than if a new and different use would be performed. In this case, at a minimum, structures and equipment would be expected to be cleaned to a level of general housekeeping. While each case would be site specific, surrounding floors, walls, and ceilings would need to be cleaned to the extent that there would be no abnormal markings or stains outside of good housekeeping principles. This, however, is not an exemption to the generator for completing reasonable closure expectations. It is strongly suggested that the generator work closely with the DEC contact person to ensure that closure expectations are met.

3. Other Regulatory Requirements

While this document addresses hazardous waste operations, issues concerning other regulations may rise. In this case, additional closure steps may be required. When a generator is ceasing all hazardous waste operations, it generally involves a closure of a building and/or the surrounding affiliated structures and grounds. This results in an overlapping of environmental regulations, such as those for hazardous waste, historical releases, underground storage tanks, and drains. Because of this activity and media variation, it is likely that there will be multiple DEC interface points. As such, there may be other state issued permits that need closing, such as an injection permit with DEC's Underground Injection Control (UIC) program. To ensure timeliness of closure, which may or may not be associated with a sale of property, it is imperative that generators maintain open lines of communication with the DEC, and be aware of additional permits that must be closed in accordance with applicable regulations.

Do you have Underground Storage Tanks? If there are underground storage tanks (UST) on the closure property, whether or not in use or abandoned, the generator must consult the **Underground Storage Tank and Site Assessment Requirements**. USTs, either completely or partially buried, are stationary devices, which are constructed primarily of non-earthen materials (e. g., wood, concrete, steel, plastic) that provide structural support. A UST may or may have been used for accumulation of hazardous waste or storage of hazardous materials or petroleum products. Typical initial, closure preparation would be to describe the UST status such as the contents, structural integrity, and associated transfer records.

A UST may *not* need to be removed *if* the DEC determines it meets current regulatory standards and is appropriate for the purchaser/renter of the property. If the UST does not meet regulatory standards and/or is abandoned, DEC will require the UST to be removed prior to closure.

Do you have Aboveground Storage Tanks? Vermont weather takes its toll, causing ground shifts, frost heaves, rust, and general wear, all of which can affect a heating oil tank (typical aboveground storage tanks, ASTs) and its piping. Weather, corrosion, and poor maintenance can cause fuel oil spills, which can lead to unpleasant smells, water contamination, and lower property values. ASTs may need to be addressed during closure if adverse conditions have compromised structural integrity or cause a spill or release. Consult with DEC if there is evidence of such activity.

Do you have Floor Drains? Floor drain/injection well systems are found in a variety of facilities, including automobile body shops, repair/maintenance garages, automotive salvage garages, car washes, large equipment dealerships, metal plating businesses, photochemical businesses, welding operations, tanneries, laboratories, laundries, dry cleaners, schools, etc. Floor drains may be found inside an operations area or outside the building in a parking/loading area. Injection wells include any openings in the ground used as a means of discharging waste except for a dry hole not exceeding seven feet in depth which is constructed as, and used solely for the disposal of domestic waste. All floor drains discharging to injection wells pose some risk to groundwater quality. If there are floor drains on the closure property that discharge fluids to the subsurface, they should be permitted with the Underground Injection Control (UIC) Program of the DEC's Wastewater Management Division. The generator should consult the **Department of Environmental Conservation Floor Drain Procedure**. If it is suspected or apparent that hazardous materials or hazardous waste entered the floor drain/injection well system, at a minimum, the floor drain must be closed and sealed as part of the closure process, in addition to the closure of any associated permits. There may be additional steps required for closure activities.

Have you had a Release of Hazardous Material or Hazardous Waste? If there is or has been a release or suspected release of a hazardous material or hazardous waste to the environment, the generator must consult the **Site Investigation Procedure**. "To the environment" means a release that may have occurred outside of the building, or inside the building through a crack in the foundation. If there are spills inside the building, and no foundation cracks present, the generator may use analytical or performance-based methods for demonstrating decontamination (see Sections X and XI).

Petroleum Contaminated Soil/Debris

If, during closure preparation, soil and/or debris appears to be contaminated with petroleum the generator should consult the **Agency Guidelines for Petroleum Contaminated Soil and Debris**. There are specific closure requirements in this guideline document that the generator must complete if there is petroleum contamination of soil and debris. Typical initial, closure preparation would be to walk-down the closure area and visually evaluate for signs of petroleum contamination, such as dark spots on the floor/ground and leaks around drip pads/pans, equipment, sumps, drains, and parking/mechanic areas.

Qualifying generators, landowners, and third parties meeting certain requirements may receive funding from the Petroleum Cleanup Fund. See **Procedures for Reimbursement From The Petroleum Cleanup Fund** for more information.

Are you Unsure of Site Contamination? If there is evidence of a release and a generator is unable to determine an appropriate level of cleanup to meet closure requirements, a full site investigation, per the **Site Investigation Procedure**, may be required to reach compliance. It is suggested that the generator work closely with DEC personnel well in advance of cessation of hazardous waste operations to provide ample time for closure strategy development.

If the generator is ceasing hazardous waste operations and is then selling the property, the buyer of the property may require Site Investigation as part of the stipulations of agreement. Again, the **Site Investigation Procedure** would be consulted.

C. 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 recognized methods below to demonstrate that whatever decontamination procedures were used have been adequate to remove all contaminants of concern.

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

Method **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** or as pre-approved by the DEC on a site by site basis.

Method **2.** Demonstrate final rinse waters have met the standard of fifteen times the enforcement standards of the **Vermont Groundwater Protection Rule**.

Method **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.

Method **4.** Use the decontamination standards found in 40 CFR §761.79(b) as demonstration of adequate Polychlorinated biphenyl (PCB) decontamination.

Method **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.

D. 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, there are two primary methods for equipment cleaning: off-site and on-site. Off-site consists of selling the equipment for reuse, disposing of the equipment via appropriate measures, and/or recycling the equipment. On-site consists of decontaminating, by whatever means, to ensure closure requirements. If the property is being sold or used for similar activities, general housekeeping, with respect to the equipment, is acceptable.

If different operations will be conducted and the equipment is to remain, the equipment is to be cleaned to the extent that only minimal equipment fluids remain so as to ensure integrity of the equipment. For example, a large, in-floor sump would need to be completely cleaned out and inspected for cracks and possible residual contamination in the cracks.

As an alternative to analytical demonstration of decontamination, the owner/operator may use one or more of the performance-based recognized methods below to demonstrate that all contaminants of concern have been removed. The Wipe Sampling Procedure, in Attachment E of this document, may be of use as well.

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

Method **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.

Method **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.

Method **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.

Method **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.

V. Standard for Closure Certifications

Types of Closure Certification. There are two types of closure certification: 1) Certification, and 2) Certification with an *additional* certification by an independent, Vermont professional engineer. Permitted facilities, as specified in their approved closure plan, are required to have the independent, Vermont professional engineer certification *in addition to* generator's certification. Generators are typically *not* required to have the additional independent, Vermont professional engineer, *unless* during the closure process, DEC determines necessary. Use of the Certification of Facility Closure (Attachment A) may be appropriate.

Closure Certification Purpose. The purpose of closure certification is for the generator to certify that they followed their closure plan, achieved the closure performance standard, that all hazardous materials have been removed, that all hazardous waste has been removed, and that all areas subject to closure are clean, **or** cleaned to a sufficient point for use for the same activities or use in a comparable manner by a subsequent owner/operator.

Who Signs the Closure Certification? The person(s) who is authorized under VHWMR §7-108 signs the closure certification. If required, an independent Vermont professional engineer must also provide *additional* closure certification. The DEC encourages the property owner/landlord, if different from the generator, to sign the closure certification as well because this helps to ensure a smooth closure approval with all interested parties' acknowledgment.

Materials submitted to the DEC 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."

Independent, Vermont Professional Engineer Certification. The DEC requires an independent Vermont professional engineer's certification of closure for permitted facilities. The DEC may also require, on a case-by-case basis, generators, whose sites are subject to corrective actions per VHWMR §7-105(b), to have an independent, Vermont professional engineer's certification of closure. In addition, the DEC may also require, on a case-by-case basis, the independent, Vermont professional engineer's certification of closure for generator sites where there may have been documented releases of hazardous materials or hazardous wastes to the environment. DEC may also require this additional certification as other conditions may arise.

Closure Report Submission. The DEC strongly suggests the generator to submit a closure report as part of the closure certification to ensure timeliness of DEC closure approval. This closure report is a comprehensive report with a copy of all information pertinent to closure. The closure report may include the following (this is not an all-inclusive list):

- Closure Certification (including additional independent, Vermont professional engineer's if required),
- Drawings/Maps,
- Material Safety Data Sheet(s),
- Final Closure Plan,
- Description of Closure Activities,
- Copies of final waste shipment manifests,
- Complete list of all site permits and status,
- Analytical test data results and subsequent determinations,
- For all ASTs and USTs that are removed, status descriptions and pictures, and
- Pictures, generally.

ATTACHMENT A

Certification Of Facility Closure

Check one: Complete Closure Closure for Reuse Closure With Ongoing Remedial Activity

Facility Name: _____ **US EPA ID №**: VT __ __ __ __ __ __ __ __ __ __

Owner/Operator _____ **Property Owner** _____

Street Address _____ Street Address _____

Town, State, zip _____ Town, State, Zip _____

Type of Closure: _____

Closure Report Items Completed and Attached to this form:

- Drawings/Maps
- Material Safety Data Sheet(s) (MSDS)
- Analytical test data results and subsequent determinations
- Final Closure Plan
- Independent, Vermont professional engineer's Closure Certification (if required)
- Other _____
- Complete list of all site permits and status
- Copies of final waste shipment manifests
- Description of Closure Activities
- Pictures

*Comments:*_____

_____

_____

NOTE: *The person(s) who is authorized under VHWMR §7-108 signs the closure certification. If required, an independent Vermont professional engineer must also provide additional closure certification. The DEC encourages the property owner/landlord, if different from the generator, to sign the closure certification as well because this helps to ensure a smooth closure approval with all interested parties' acknowledgment.*

Generator/Owner 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: _____

Independent, Vermont Professional Engineer's Certification, if required:

Signature: _____ Date: _____

Name: _____ Title: _____

Independent, Vermont Professional Engineer's Certification *(check here if additional PE certification documentation is attached)*

***Property Owner/Landlord Acknowledgement of Closure Activities:** *(not required, but suggested by DEC)*

Signature: _____ Date: _____

Name: _____ Title (property owner/landlord): _____

*If the generator is the property owner/landowner, this acknowledgement is not applicable.

Listing of Contaminants of Concern*:

Item #	Hazardous Materials Used	CAS No., if available	MSDS in Closure Report? (Y/N)

*If more space is needed, attach additional sheet with information requested above.

Comments:

Listing of Hazardous Wastes Produced*:

Item #	Hazardous Waste Produced	Associated Waste Codes	Applicable MSDS in Closure Report? (Y/N)

*If more space is needed, attach additional sheet with information requested above.

Comments:

_____

_____

_____

_____

Attachment B

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 for review by the Secretary at least 30 days prior to the commencement of closure activities (refer to the document titled: **"Vermont Hazardous Waste Generator and Facility Closure Guidance"** which is available from the Secretary upon request). 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, signed in accordance with §7-108, 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 C

Permitted 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:

(1) § 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.

Attachment D

Definitions

Closure means process and actions taken once hazardous waste operations have ceased in an effort to comply with VHWMR.

Corrective Action means actions taken, as determined by the Secretary, if a discharge of hazardous waste, or a release of hazardous material has not been adequately addressed under §7-105(a)(1)(A). (VHWMR §7-105(b)).

Disposal means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any ground or surface waters.

Floor Drains means actual drains in floors, trench drains, French drains, man-made earthen depressions,

Hazardous materials means all petroleum and toxic, corrosive or other chemicals and related sludge included in any of the following: (a) any substance defined in CERCLA §101(14); (b) petroleum, including crude oil or any fraction thereof; or (c) hazardous waste, as defined below.

Hazardous waste means any waste or combination of wastes of a solid, liquid, contained gaseous, or semi-solid form, including but not limited to those which are toxic, corrosive, ignitable, reactive, strong sensitizers, or which generate pressure through decomposition, heat or other means, which in the judgment of the Secretary may cause, or contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, taking into account the toxicity of such waste, its persistence and degradability in nature, and its potential for assimilation, or concentration in tissue, and other factors that may otherwise cause or contribute to adverse acute or chronic effects on the health of persons or other living organisms, or any matter which may have an unusually destructive effect on water quality if discharged to ground or surface waters of the state. All special nuclear, source, or by-product material, as defined by the Atomic Energy Act of 1954, as amended, codified in 42 U.S.C. §2014, is specifically excluded from this definition.

Release means any intentional or unintentional action or omission resulting in the spilling, leaking, pumping, pouring, emitting, emptying, dumping, or disposing of hazardous materials into the surface or groundwaters, or onto the lands in the state, or into waters outside the jurisdiction of the state when damage may result to the public health, lands, waters or natural resources within the jurisdiction of the state. (VHWMR §7-103)

Site Assessment means a determination of whether a property has been affected by chemical contamination and whether the contamination is at levels that require cleanup under state regulations. The determination may be comprised of elements such as comprehensive planning at the beginning of the project; collection of sufficient data, both on and off the property;

clear reporting about what was done and why; and compliance with state Site Investigation (SI) report requirements.

Storage means the actual or intended containment of wastes, either on a temporary basis or for a period of years; in such a manner as not to constitute disposal of such wastes. Hazardous waste that is being staged at a recycling facility for no more than three (3) days is not considered to be in storage.

Tank means a stationary device, designed to contain an accumulation of hazardous waste, which is constructed primarily of non-earthen materials (e. g., wood, concrete, steel, plastic) that provide structural support.

Treatment means any method, technique, or process, including neutralization, designed to change the physical, chemical or biological character or composition of any hazardous or solid waste, so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste safer for transport, amenable for recovery, amenable for storage, or reduced in volume, or for hazardous wastes, so as to render such waste non-hazardous.

ATTACHMENT E

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:
    - Methanol for volatile organic compounds,
    - Hexane-acetone (1:1), or methylene chloride semi-volatile for organic compounds,
    - Hexane for PCBs,
    - Dilute nitric acid (1:4 nitric acid to distilled water) for metals,
    - 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 F

Recognized Methods for Sampling and Analysis

NOTE: *All wastes generated from decontamination activities must be evaluated to determine whether or not they too are hazardous wastes. The recognized methods listed below should not be viewed as conclusive. Other ASTM Standards may be applicable.*

Objective: To Develop List of Contaminants of Concern (COC) (See VHWMR Subchapter 2 for Lists of Hazardous Wastes)			
Sampling Plan Components	**Sampling Media**		
	Wastes	**Structures/Equipment**	**Soil**
Number of Samples	One per waste stream	Inorganics: one per 100 ft^2 of surface area but no less fewer than three 3 samples Organics: one per 1000 ft^2 of surface area	Inorganics: one per 100 ft^2 of surface area but no less fewer than three 3 samples Organics: one per 1000 ft^2 of surface area
Method to Select Sample Locations	N/A (sample each container or tank)	Inorganics: Random sampling and Judgemental[1] Organics: Random & Judgemental[1], may use OVA[2] to screen location	Inorganics: Random sampling and Judgemental[1] Organics: Random & Judgemental[1], may use OVA[2] 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 Totals/TCLP Extract	Totals	Totals	Totals

Sampling Plan Components	**Objectives:**		
	To Identify Contamination of Structures or on Equipment	**To Identify Extent of Contamination in Soil**	
		Lateral	**Vertical**
Number of Samples	One per 100 ft^2 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 Sampling & Judgemental[1]	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 E)	Discrete soil samples	Discrete soil samples
Analytical Parameters	All COCs[3]	All COCs[3] at outermost sample; may use a subset for initial samples	All COCs[3] at deepest sample; may use a subset for upper samples
Analysis of Totals/TCLP Extract	Totals and Leachate[4]	Totals and Leachate[4]	Totals and Leachate[4]

Sampling Plan Components	Objective: To Verify as Clean		
	Sampling Media		
	Soils[5]	**Porous Structures**[5]	**Non-porous Structures or Equipment**[5]
Number of Samples	One per 100 ft^2 of surface area; minimum of 3 three samples	One per 100 ft^2 of surface area; minimum of 3 three samples	One per 1000 ft^2 of surface area; minimum of 1 one sample
Method to Select Sample Locations	Random Sampling & Judgemental[1]	Random Sampling & Judgemental[1]	Judgemental[1]
Sampling Methodology (composite, discrete, chip, wipe)	Discrete soil samples	Discrete chips	Wipe sample (See Attachment E)
Analytical Parameters	All COCs[3]	All COCs[3]	All COCs[3]
Analysis of Totals/TCLP Extract	Totals and Leachate[4]	Totals and Leachate[4]	Totals

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.

ATTACHMENT G

Recognized Decontamination Methods

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

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.
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.)**
Immobilization Method	
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.