



AGENCY GUIDELINES FOR PETROLEUM CONTAMINATED SOIL AND DEBRIS

**Vermont State Agency of Natural Resources
Waste Management Division**

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INTRODUCTION

The Department of Environmental Conservation, Waste Management Division (WMD) has prepared this document to provide guidelines for the management, treatment, and disposal of petroleum contaminated soil and debris. These guidelines were developed as a common sense approach, for dealing with numerous large and small scale incidents in a cost effective manner that is protective of public health and the environment. This guidance provides information to be used by responsible parties and their consultants, to determine what actions are needed to clean up petroleum contamination caused by underground storage tank (UST) leaks, overfills, and spills.

A main purpose of these guidelines is to establish a procedure to manage petroleum contaminated soil and debris outside of the hazardous waste universe. This guidance is applicable to petroleum contaminated soil or debris that is not classified as a hazardous waste. Soil or debris classified as a hazardous waste is comprehensively regulated by the provisions of the Vermont Hazardous Waste Management Regulations (VHWMR). It is the responsibility of the generator of the soil or debris to understand the relevant parts of these regulations, and any exemptions that may apply. Please refer to Appendix E for guidance on determining whether the soil or debris must be managed in accordance with this document or the VHWMR.

This guidance is not intended to address free phase petroleum product, petroleum vapor impacts to air quality, water supply impacts, surface water impacts, groundwater impacts, or any other immediate threats or impacts to potential sensitive human or environmental receptors. If any of the above conditions are encountered, the WMD must be contacted immediately. Additionally, these issues are addressed in the WMD documents titled, "Site Investigation Guidance" and "Corrective Action Guidance."

Please note that failure to handle the waste in accordance with this document may be considered a violation of statute or regulation, and such violation could result in the imposition of penalties or fines. In addition, these guidelines must be followed in order to allow most petroleum contaminated soil or debris to be exempt from the VHWMR. It is in the responsible party's and cleanup contractor's best interests to follow this guidance as closely as possible. Any questions or comments are encouraged, and should be directed to WMD staff for assistance.

RELEASE NOTIFICATION AND REPORTING REQUIREMENTS

Petroleum is classified as a hazardous material. According to 10 V.S.A. Section 6617, "Any person who has knowledge of a release or a suspected release and who may be subject to liability for a release, as detailed in section 6615 (e.g. owners or operators of a facility), shall immediately notify the Agency." This notification requirement applies to the release of petroleum into the surface or groundwater, or onto the land of the state, and would pertain to contamination covered by these guidelines.

For petroleum contaminated soil or debris classified as a hazardous waste, the generators of this waste are required to report activities associated with this waste including monitoring and sampling results, and the treatment, storage and disposal of the waste. The reporting requirements are outlined in the VHWMR.

Any release from a regulated UST is subject to the reporting requirements outlined in Subchapter 6 of the "Vermont UST Regulations". The UST owner or operator are required to report to the Agency activities associated with the release(s) of petroleum including the confirmation of a release or suspected release, a release investigation and confirmation, corrective action activities, and the closure of USTs.

Once a release has been reported to the Agency, oversight by the WMD will be provided to ensure that the responsible party initiates the appropriate abatement actions in order to protect human health and the environment.

FIELD MEASUREMENTS

The WMD encourages the use of a photoionization detector (PID) for the direct screening of soil or debris contaminated with gasoline, fuel oils, and used oil. Soil or debris contaminated with waste oil or heavier petroleum products (e.g. - #4 and #6 fuel oil) will also need to be evaluated by analyzing samples in a laboratory. This is discussed in more detail in the section titled, "Soil Guideline Thresholds." The WMD recognizes that many other instruments and techniques can be used to measure the degree and extent of petroleum contamination. The use of other methods requires review and approval by the WMD.

The PID offers the ability to collect numerous samples for instantaneous analysis. Proper maintenance and consistent operation of this instrument provides a relatively inexpensive and adequate measure of the degree and extent of the contamination. This information, along with relevant site information such as soil types, adjacent receptors, contaminant migration routes, presence of free product and groundwater contamination, may be used to determine the need for future site work.

The PID does not measure specific compounds (e.g. benzene); it is calibrated using a compound which produces a meter response equivalent to benzene, and this response factor determines relative concentrations of contaminants. The PID response is affected by temperature, wind, and humidity. Sensitivity may also vary with different models and manufacturers. However, the WMD believes that the PID is an effective field screening device, and for this reason encourages its use.

The WMD has developed the following guidelines to ensure standardized use of a PID. These guidelines are not meant to replace any standard operating procedures (SOPs) employed by the user or operating instructions recommended by the manufacturer, but are meant to provide a minimum standard which is required by the WMD.

1. PID assays are to be done on-site, using a minimum 10.2 electron volt (eV) unit calibrated to a benzene equivalent (e.g. isobutylene).
2. Calibrations should be performed each day the instrument is in use. It is preferable to calibrate the instrument onsite and whenever significant climatic changes occur during screening activities.
3. An instrument log book must be maintained by the operator and shall be provided to the WMD for review upon request. At a minimum, the log book should contain the PID make and model, the date and time of calibration, and the type of calibration gas used. Other information could include humidity, wind, temperature, and any other relevant information.
4. Headspace vapor readings on samples shall be taken by placing a sample of soil or debris into a closed plastic bag or sample jar. The sample should occupy approximately 50% of the volume of the sample container. The sample container should be vigorously agitated, then allowed to sit undisturbed for approximately 1 minute to allow for sample equilibration, and finally a headspace vapor concentration may be measured using the PID.
5. In cold weather conditions, the collected samples should be warmed to room temperature (~ 68° F) prior to screening.
6. In humid conditions, the samples should be taken into a dry environment prior to screening to prevent outside moisture interference.
7. In windy conditions, the samples should be shielded from the wind during collection.
8. SOPs for sample collection should be maintained by the sampler and made available to the WMD upon request.

SOIL GUIDELINE THRESHOLDS

The WMD has developed these guideline thresholds to help in the decision-making process concerning petroleum contaminated soils. The soil vapor concentrations measured in the field should be used in conjunction with other site information when determining what actions to take. For example, it may not be appropriate to backfill soils with less than 20 ppm by PID if a drinking water supply is nearby, and it may not be practical to remove soils above 20 ppm PID if the degree of contamination is extensive and free product contamination is observed.

The WMD discourages the removal of petroleum contaminated soil when groundwater is known to be impacted, and/or when extensive contaminated soil is present which is impractical to remove and treat. In these situations, the WMD recommends backfilling all contaminated soil and will normally require a full subsurface site investigation to determine the nature, degree and extent of the contamination; please refer to the document titled, "Site Investigation Guidance" for more information.

Excavation and treatment of petroleum contaminated soil in excess of 80 cubic yards, or 120 tons, is considered a corrective action measure, except in cases where soil is removed to accommodate replacement USTs. Prior to performing a corrective action measure, a formal written Corrective Action Plan must be submitted and approved in writing by the WMD before excavating petroleum contaminated soil; please refer to the WMD document titled, "Corrective Action Guidance" for more information. If there is confusion in using the soil guideline thresholds when onsite, please contact the WMD for assistance.

1. PID readings < 20 ppm gasoline and < 10 ppm fuel oils: This soil may be backfilled provided that a potential sensitive receptor (i.e. public and private water supplies, surface waters, outdoor and indoor air) is not immediately threatened by the soil. Soil exhibiting higher PID readings may also be backfilled as explained in 2-4 below. **These soils are not considered "clean" and may not be moved off-site without written WMD approval, unless petroleum contamination is non-detectable by PID, and soil exhibits neither visual nor olfactory evidence of contamination.**

2. PID readings from 20 - 100 ppm gasoline and from 10 - 40 ppm fuel oils: This soil needs treatment either on-site or off-site, but may be backfilled only if a full site investigation will be performed to fully characterize the contamination. **Off-site transportation of petroleum contaminated soils requires written WMD approval prior to transport.**

3. PID readings from 100 - 1,000 ppm gasoline and from 40 - 400 ppm fuel oils: This soil needs treatment on-site. The WMD encourages the backfilling of soil contaminated to this degree to relieve the release of petroleum vapors to the atmosphere. A full site investigation will need to be performed to fully characterize the contamination. **Off-site transportation of these soils also requires written WMD approval prior to transport. In addition, treatment of these soils off-site will only be approved by the WMD on a case-by-case basis.**

4. PID readings > 1,000 ppm gasoline and > 400 ppm fuel oils or soil saturated with free product: This soil must be treated in-situ or, in circumstances when this soil is excavated, handled as a hazardous waste in accordance with the VHWMR. The WMD encourages the backfilling of soil contaminated to this degree to relieve the release of petroleum vapors to the atmosphere. A full site investigation will need to be performed to fully characterize the contamination.

Soils contaminated with #4 fuel oil, #6 fuel oil, or used oil will require additional analysis of samples collected in the field by a qualified laboratory. A minimum of two samples per UST excavation will need to be collected and analyzed using an acceptable EPA method for total petroleum hydrocarbons (TPH). For #4 fuel oil contaminated soil, an additional two soil samples per UST excavation will need to be collected and analyzed using an acceptable EPA method for BTEX compounds. For #6 fuel oil or used oil contaminated soil, an additional two soil samples per UST excavation will need to be collected and analyzed EPA Method 8260, or an approved alternative. For spills or overfills, the minimum number of samples will be determined by the WMD on a case-by-case basis. The exact sample locations should be based on site specific information but should be obtained from locations in the excavation which provide representative results of the most contaminated soil. However, if soils are excavated in an attempt to remove all petroleum contaminated soil, then laboratory samples should instead be taken from the limits of the excavation following soil removal. Soils contaminated with these petroleum products may be backfilled only if a full site investigation will be performed to fully characterize the contamination.

Whenever soils are removed for stockpiling and/or treatment, additional samples of the native material remaining in the ground must be collected and screened using a PID, in order to demonstrate that the full extent of contamination was removed. In cases where replacement USTs are installed, and/or the full extent of contamination can not be removed, screening the remaining native soil provides useful information on the degree and extent of contamination left in the subsurface. The WMD may also require the collection of samples for laboratory analysis to demonstrate that the full extent of contamination was removed (e.g. #4 fuel oil, #6 fuel oil, or used oil contaminated soil [see above paragraph]).

SOIL TREATMENT OPTIONS

On-Site Soil Treatment- Excavated soils can be treated on-site if no potential sensitive receptors are adjacent to the site (e.g. - water supplies, surface waters, wetlands, etc.) and adequate room is available so that the contaminated soils can be secured from public access. With the exception of on-site polyencapsulation, the WMD must pre-approve the use of an on-site soil treatment option. The WMD will allow the following types of on-site treatment if the location is suitable, and when necessary, a corrective action plan to excavate and treat the soil has been approved of prior to soil removal:

1. **Polyencapsulation** - This treatment option relies on the processes of biodegradation, photochemical reactions and volatilization to reduce concentrations of petroleum in soils. The treatment method requires the complete containment or encapsulation of the contaminated soil within a polyethylene, plastic liner. The plastic should be a minimum thickness of 8 mils (0.008 inches). Clear plastic should be used to enhance petroleum degradation through photochemical reactions. The integrity of the plastic must be maintained to prevent leaching of contaminants out of the pile, and to minimize the rate of volatilization. The soils must remain polyencapsulated on-site until vapor levels are non-

detectable (< 1 ppm) using a PID, and there is no olfactory or visual evidence of contamination. For soil contaminated with used oil, #4 or #6 fuel oil, confirmatory lab samples may be requested for compound specific and TPH analysis prior to thinspreading soil onsite. For off-site stockpiles, additional criteria must be met prior to thinspreading (see "Off-Site Treatment").

2. **Vapor Extraction** - This treatment method involves polyencapsulating soils on site and designing and implementing a system which draws air and contaminants out of the pile. This is often accomplished by placing slotted PVC piping throughout the soil pile and connecting the piping to a vacuum blower. The blower promotes volatilization of hydrocarbons in the soil. This technique results in faster and more complete removal of contaminants from the soil as compared to polyencapsulation. The emissions from the blower must be treated to meet the Hazardous Most Stringent Emission Rate as defined in the Vermont Air Pollution Control Regulations; please refer to the document titled, "Use of Soil Vapor Extraction Systems to Treat Contaminated Sites" (page 12), under "Air Emissions."

3. **Bioremediation** - This treatment method involves polyencapsulating the soils onsite and designing a system for stimulating naturally occurring bacteria to enhance the degradation of petroleum products. This is typically done by adding nutrients, water and oxygen to the soil pile. The addition of bacteria to the soil piles will be allowed on a case-by-case basis only.

4. **Landfarm** - This treatment method may be used on soils contaminated with either fuel oil or used oil. Upon WMD approval, contaminated soils from #6 fuel oil or used oil may be landfarmed provided that chlorinated compounds do not exceed the Vermont Groundwater Enforcement Standards (VGES). The soil sample units, ug/kg, will be used to substitute the aqueous units, ug/l. This treatment option is available only for sites which meet the criteria listed below under "Off-Site Treatment" (1.) through (8.). Additional criteria for determining proper site location includes: a minimum separation distance of three feet between the ground surface and the seasonable high groundwater table; and the slope of the land does not exceed 8%. If the above criteria are met, then this treatment option may be selected. The following treatment method summary highlights the more detailed guidance provided in Appendix A; this appendix includes all the necessary information for utilizing the treatment option and must be complied with to use the landfarming option. Landfarming involves the thin spreading of soil at a site to a depth of 3"-6". Fertilizer, typically cow manure, is added to the soil, and incorporated into the soil through disc harrowing or rototilling. As with bioremediation, this process stimulates the activity of bacteria in the soil which enhances the degradation of petroleum. Laboratory sampling is conducted to evaluate the progress of treatment, and to determine the need for further treatment. Following completion of the landfarm, soils are seeded with a final cover material.

Following on-site treatment options (1.) through (3.), soils may be thinspread at the site where they were generated, if the soils contain no olfactory or visual evidence of contamination, vapor levels are non-detectable (< 1 ppm) using a PID, and approval to thinspread has been obtained from the WMD. For soil contaminated with used oil, #4 or #6 fuel oil, confirmatory lab samples may be requested for compound specific and TPH analysis prior to thinspreading soil onsite. Approval must be granted by the WMD prior to thinspreading soils onsite or disposing of these soils at a WMD approved location. Please refer to Appendix A for information on landfarming closure requirements. If the soil is to be thinspread off-site, then the minimum criteria for off-site thinspreading must be met (see below).

Off-Site Soil Treatment - The above on-site treatment options (1-4) will only be available at off-site locations following written WMD approval. The WMD will only approve of an off-site treatment location if it meets the following criteria (a checklist is included with Appendix B):

1. There are no bedrock drinking water supplies within a 200 foot radius.
2. There are no shallow water supplies (e.g. dug wells, driven wells, etc.) within a 300 foot radius. This limit may need to be extended if shallow water supplies are shown to be hydraulically downgradient.
3. There are no sensitive environments such as a stream, river, lake, pond, wildlife refuge, wetland, floodplain, Class I or Class II groundwater zone or other similar areas, within 100 feet of the treatment location.
4. There is adequate room to allow for treatment to occur over the necessary time frame.
5. Public access to the treatment area must be restricted (e.g. fencing, posted)
6. The treatment location is not in a residential area.
7. Written approval from the landowner, if different from soil generator, is obtained before treatment begins.
8. Written approval from the landowner granting WMD investigators property access for the purpose of inspecting soil treatment at any reasonable time.
9. The local municipality must be notified in writing of the off-site location prior to initiating any soil treatment. If applicable, local permits should be obtained. The responsible party must provide evidence to the WMD that this notification has been made.
10. An area map and street address of the soil location are submitted to the WMD.

Following treatment, soils may be thinspread at the site where they were treated once the conditions cited below have been met. First, the soil must contain no olfactory or visual evidence of contamination, and the vapor levels must be non-detectable (<1 ppm) using a PID. Once the above criteria have been met, then confirmatory soil samples must be collected for laboratory analysis. For soil contaminated with gasoline and fuel oil (except #6 fuel oil-see below), samples must be analyzed for BTEX compounds; for gasoline contaminated soil MTBE must also be analyzed. For used oil and #6 fuel oil contaminated soil, samples must be analyzed using EPA Method 8260, or a WMD approved alternative. In addition, soils contaminated with any petroleum product must also have samples collected and analyzed for TPH.

For soil stockpiles not exceeding 50 cubic yards, a minimum of two discrete soil samples for analysis must be collected from soil core samples; for soil contaminated with fuel oil or used oil, composite samples may be taken rather than discrete samples. For soil stockpiles not exceeding 100 cubic yards, a minimum of three samples must be collected in the same manner. For soil stockpiles not exceeding 200 cubic yards, a minimum of four samples must be collected, and so forth.

In circumstances where EPA Method 8020 or 8260 is used, soils may not be thinspread until all petroleum compounds are below Vermont Groundwater Enforcement Standards. The WMD is substituting the VGES ug/l numerical values with ug/kg values obtained for soil analyses. For benzene, non-detect may substitute for 5 ug/kg when detection limits are raised above this concentration, and no clear correlation can be made between the concentration of benzene and other compounds. In circumstances where a method for TPH is used, then concentrations must not exceed 1,000 ppm.

Soils not thinspread following off-site treatment will need to be disposed of at a WMD approved location. **Approval must be granted by the WMD prior to thinspreading soils at an off-site location or disposing of these soils at an approved location.**

SOIL DISPOSAL OPTIONS

Soils may be disposed at the following locations after site specific approval is granted by the WMD; additional testing may be required before disposal at these locations (see Appendix C for a list of disposal facilities):

1. **Certified Lined Landfills** - Following approval from the owner/operator of the landfill and the WMD, petroleum contaminated soils (with < 100 ppm by PID for gasoline and < 40 ppm by PID for kerosene, diesel, and fuel oils) may be disposed as fill material or as daily cover material at Vermont certified lined landfills. If contaminated soils exhibit PID readings exceeding the above cited concentration limits, then the soils must be tested to determine whether the soils exhibit either the characteristic of ignitability (refer to the VHWMR Section 7-204) or toxicity (refer to the VHWMR Section 7-207, specifically TCLP for benzene). If neither of the above characteristics is exhibited, then these soils may be disposed of only as fill material at Vermont certified lined landfills following approval from the owner/operator of the landfill and the WMD. Landfills may accept petroleum contaminated soil for treatment prior to use as fill material, but must have or obtain the

appropriate permit; please contact the WMD for information on obtaining this permit.

2. **Asphalt Batching** - The WMD allows petroleum contaminated soils to be processed at hot mix or cold patch asphalt batching facilities, certified by the Air Pollution Control Division.

The WMD allows out-of-state disposal of petroleum contaminated soils at approved locations, such as hazardous waste facilities, landfills, asphalt batching plants, thermal treatment plants, and other treatment facilities. Approval to take soils out-of-state must be granted by the WMD and the receiving State or Province. The WMD must receive written proof that the soils were disposed of at such facilities.

DEBRIS TREATMENT AND DISPOSAL OPTIONS

Petroleum contaminated debris (i.e. carbon filtration media or spill cleanup material) may be treated and/or disposed of using the following options after site specific approval is granted by the WMD. These options are only available provided that the petroleum contaminated debris is not classified as a hazardous waste subject to the VHWMR.

1. **Asphalt Batching** - The WMD allows petroleum contaminated debris to be processed at in-state and out-of-state hot mix or cold patch asphalt batching facilities permitted to accept such waste.

2. **Certified Landfills** - Petroleum contaminated debris may be disposed of at certified lined landfills following prior approval from the operator/owner of the landfill and the WMD.

3. **On-Site Carbon Regeneration** - The WMD allows the treatment of carbon filtration media (vapor phase carbon only) using approved on-site regeneration techniques (e.g. - steam regeneration). The waste produced by the regeneration process must be handled as a hazardous waste. On-site discharge permits may be needed depending on the specifics of the site regeneration.

4. **Off-Site Carbon Regeneration** - Carbon filtration media not classified as a hazardous waste may be treated at off-site locations approved by the WMD, if in-state, or approved by the receiving state, if out-of-state. The transport of this material must be handled by a carrier with a valid solid waste carrier permit.

The WMD allows out-of-state disposal of petroleum contaminated debris at approved locations, such as hazardous waste facilities, landfills, asphalt batching plants, thermal treatment plants, and other treatment facilities. Approval to take debris out-of-state must be granted by the WMD and the receiving State or Province. The WMD must receive written proof that the debris were disposed of at such facilities.

APPROVAL

P. Howard Flanders, Director
Waste Management Division

Date

Appendix A - Landfarming
Appendix B - Off-Site Soil Treatment Request Form
Appendix C - List of Disposal Facilities
Appendix D - List of WMD Documents
Appendix E - Legal Authority and Guidance Applicability

APPENDIX A

LANDFARMING

APPENDIX A LANDFARMING

OPERATION OF A LANDFARM

1. **Soil Incorporation** - The petroleum contaminated soils shall be spread on the landfarm location to a depth not to exceed six (6) inches, and then thoroughly incorporated into the native topsoil. The spreading of the contaminated soil shall take place at the beginning of a forecasted period, of not less than 48 hours, of fair weather.
2. **Containment** - Surface runoff must be prevented (e.g. - an earthen berm can be built around the landfarm using non-contaminated material).
3. **Manure Addition** - A minimum of 1-2 inches of manure shall be added to the surface of the entire landfarm and then thoroughly incorporated into the top six inches of soil. Rotary tilling or disc harrowing can be used for this process. Commercial grade fertilizers or other organic material will be allowed only on a case-by-case basis.
4. **Aeration** - Aerobic biodegradation of the petroleum shall be maintained through frequent tilling following the initial application and incorporation. A tilling schedule will be developed for each case depending upon the degree of contamination and the soil type. At a minimum, soils must be tilled once a month from May through September.
5. **Irrigation** - Critical to the success of enhanced biodegradation by landfarming, is the proper application of water during dry periods. All landfarms should be periodically irrigated when dry periods exist. Irrigation should provide only enough water to fill the soil's available water capacity. Any excess water may lead to contaminant migration to the groundwater. Irrigated water should be applied at a rate less than the soils infiltration rate as a means of preventing surface runoff.
6. **Seeding** - At least three weeks before the end of each growing season the landfarm should be seeded with a final cover crop, such as a winter rye mix or a conservation grass mix.

SAMPLING AND ANALYTICAL REQUIREMENTS

1. **Sampling Frequency** - Initial composite soil samples must be taken throughout the landfarm directly following the application and mixing of the soil and manure to establish a baseline. Subsequent sampling shall be conducted at the end of the growing season. The WMD recommends the collection of additional samples in mid-summer in order to measure the success of the landfarm, as well as to determine if elements of the operation need modifications to enhance treatment.

2. **Sampling Method** - A pig-tail soil auger or shovel shall be used to collect the soil samples. Ten equal amounts of soil shall be collected from the top six inches of the landfarm, and shall be placed in a 1 liter glass jar, to represent one composite sample.

3. **Number of Samples** - The number of samples required to be taken during each sampling round, is dependent on the volume of contaminated soil being landfarmed.

0 - 50 cubic yards: 2 samples composited from 10 locations each within the top 6 inches of the landfarmed soil; and 1 sample composited from 5 locations each collected 12 - 18 inches underneath the landfarmed soil.

50 - 100 cubic yards: 3 samples composited from 10 locations each within the top 6 inches of the landfarmed soil; and 2 samples composited from 5 locations each collected 12 - 18 inches underneath the landfarmed soil.

100 - 200 cubic yards: 4 samples composited from 10 locations each within the top 6 inches of the landfarm; and 3 samples composited from 5 locations each collected 12 -18 inches underneath the landfarmed soil.

Each additional 100 cubic yards, up to a total of 500 cubic yards, will require another sample composited from 10 locations each within the top 6 inches of the landfarm, and another sample composited from 5 locations each collected 12 - 18 inches underneath the landfarm. After 500 cubic yards, one additional sample shall be required for each additional 500 cubic yards of soil.

Subsurface soil samples will not be required for landfarms set-up on an impermeable layer, such as polyethylene plastic of 8 mil or greater, unless there is indication the liner has been compromised.

5. **Analytical Methods** - All samples collected must be submitted to a laboratory for analysis of total petroleum hydrocarbons (TPH) using an acceptable EPA Method. For lighter petroleum distillates it is more appropriate to use EPA Method 8015 or an acceptable equivalent. For heavier distillates such as heavier fuel oils or used oil, a modified EPA Method 8100 for TPH or an acceptable alternative should be used.

MONITORING REQUIREMENTS

1. The responsible party shall maintain a detailed log with records of all landfarm activities and characteristics, including but not limited to the following:

! map of treatment sites with sampling locations;

- ! volume and type of petroleum contaminated soils in the landfarm;
 - ! tillage dates and sample dates;
 - ! manure applications, soil amendments (lime), irrigation events and seeding events;
 - ! and results of all laboratory analyses.
2. Depending on the volume of the contaminated soil, the location of the landfarm and the degree of contamination, additional monitoring may be required on a case-by-case basis. Additional monitoring may include surface water sampling, and/or groundwater sampling. Groundwater sampling will require the installation of monitoring wells.

CLOSURE REQUIREMENTS

Biological treatment of the petroleum contaminated soils will be deemed completed when the following criteria are met:

1. All TPH samples collected during a sampling round contain less than 1,000 ppm.
2. No visible discoloration or detectable fuel odors remain in the landfarmed soils.
3. Petroleum vapor concentrations must be non-detectable (< 1 ppm) using a PID. The entire land farm must be thoroughly screened by PID with two sample locations for every ten cubic yards of soil being landfarmed. The landfarm only needs to be screened by PID once the TPH, visual, and olfactory requirements have been met (see [1.] and [2.] above).
4. The results of compound specific testing demonstrates that these compounds do not exceed the Vermont Groundwater Enforcement Standards, a Vermont Health Advisory level or a federal Maximum Contaminant Level (MCL). Once closure requirements (1.) through (3.) have been met, a number of discrete, compound-specific, soil samples should be collected for laboratory analysis. The number of samples collected, at a minimum, must be equivalent to the number of samples collected for TPH during a sampling round (see "Sampling and Analytical Requirements" [3.]). For fuel oil (except #6 fuel oil) contaminated soil, samples must be collected and analyzed for BTEX compounds (e.g. EPA Method 8020). For used oil contaminated soil, samples should be analyzed using EPA Method 8260, or a WMD approved alternative.

If the above conditions are not achieved at the end of the growing season, the operation of the landfarm shall continue in the following growing season(s) until the closure requirements have been met.

LAND DISPOSAL RESTRICTIONS

When the landfarm is complete, the site should not be used for growing crops for human consumption until there are no detectable petroleum hydrocarbons remaining.

APPENDIX B

OFF-SITE SOIL TREATMENT REQUEST FORM

OFF-SITE SOIL TREATMENT REQUEST FORM

Off-Site Location

Soil Volume/Peak PID/Avg. PID: _____ Off-Site Street Address: _____
Name of Land
Owner: _____ Phone # of Land
Owner: _____

Generator/Owner of Soil

Name: _____
Facility ID#, Name, and Street Address: _____
Contact: _____
Phone #: _____

Off-Site Soil Treatment Siting Criteria Checklist

- There are no bedrock drinking water supplies within 200 feet of the treatment location.
- There are no shallow water supplies (e.g. dug wells, driven wells, etc.) within 300 feet of the treatment location. This limit may need to be extended if shallow water supplies are shown to be hydraulically downgradient.
- There are no sensitive environments such as a stream, river, lake, pond, wildlife refuge, wetland, floodplain or other similar areas, within 100 feet of the treatment location.
- There is adequate room to allow for treatment to occur over the necessary time frame.
- Public access to the treatment area has been restricted (e.g. fencing, posted).
- The treatment location is not in a residential area.
- Written approval from the landowner, if different from the soil generator, has been obtained before treatment begins. This must include written approval from the landowner granting Department of Environmental Conservation (DEC) investigators property access for the purpose of inspecting soil treatment at any reasonable time.
- The local municipality has been notified in writing of the off-site location prior to initiating any soil treatment. The soil generator has provided evidence to the Waste Management Division (WMD) that this notification has been made. If applicable, local permits should be obtained.
- An area map of the soil location has been submitted to the WMD.
- The WMD has given approval to move soils to the off-site location specified above, as indicated by the WMD representative's signature below.

As the party responsible for compliance with the "Agency Guidelines for Petroleum Contaminated Soil and Debris," subchapter 6 of the "Vermont Underground Storage Tank Regulations," and applicable statutes, I hereby certify that the representations made on this form are to the best of my knowledge true and correct.

Name of Owner/Operator Representative (printed)

Company Title

Signature

Date

As land owner of the soil treatment location, I hereby give approval to the soil generator to treat the soil volume cited above at the above referenced location. In addition, I hereby grant property access to DEC investigators for the purpose of inspecting soil treatment at any reasonable time.

Signature of Land Owner

Date

Signature of WMD Representative

Date of Approval

APPENDIX C

LIST OF DISPOSAL FACILITIES

Waste Management Division
103 South Main Street/West Building
Waterbury, Vermont 05671-0404
(802) 241-3888
FAX: (802) 241-3296

FACILITIES LIST

For Treatment or Disposal of Petroleum Contaminated Soil or Debris

Update: April 1, 1996

ASPHALT BATCHING FACILITIES

Massachusetts	Massachusetts (cont.)	New Hampshire (cont.)
<p>American Reclamation Corporation 130 Route 20 Charlton, MA 01508 (508) 248-3777</p> <p>Barton Trimount, Inc. 1101 Turnpike Street Rt. 27 Stoughton, MA 02072 (617) 344-1100</p> <p>Brox Industries, Inc. (508) 454-9105 Contact: Erik Stevenson</p> <p><i>facilities include:</i></p> <p style="padding-left: 40px;">181 Mill Street Marlboro, MA 01752</p> <p style="padding-left: 40px;">1471 Methuen Street Dracut, MA 01826</p> <p>Maxymillian Technologies 1801 East Street Pittsfield, MA 01201 (413) 499-3050 <i>[no gasoline waste accepted]</i></p>	<p>Ondrick Construction 58 Industry Road Chicopee Falls, MA 01021 (413) 592-2081 Contact: Paul Mullen</p> <p>New Hampshire</p> <p>Brox Industries, Inc. 85 Greeley Street Hudson, NH 03051 (508) 454-9105 Contact: Erik Stevenson</p> <p>Continental Paving 1 Continental Drive Londonderry, NH 03053 (603) 437-5387 Contact: Mark Charbonneau <i>[virgin petroleum waste only]</i></p> <p>Iafolla Industries 650 Peverly Hill Road PO Box 840 Portsmouth, NH 03802-0840 (603) 436-4432 Contact: Michael Iafolla</p>	<p>Merrimac Timber Services, Inc. Route 4 Chichester, NH 03263 (603) 798-5638 Contact: Lisa Fauteux</p> <p>New York</p> <p>CWA Schoharie Tpk. County RT. 28 Athens, NY 12015 <i>[mailing address]</i> PO Box 359 Epsom, NH 03234 (603) 798-4700</p> <p>Rhode Island</p> <p>Aggregate Recycling Corp. 800 Jefferson Blvd. Warwick, RI 02887 (401) 737-1300 Contact: Al Marcello</p>

(over)

LANDFILL FACILITIES

Massachusetts	Massachusetts (cont.)	New York
<p>Browning Ferris Industries (508) 588-2260 Contact: Eugene Lunney <i>facilities include:</i></p> <p style="padding-left: 40px;">234 Thatcher Street East Bridgewater, MA</p> <p style="padding-left: 40px;">Johnson Street Randolph, MA 02368</p> <p style="padding-left: 40px;">1080 Airport Road Falls River, MA 02720</p> <p>United Waste Systems, Inc. (800) 229-0261 Contact: Tim Tynan <i>facilities include:</i></p> <p style="padding-left: 40px;">Avenue M Route 5 Agawam, MA 01001</p> <p style="padding-left: 40px;">99 Barre Depot Road Barre, MA 01005</p> <p style="padding-left: 40px;">100 New Lombard Road Chicopee, MA 01020</p>	<p>600 New Ludlow Road Granby, MA</p> <p>Turnpike Road Townshend, MA 01469</p> <p>New Hampshire</p> <p>North Country Environmental Tech. Trudeau Road Bethlehem, NH <i>[mailing address]</i> 501 South Street Box E Bow, NH 03304 (800) 883-8877 Contact: Mike Viani</p> <p>Waste Management, Inc. Turnkey Landfill 90 Rochester Neck Road PO Box 7065 Rochester, NH 03839 (603) 330-0217 x108 Contact: Rich Messer</p>	<p>Landfill Technologies, Inc. Albany Interim Landfill PO Box 519 West Sand Lake, NY 12196 (518) 674-8694 Contact: George Nealon</p> <p>Vermont</p> <p>Waste USA Airport Road Coventry, VT (603) 225-0579 Contact: Mike Viani</p> <p>Randolph Lined Landfill Landfill Road Drawer B Randolph, VT 05060 (802) 728-5433 Contact: Gwendolyn Hallsmith</p>

OTHER TREATMENT FACILITIES

Massachusetts	New Hampshire (cont.)	Quebec
<p>Maxymillian Technologies E Street North Adams, MA <i>[mailing address]</i> 1801 East Street Pittsfield, MA 01201 (413) 499-3050 <i>[thermal treatment]</i></p> <p>New Hampshire</p> <p>Environmental Soil Mgmt., Inc. 67 International Drive Loudon, NH 03301 (603) 783-0228 Contact: Lee Fox <i>[thermal treatment]</i></p>	<p>TPS Technologies, Inc. Facility: Derry, NH <i>[mailing address]</i> 12068 Market Street Livonia, MI 48130 (313) 591-1000 Contact: S.N. Prakash <i>[thermal treatment]</i></p> <p>New York</p> <p>Environmental Soil Mgmt., Inc. 304 Towpath Road Fort Edward, NY 12828 (603) 783-0228 Contact: Lee Fox <i>[thermal treatment]</i></p>	<p>Cintec Environnement, Inc. 2401 Lapierre Lasalle, Quebec H8N 4B7 (514) 945-4762 Contact: Philippe Guerin <i>[soil washing]</i></p> <p>Envirogat, Inc. 48, rue De Granby Street Gatineau, Quebec J8P 7G7 (819) 663-1240 Contact: Michel Bard <i>[bioventing]</i></p>

This is a list of soil treatment or disposal facilities available in the greater Vermont area. The State does not endorse any of the listed facilities

APPENDIX D

LIST OF HAZARDOUS MATERIALS MANAGEMENT PROGRAM DOCUMENTS

Waste Management Division
103 South Main Street/West Building
Waterbury, Vermont 05671-0404
(802) 241-3888
FAX: (802) 241-3296

LIST OF WASTE MANAGEMENT DIVISION DOCUMENTS

Update: April 1, 1996

The following documents contain information relevant for conducting site assessments, investigations, remediation, as well as for preparing both summary reports and claims for reimbursement. To obtain copies of the following documents call the Waste Management Division office at (802) 241-3888.

UST Closure & Site Assessment Requirements - This document provides information on the activities necessary when closing or removing underground storage tanks. Information such as health and safety requirements, site characterization techniques, field sampling procedures, and quality assurance and quality control requirements are provided.

Site Investigation Guidance - This document provides the minimum requirements for site investigations on properties where a release or suspected release of a hazardous material(s) has occurred. It provides guidance for ensuring that costs of site investigations are eligible for reimbursement from the Petroleum Cleanup Fund when the release is from a qualifying underground storage tank system. It provides information on the Site Investigation Expressway program, and on preparing both site investigation reports and corrective action feasibility investigation reports.

Corrective Action Guidance - This document provides information on preparing corrective action plans that satisfy the requirements of state and federal regulations. This guidance also provides information both on the objectives of corrective action and on when such actions are necessary.

Site Monitoring and Operation & Maintenance of Corrective Action Guidance - This document provides information on monitoring and documenting the progress of cleanup at a site.

Use of Soil Vapor Extraction Systems to Treat Contaminated Sites - This document provides both a basic and detailed technical description of how this prevalent remedial technology works. It provides guidelines for determining the applicability of the technology at a site, and for operating and maintaining a soil vapor extraction system.

Procedures for Reimbursement from the Petroleum Cleanup Fund - This document provides guidance to owners and operators of underground storage tanks for preparing claims against the Petroleum Cleanup Fund. This document also describes the coverages provided and the parties who are eligible to receive these coverages.

"Site Management Activity Completed" Classification Procedure - This document provides information on completing management site investigation, monitoring, and/or cleanup activities.

Underground Storage Tank Regulations - These regulations regulate petroleum, related sludges, and chemical underground storage facilities in order to protect the public health and the environment.

Hazardous Waste Management Regulations - These regulations, which are effective in Vermont in lieu of federal regulations, are intended to protect public health and the environment by a comprehensive management scheme for hazardous waste in Vermont.

APPENDIX E

LEGAL AUTHORITY
AND
GUIDANCE APPLICABILITY

APPENDIX E LEGAL AUTHORITY AND GUIDANCE APPLICABILITY

LEGAL AUTHORITY

This guidance document was developed in response to 10 V.S.A. Chapter 159 §6604a "Contaminated Soil." This statute required the Agency of Natural Resources to develop, by January 15, 1989, a treatment and disposal plan for petroleum contaminated soil, including establishing health and environmental standards. These guidelines are an extension of the plan submitted to the legislature. In addition, management of any petroleum contaminated soil or debris, not generated from a farm or residence, must follow these guidelines to allow the soil or debris to be exempt from the Vermont Hazardous Waste Management Regulations; see conditions of 7-203 (16) listed below.

HAZARDOUS WASTE DETERMINATION

Under the Vermont Hazardous Waste Management Regulations (VHWMR), petroleum contaminated soil and debris may be classified as a hazardous waste. As a hazardous waste, the handling and disposal of the soil and debris must follow the provisions of these regulations; however, within these regulations there are exemptions that may apply to the soil or debris. In addition, even if there are not any exemptions applicable to the soil or debris, then it may still not exhibit a characteristic of a hazardous waste and be subject to the VHWMR. Petroleum contaminated soil generated from farm or residential sources, are exempt from being handled as a hazardous waste per VHWMR Section 7-203 (1), from 40 CFR 261.4 (b)(1). In order for soil or debris generated from other sources to qualify for an exemption, the following conditions of the VHWMR Section 7-203 (16) must be met:

- ! the petroleum contaminated soil or debris must be handled in accordance with this document;
- ! the petroleum contaminated soil or debris does not exhibit a characteristic of ignitability, corrosivity, reactivity, or toxicity as defined in sections 7-204 through 7-207 of the VHWMR, with the exception that petroleum contaminated soil or debris subject to regulation under 40 CFR Part 280 (e.g. Category One Tanks as defined in the Vermont UST Regulations) are not subject to regulation for the waste codes of D018 through D043 (e.g. benzene and a number of hydrocarbon derivatives) of the VHWMR Section 7-207; and
- ! the petroleum contaminated soil or debris does not contain wastes listed in the VHWMR 7-211 through 7-214, or listed in the VHWMR Section 7-210 F001 through F028 and VT01.

Failure to meet any of the above conditions will result in the requirement that the soil or debris be disposed of as a hazardous waste. Additionally, failure to handle soil or debris not classified as a hazardous waste in accordance with this document may result in the imposition of penalties or fines.

TESTING REQUIREMENTS FOR PETROLEUM CONTAMINATED SOIL AND DEBRIS

Farm and Residential Waste

Since petroleum contaminated soil and debris generated from farm and residential sources are exempt from being handled as a hazardous waste, per VHWMR Section 7-203 (1), from 40 CFR 261.4 (b)(1), no testing is necessary to demonstrate whether the soil or debris is considered a listed hazardous waste. However, the soil or debris must be handled in accordance with this document, and this may include some laboratory testing.

Ignitability, Corrosivity, and Reactivity

In most circumstances, petroleum contaminated soil or debris is assumed **not** to exhibit the characteristics of ignitability, corrosivity or reactivity. However, the WMD may require laboratory analysis to provide this demonstration. Petroleum contaminated soil with photoionization detector (PID) readings greater than 1,000 parts per million (ppm) gasoline (greater than 400 ppm fuel oils) or soil saturated with free phase product are assumed to be ignitable. However, these soils may be tested to demonstrate that the characteristic of ignitability is not exhibited; refer to the VHWMR Section 7-204 for more information.

Toxicity

Petroleum contaminated soil or debris generated from an UST system subject to 40 CFR Part 280 (e.g. Category One Tanks as defined in the Vermont UST Regulations) are not subject to testing requirements from VHWMR Section 7-207 waste codes D018 through D043 (includes benzene and a number of hydrocarbon derivatives); this exemption is from 40 CFR 261.4 (b)(10). With this exemption, the soil does not need to be tested to determine if it exhibits the characteristic of toxicity.

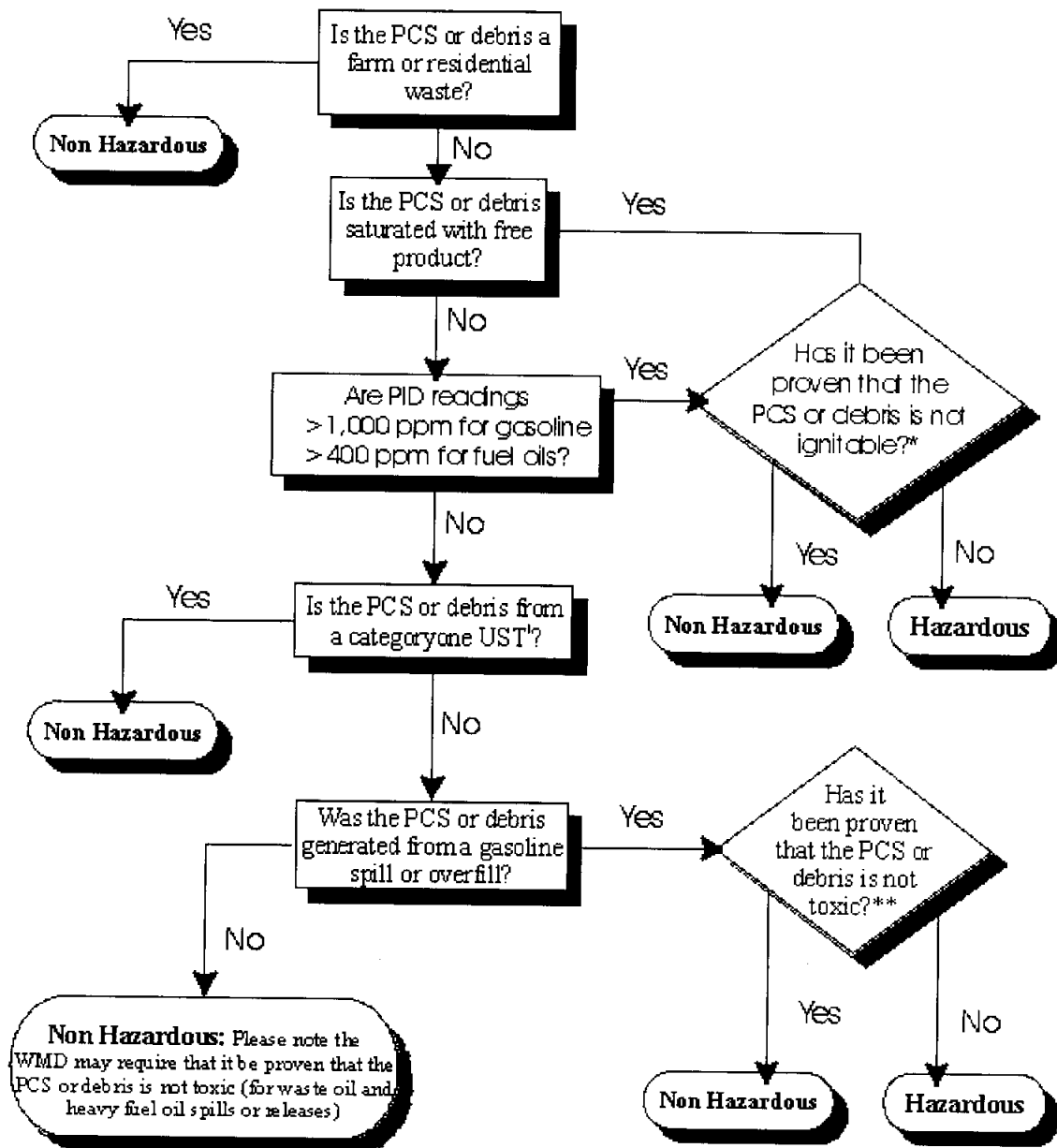
Petroleum contaminated soil or debris that is not generated from an UST system subject to 40 CFR Part 280 (e.g. spills/overfills and non-farm/non-residential heating oil USTs), does not receive an exemption from waste codes D018 through D043 for toxicity (VHWMR Section 7-207). In such circumstances, the following applies:

! Gasoline contaminated soil or debris from a spill/overfill is assumed to exhibit the characteristic of toxicity due to the presence of benzene (waste code D018) exceeding the compound's "maximum concentration for the characteristic of toxicity" (0.5 mg benzene/liter TCLP extract), and must therefore be handled in accordance with the VHWMR. However, these soils may be tested to demonstrate that the characteristic of toxicity is not exhibited; please refer to the VHWMR Section 7-207 for more information.

! Soil or debris contaminated with petroleum products other than gasoline, and not generated from an UST subject to regulation under 40 CFR Part 280 (e.g. non-farm/non-residential heating oil USTs or non-gasoline spills), is generally assumed not to exhibit the characteristic of toxicity. However, the WMD may require laboratory analysis to provide this demonstration (e.g. used oil or #6 fuel oil contaminated soil).

Please contact the WMD for assistance if there is still confusion in determining whether the soil or debris may be handled in accordance with this document.

Waste Determination Flow Chart



*Please refer to Section 7-204 of the VHWMR for information on testing for the characteristic of ignitability.
 **Please refer to Section 7-207 of the VHWMR for information on testing for the characteristic of toxicity.