

MEMORANDUM

**DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF LAND PROTECTION AND REVITALIZATION
OFFICE OF SPILL RESPONSE AND REMEDIATION**

Mail Address:
P.O. Box 1105
Richmond, VA 23218

Location:
1111 East Main Street
Richmond, VA 23219

SUBJECT: Storage Tank Program Technical Manual, Volume 6: Managing Petroleum Contaminated Media. December 2020 Edition. LPR-SRR-2020-04

TO: Petroleum Program Managers

FROM: Jeffery Steers 
Director, Division of Land Protection and Revitalization

DATE: January 15, 2021

COPIES: Regional Directors, OSRR Director and Staff, Regional Storage Tank Program Managers

Summary:

The Storage Tank Program Technical outlines and discusses procedures used by DEQ staff following the release of petroleum into the environment. Volume 6 provides guidance related to managing petroleum contaminated media at leaking storage tank sites. This volume replaces Chapter 6 of the Fourth Edition of the Storage Tank Program Technical Manual issued in 2011. This guidance is based upon the Code of Virginia §62.1-44.34:8 – 23 and Virginia Administrative Code 9 VAC 25-580.

The General VPDES Permit for Petroleum Contaminated Sites, Groundwater Remediation, and Hydrostatic Tests (a.k.a. the Petroleum Discharge General Permit) has been updated and re-issued since the effective date of the Fourth Edition of the Storage Tank Program Technical Manual. Information related to the Petroleum Discharge General Permit and managing discharges of petroleum contaminated water under this permit have been updated.

The Storage Tank Program had not previously provided any information about the use of various chemical countermeasures following petroleum releases. Volume 6 now includes general guidance for the use of chemical countermeasures following a petroleum release.

Options for managing petroleum contaminated soil have been expanded to include allowing emergency response contractors to temporarily store petroleum contaminated soil at their facilities as long as they are doing so in accordance with the solid and hazardous waste management regulations.

Volume 6 was also updated to incorporate information from DEQ's guidance for the Management and Reuse of Contaminated Media.

Attachment 2

Electronic Copy:

Once effective, an electronic copy of this guidance will be available on:

- The Virginia Regulatory Town Hall under the Department of Environmental Quality(<http://www.townhall.virginia.gov/L/gdocs.cfm?agencynumber=440>);

Contact information:

Please contact James Barnett, 804-698-4289, james.barnett@deq.virginia.gov with any questions regarding the application of this guidance.

Certification:

As required by Subsection B of § 2.2-4002.1 of the Administrative Process Act (APA,) the agency certifies that this guidance document conforms to the definition of a guidance document in § 2.2-4101 of the Code of Virginia.

Disclaimer:

This document is provided as guidance and, as such, sets forth standard operating procedures for the agency. However, it does not mandate any particular method nor does it prohibit any alternative method. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations.

STORAGE TANK PROGRAM TECHNICAL MANUAL

VOLUME 6: MANAGING PETROLEUM CONTAMINATED MEDIA

DEQ Guidance Document #LPR-SRR-2020-04

January 2021 Edition

**Commonwealth of Virginia
Department of Environmental Quality**

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Petroleum contaminated wastes are generated during storage tank closure, site characterization, and corrective action. These materials also may be generated during construction or property development activities. The purpose of this section is to discuss the regulatory and statutory requirements and provide general guidance for managing and handling petroleum contaminated media. Please keep in mind that the guidelines for managing contaminated media discussed in this manual are only for petroleum contaminated materials and do not apply to petroleum contaminated materials mixed with a listed hazardous waste or meeting the definition of a hazardous waste.

1.0 Managing Petroleum Contaminated Water

During the course of various tank-related activities as well as release response and corrective actions it may be necessary to deal with petroleum contaminated water. Article 1 of State Water Control Law (Section 62.1-44.5) states: "Except in compliance with a certificate issued by the Board, it shall be unlawful for any person to (1) discharge into state waters sewage, industrial wastes, other wastes, or any noxious or deleterious substances..." Persons discharging sewage, industrial wastes, or other wastes into or adjacent to state waters are required by 9 VAC 25-30-50.A of the Permit Regulation to have a VPDES or VPA permit for that activity. Persons discharging petroleum contaminated water to surface water via a point source are required to obtain coverage under a VPDES permit for those discharges. In most instances, point source discharges of petroleum contaminated water may be permitted by the General VPDES Permit for Discharges from Petroleum Contaminated Sites, Groundwater Remediation, and Hydrostatic Tests (Petroleum Discharge General Permit). If regional staff believe that an individual permit is more appropriate than the general permit for a discharge, staff may require the tank owner/operator to seek an individual VPDES permit.

DEQ realizes that these requirements may present difficulties for conducting and completing certain types of site characterization activities (e.g. aquifer testing) in a timely and cost effective manner. In order to promote more timely and cost effective site characterizations, DEQ has developed procedures for the on-site land application of contaminated water which provide increased flexibility in the handling and disposal of this material.

Please be aware that managing petroleum contaminated water related to tank closure and/or installation, site construction, or redevelopment activities may not be eligible for reimbursement. The responsible person should work closely with DEQ staff to establish what work, if any, may be eligible.

1.1 Land Application of Petroleum Contaminated Water

Water contaminated by leakage from petroleum storage tanks may be applied to land at the site if the conditions outlined below are followed. In all instances, it shall be the sole responsibility of the tank owner or operator to either provide adequate treatment of the petroleum contaminated water or certify that such water is not contaminated above specified thresholds prior to land application on site.

Criteria for on-site land application of any petroleum contaminated or treated ground water

1. The Regional Office must be notified prior to the land application of ground water near a drinking water supply well.
2. The purged ground water must not discharge to any storm sewer or surface waters.
3. The purged ground water must be applied to the land in such a way that it will infiltrate over the delineated dissolved phase plume, as best as known, and within the property boundaries of the site, preferably near the point of origin.
4. There must be no presence of liquid phase hydrocarbons, including a sheen or emulsion on the purged ground water.
5. The purged ground water may not be land applied during saturated or frozen ground conditions.
6. All actions taken to manage purged groundwater must be described in the subsequent report submitted to DEQ.

In addition to these criteria, the on-site land application of large volumes of waste water (e.g. discharges of water from aquifer tests and tank pit dewatering), must also meet the following requirements.

7. In all instances, water samples from the appropriate location(s) must be collected and analyzed prior to discharging that material. Petroleum constituents in water to be land applied shall not exceed the concentrations specified in the Petroleum Discharge General Permit (see Tables 1 and 2). These discharge concentrations are considered protective of aquatic life, but are not meant for protecting human health. Therefore, these discharge limits should not automatically be applied where humans may come into direct contact with the waste water. Acceptable concentrations of individual constituents must be considered on a case by case basis when humans may come into contact with the waste stream. In all cases, human receptors should not be exposed to more than a 1×10^{-6} excess lifetime cancer risk from contact with the constituent(s) being released. The hazard index for exposure to non-carcinogenic constituents may not exceed a value of one.
8. Water discharged onto the land must be sampled at least once every eight hours of the discharge activity. Turn-around time for analysis should be 24 hours or next business day. If sampling confirms that concentrations of dissolved constituents exceed the concentrations listed in Tables 1 and 2, the discharge must cease immediately until these discharge limits can be maintained.
9. Samples should be analyzed for the appropriate constituents of concern using EPA/DEQ approved methods.
10. All records of the disposal and testing should be included in the required reports.

After initiating the land application of petroleum contaminated water, the responsible person must immediately notify the Regional Office of failure to meet or maintain any of the conditions listed above. The Case Manager will then identify the appropriate course of action. In all instances, the land application of large volumes of petroleum contaminated water (usually from aquifer tests and tank pit dewatering) must be stopped if the effluent exceeds the limits specified in Tables 1 and 2. Moreover, these discharges may not be re-started until the responsible person is capable of maintaining the discharge limits.

Note: If previously unreported petroleum contamination is discovered during a dewatering event, the responsible person must cease dewatering immediately and report the release to DEQ.

1.2 General VPDES Permit for Petroleum Contaminated Sites

The General VPDES Permit for Petroleum Contaminated Sites, Groundwater Remediation, and Hydrostatic Tests (Petroleum Discharge General Permit) may be used to authorize point source discharges of petroleum contaminated water to surface water. Discharges that may be granted coverage under this permit include:

- Tank pit dewatering,
- Purging ground water monitoring wells,
- Aquifer testing,
- Hydrostatic testing of petroleum storage tank systems and pipelines,
- Ground water recovery associated with the recovery of free product, or
- Discharges resulting from another petroleum product cleanup activity approved by DEQ.

Table 1. Discharges of Wastewater Contaminated by Gasoline

Constituent	Maximum Discharge Level
Benzene	12 µg/l
Toluene	43 µg/l
Ethylbenzene	4.3 µg/l
Total Xylenes	33 µg/l
MTBE	440 µg/l
pH	6.0 - 9.0 (standard units)
Total Recoverable Lead ¹	$e^{(1.273(\ln \text{hardness}))-3.259}$
Ethylene Dibromide (EDB) ¹	1.9 µg/l
1,2 Dichloroethane (1,2 DCA) ¹	3.8 µg/l
Ethanol ²	4100 ug/l

Contaminant concentrations were taken from the effluent limitations listed in the VPDES Permit Regulation For Discharges from Petroleum Contaminated Sites, Groundwater Remediation and Hydrostatic Tests

¹ Required only if fuel is leaded

² Required only if gasoline contains > 10% ethanol

Table 2. Discharges of Wastewater Contaminated by Petroleum Products Other than Gasoline

Constituent	Maximum Discharge Level
Naphthalene	8.9 µg/l
Total Petroleum Hydrocarbons	15 mg/l
Benzene	12 µg/l
MTBE	15 µg/l
pH	6 - 9 (standard units)

The maximum discharge concentrations were taken from the effluent limitations listed in the VPDES Permit Regulation for Discharges from Petroleum Contaminated Sites, Groundwater Remediation and Hydrostatic Tests.

The Petroleum Discharge General Permit applies only to discharges of petroleum contaminated water, water contaminated with chlorinated hydrocarbon solvents, or water generated by hydrostatic tests. For the purposes of this general permit, “petroleum products” means petroleum-based substances comprised of a complex blend of hydrocarbons derived from crude oil such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents and used oils. Petroleum products do not include hazardous waste as defined by the Virginia Hazardous Waste Regulations, 9 VAC 20-60. “Chlorinated hydrocarbon solvents” means solvents containing carbon, hydrogen, and chlorine atoms and the constituents resulting from the degradation of these chlorinated hydrocarbon solvents.

All VPDES general permit regulations have a five-year term limit. The present Petroleum Discharge General Permit regulation became effective in late February, 2018. Volume 6 of the Storage Tank Program Technical Manual will not be issued concurrently with new Petroleum Discharge General Permit regulations. Staff should always check the permit regulation and accompanying water permit guidance to ensure compliance with current requirements.

Staff in the Storage Tank Program as well as the Water Permits and Water Compliance programs may have responsibilities related to this permit regulation. Procedures for reviewing registration statements, issuing coverage, and standard letters related to the implementation of this regulation may be found in, [DEQ’s Guidance GM13-2001, Implementation Guidance for the Reissuance of the General VPDES Permit Regulation for Discharges from Petroleum Contaminated Sites, Groundwater Remediation, and Hydrostatic Tests, 9VAC 25-120 \(GM13-2001\).](#)

1.3 Individual VPDES Permits

In the rare instances where the discharge cannot be granted coverage under the Petroleum General Permit, an individual VPDES permit may be issued. Individual permits will generally be used when: (1) the responsible person has specifically requested an individual permit; (2) the Regional Director evaluates whether an individual permit is more appropriate than the General VPDES Permit due to the complex nature of the site; or (3) an individual permit is required by the Permit Regulation (e.g. an existing

VPDES permittee proposes to discharge effluent through an existing VPDES outfall). Additional information about water permits can be found on DEQ's website.

1.4 Re-infiltration of Treated Ground Water into the Subsurface

Depending on site conditions, responsible persons, consultants, and/or DEQ staff may find it advantageous to utilize the effluent from a treatment system to promote soil flushing and preclude a ground water shortage at the remediation site. Re-infiltration may also result in cost savings at the site which makes more funding available for remediation. In those situations where discharging to surface water and re-infiltration appear to be comparably effective and efficient means for meeting remedial goals, responsible persons, consultants, and DEQ staff are encouraged to evaluate costs associated with re-infiltration versus discharging to surface water or offsite treatment. DEQ staff may approve remediation plans that call for the re-infiltration of treated water provided that the area of re-infiltration is within the defined contamination zone and the use of re-infiltration can be demonstrated to be beneficial to the overall cleanup effort.

A well or infiltration gallery/lines utilized for re-infiltration under these circumstances does not qualify as an injection well permitted by EPA. Water in this context is being re-infiltrated to promote cleanup at a site and not to dispose of wastes.

Sometimes, persons request permission to utilize chemical countermeasures following a petroleum release. Chemical countermeasures may include biological additives, dispersing agents, surface washing agents, and other types of oil spill control agents. Chemical countermeasures must be authorized and managed in accordance with 40 CFR 300.910. Moreover, chemical countermeasures, where allowed, must be utilized in accordance with the approved use(s) of that product. For instance, a surface washing agent might be used to promote the removal of oil from the ground surface. That same product should not be sprayed into an open excavation to be followed by the immediate backfilling of that excavation as this would be counter to the intended use of the product.

1.5 Offsite Disposal of Petroleum Contaminated Water

If wastewater cannot be reasonably treated to meet the concentrations listed in Tables 1 and 2, or there are impervious surfaces or saturated surficial soils at the site, or the costs to treat and re-infiltrate or release as part of a VPDES permit are too high due to the contaminant amount in the water, the responsible person should consider having that water treated at an offsite facility. Facilities are available to both recycle and treat waste water/petroleum mixtures. The ratio of petroleum to water that may be recycled is decided by individual recyclers. In all instances, it is the responsibility of the tank owner or operator to obtain proper analyses of the wastewater as required by the recycling or treatment and disposal facility. Reimbursement eligibility from the VPSTF will be based upon: (1) prior approval of the activity by the Regional Office; and (2) the selection of the least expensive option which is feasible for the site. DEQ regional staff may require bids for disposal.

2.0 Managing Petroleum Contaminated Soil

Managing petroleum contaminated soil frequently is an issue during UST closure, boring and monitoring well installation, and soil excavation associated with any phase of corrective action or as part of post-closure soil management activities. Petroleum-contaminated soil management may be required while a case is open or long after a case has been closed. Non-hazardous petroleum contaminated soil that is excavated or moved/graded meets the definition of "solid waste" under the Virginia Solid Waste Management Regulations (VSWMR; 9 VAC 20-81-10 et seq.). Petroleum contaminated soils excavated due to construction or site redevelopment may not be eligible for reimbursement. The responsible person should work closely with DEQ staff to establish what work, if any, may be eligible. Alternative soil management options may include enrolling in DEQ's Voluntary Remediation Program or following guidelines outlined in [DEQ's Management and Reuse of Contaminated Media guidance \(LPR-SW-04-2012\)](#), particularly if the remediation case is closed or if petroleum contaminated soil outside of remediation required by DEQ's Tank program needs to be managed.

2.1 Options for the Treatment and Disposal of Petroleum Contaminated Soil

Under Virginia Law and Regulation, the responsible person has several options for managing non-hazardous petroleum contaminated soil that is generated during storage tank closure or release response and corrective action. Not all soils disposed may be eligible for reimbursement, especially if the excavation is for the purposes of site redevelopment. The responsible person is responsible for working with tank staff prior to treatment and disposal to determine eligibility. As a reminder, soil management options may include enrolling in DEQ's Voluntary Remediation Program or proceeding as outlined in [DEQ's Management and Reuse of Contaminated Media guidance \(LPR-SW-04-2012\)](#).

- If the remediation case is still open, petroleum contaminated soil may be managed at the release site or another site owned by the responsible person under the approval of the DEQ Storage Tank Program or according to guidance referenced above.
- Petroleum contaminated soil may be transported to a solid waste management facility (e.g. landfill, soil treatment facility), permitted under the VSWMR, to accept petroleum contaminated soil. Information about active, permitted solid waste management facilities in Virginia may be obtained from DEQ solid waste staff. Not all solid waste management facilities accept petroleum contaminated soil. Persons seeking to dispose petroleum contaminated soil are advised to contact the facility prior to transport to determine the waste acceptance requirements for that facility.
- If the material meets the requirements for re-use as fill, the responsible person may manage this material in accordance with the disposal requirements listed in section 660.D.2.d of the VSWMR (see Section 2.2) or as outlined in [DEQ's Management and Reuse of Contaminated Media guidance \(LPR-SW-04-2012\)](#) or as part of the Voluntary Remediation Program.
- Section 95.C.7 of the VSWMR conditionally exempts certain non-hazardous petroleum contaminated soil from the requirements of the solid waste regulation as long as no open dump, hazard, or public nuisance is created. This exemption applies to:
 - "Non-hazardous, contaminated soil that has been excavated as part of a construction project

- and that is used as backfill for the same excavation or excavations containing similar contaminants at the same site, at concentrations at the same level or higher. Excess contaminated soil from these projects is subject to the requirements of this chapter” (the VSWMR).
- “Non-hazardous petroleum contaminated soil that is treated to the satisfaction of the DEQ in accordance with 9 VAC 20-810-660.”
- Furthermore, section 660.E of the VSWMR exempts soil contaminated by a petroleum storage tank release from the limits and/or testing requirements for contaminated soil listed in sections 660.D.2.a through c of the regulation as long as the total volume of soil is less than 20 cubic yards and the soil is not a hazardous waste.

The following sections discuss options that responsible persons have when treating or disposing petroleum contaminated soil and provide guidelines for each option.

2.1.1 Management of Petroleum Contaminated Soil at the Site Where the Release Occurred

On-site management of petroleum contaminated soil is an option that may be considered at many sites provided that constituents within the soil do not create immediate hazards at the site. DEQ staff will use the following guidelines when evaluating requests for the management (including treatment) of petroleum contaminated soil at the location where the release occurred:

1. Above ground treatment of petroleum contaminated soil
Petroleum contaminated soil may be treated above the ground at the release site provided that:
 - A. Risks from constituents in the soil are evaluated and do not exceed applicable risk management thresholds at any time during the corrective action process;
 - B. The responsible person develops a CAP or receives Interim Authorization³ and goes through a public notice/public comment process before initiating this type of treatment;
 - C. DEQ issues a Corrective Action Plan approval letter authorizing this activity;
2. Placement of petroleum contaminated soil in an excavation or boring
Petroleum contaminated soil may be returned to the excavation or boring from which it originally came or another excavation on the same site⁴ provided that:
 - A. This soil is not saturated with petroleum (Petroleum saturated soil may not be placed back in a boring or excavation unless staff have evaluated this course of action and believe that this material is unlikely to be a continuing source of free product at the site);
 - B. Constituents within the soil are not believed to create an immediate health hazard; and

³ Corrective actions may be initiated under Interim Authorization granted by DEQ. **Activities initiated under Interim Authorization should be entered as “Interim CAP” phase in CEDS.** Even if on-site soil treatment is started under Interim Authorization, the RP must go through the public notice process before initiating this type of corrective action.

⁴ Interpretation of what constitutes the "same site" may pose a challenge at facilities covering large tracts of land that are owned by one RP (e.g. military bases). DEQ Storage Tank Program staff should interpret "same site" in the case of large facilities to mean the area that can be adequately addressed by the same SCR.

C. Risks from constituents in this soil are evaluated during the Site Characterization process.

NOTE: Soil should not be placed in an excavation other than the one from which it originally came unless the surrounding material is also contaminated by petroleum and is more heavily contaminated than the material being backfilled.

3. Temporary on-site storage of petroleum contaminated soil

Petroleum contaminated soil that has been excavated, generated from borings or monitoring wells, or otherwise managed at the site must be contained until this material is properly treated or disposed. Petroleum contaminated soil may not be placed directly on the ground unless: (1) that soil meets the criteria as listed in section 660.D.2.d of the VSWMR and no open dump, hazard, or public nuisance is created; or (2) the responsible person has received a CAP approval or Interim Authorization approval letter from DEQ specifically authorizing the on-site treatment of that material.

Analytical testing requirements for petroleum contaminated soil managed at the release site will be established by the Storage Tank Program staff. Soil may not be re-used as fill unless it meets the requirements of the VSWMR (see Section 2.2 of this Volume).

2.1.2 Treatment and Disposal of Petroleum Contaminated Soil at Permitted Solid Waste Management Facilities

Conditions at certain sites make it more practicable and cost effective to dispose or treat petroleum contaminated soil at a facility permitted under the VSWMR than to treat the soil on site or offsite under the requirements of the DEQ Storage Tank Program. Responsible persons wishing to treat or dispose petroleum contaminated soil at permitted solid waste management facilities are required to characterize the soil in accordance with: (1) Section 660 of the VSWMR; or (2) the permit requirements of the facility at which the soil will be treated or disposed (i.e. the RP must contact the facility operator to identify what analyses are required before the facility will accept the material).

Waste characterization requirements are discussed further in Sections 2.3, 2.3.1, and 2.3.2 of this Volume.

NOTE: Bidding is required for reimbursement purposes when transporting and disposing of more than 250 tons (approximately 167 cubic yards) of contaminated soil. DEQ Case Managers have the authority to request bidding for transporting and disposing of soil amounts 250 tons or less. Please follow the proper bidding procedures outlined in Volume 6 of the DEQ Reimbursement Manual.

2.1.3 Offsite Treatment of Petroleum Contaminated Soil at Facilities Owned and Operated by the Responsible Person

If possible, soil should be remediated at the site where the release occurred rather than offsite. This will reduce the possibility of contaminating a previously uncontaminated site. However, DEQ recognizes the technical viability and cost effectiveness that may potentially be achieved by remediating petroleum contaminated soil at offsite properties that are owned by the tank owner or operator. Staff should use the following guidelines when considering the offsite treatment of petroleum contaminated soil at sites that

are owned by the tank owner or operator and that are not permitted by the VSWMR:

1. Soil treated at a site other than where the release occurred must be treated until it meets the standards in Section 660.D.2.d of the VSWMR (see Section 2.2 of this Volume). The reason for this is that contaminated material has been moved from a contaminated site to one that presumably is not contaminated.
2. The treatment of petroleum contaminated soil at a site owned by the tank owner or operator is a type of corrective action. It is DEQ's position that a public notice process must be used before soil is taken to or treated at a site which is not permitted pursuant to the VSWMR. Once at such a site or facility, the soil must be managed in such a way that no open dump is created.
3. A CAP⁵ must be developed and DEQ must approve the CAP authorizing soil treatment at a site that does not have a waste permit before the tank owner or operator may proceed with this type of corrective action.
4. Soils in excess of the amount required to be remediated by the tank program may also be managed as outlined in [DEQ's Management and Reuse of Contaminated Media guidance \(LPR-SW-04-2012\)](#) or as part of the Voluntary Remediation Program.

The criteria listed below are consistent with siting requirements in the VSWMR. It is recommended that staff consider these criteria when evaluating sites owned by the responsible person and not permitted under the VSWMR for suitability for the treatment of petroleum contaminated soil.

1. The treatment activity should not be located in a floodplain or in any way restrict the flow of the base flood, reduce the temporary water storage capacity of the floodplain (100 year floodplain), or result in washout of solid waste.
2. The treatment activity at a site should not cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife.
3. The treatment activity at a site should not cause a discharge of pollutants to state waters, including wetlands. This includes runoff from storm events. Proper sedimentation and erosion control best-management practices – per the Virginia Department of Conservation and Recreation – should be applied to stockpiled soil.
4. The treatment activity should not involve excavation within or filling of state waters, including wetlands, without first obtaining a Virginia Water Protection permit.
5. The treatment activity should be located at least 100 feet from any regularly flowing surface water body.
6. The treatment activity should be more than 500 feet from any well, spring, or source of drinking water.
7. The treatment activity should be more than 200 feet from a residence, school, daycare center, hospital, nursing home, or recreational park.

⁵ These activities may be initiated under Interim Authorization granted by DEQ. **Activities initiated under Interim Authorization should be entered as the "Interim CAP" phase in CEDS.**

2.1.4 The Offsite Treatment or Disposal of Petroleum Contaminated Soil at Sites Neither Owned by the Responsible Person nor Permitted Pursuant to Virginia Law and Regulation

Petroleum contaminated soil (soil contaminated by petroleum and not meeting the fill material requirements in Section 660.D.2.d of the VSWMR) may not be treated at a site that is owned by someone other than the UST/AST owner or operator unless that site has the appropriate solid or hazardous waste management permit. The issue of who owns the site on which treatment takes place is critical as to whether that treatment may be permitted under a Corrective Action Plan. A Corrective Action Plan approval letter authorizes the UST owner or operator to conduct corrective actions specified in an approved Corrective Action Plan. If soil is treated at a site that is owned by someone other than the UST owner or operator, the UST owner or operator does not have ultimate control over that property and, therefore, does not have the ultimate control over corrective actions performed on that property.

Emergency response contractors may temporarily store petroleum contaminated soil at their facilities in accordance with the solid and hazardous waste management regulations.

Soils in excess of the amount required to be remediated by the tank program may also be managed as outlined in [DEQ's Management and Reuse of Contaminated Media guidance \(LPR-SW-04-2012\)](#) or as part of the Voluntary Remediation Program.

2.2 Requirements for Re-use as Fill Material

Petroleum contaminated soil meeting the following testing and disposal requirements (Section 660.D.2.d of the VSWMR) may be used as fill material with certain restrictions:

Testing Requirements for Re-use as Fill

Petroleum Testing

- TPH concentration of less than 50 mg/kg
- Total BTEX concentration of less than 10 mg/kg

Hazardous Waste Testing

- Waste is not hazardous
 - Pass tests for corrosivity, ignitability, reactivity, and toxicity (TCLP)
- Total Organic Halogen (TOX) concentration is less than 100 mg/kg

Staff should be aware that responsible persons may use their knowledge of the waste and declare a waste non-hazardous without having to test that material by TCLP or TOX. Persons wanting to dispose of petroleum contaminated soil as clean fill usually can certify that the soil is non-hazardous if the sole source of contamination is an unleaded motor fuel, fuel oil, or unused motor oil and the total BTEX concentration in that soil is less than 10 mg/kg. Unleaded motor fuels, fuel oils, and unused motor oil are not expected to contain significant concentrations of metals or halogenated compounds, nor are they expected to contain pesticides. Soils contaminated solely by these petroleum products, therefore, would not be expected to fail TCLP metals, halogenated compounds, or pesticides. If the benzene concentration in the soil is less than 10 mg/kg, that soil would not be expected to fail TCLP for benzene because a 20:1

dilution factor is used in that procedure.

Disposal Requirements

Petroleum contaminated soil containing less than 50 mg/kg TPH and total BTEX less than 10 mg/kg may be used as fill material with the following restrictions (Section 660.D.2.d of the VSWMR):

1. May not be disposed closer than 100 feet from any regularly flowing surface water body.
2. May not be disposed less than 500 feet from any well, spring, or source of drinking water.
3. May not be disposed within 200 feet of a residence, school, hospital, daycare center, nursing home, or recreational park.
4. If the soil is disposed on a property not owned by the generator, the generator must notify the property owner that the soil is contaminated and disclose the nature of the contamination.

Regardless of location, the placement of soil as fill must be completed in a manner that is consistent with sediment and erosion control regulations in order to limit the potential for subsequent soil erosion.

2.3 Waste Characterization Requirements for Disposal or Treatment

Petroleum contaminated soil that is treated or disposed at a permitted waste management facility must be tested in accordance with the waste characterization requirements of the Virginia Solid Waste Management Regulations (9 VAC 20-81) and the Virginia Hazardous Waste Management Regulations. (9 VAC 20-60). Persons generating a solid waste must determine whether that waste is a hazardous waste (40 CFR 262.11). Persons who generate solid wastes may evaluate whether this waste is hazardous by either: (1) testing the waste; or (2) applying knowledge of the hazardous characteristics of such wastes. The testing requirements for hazardous waste for petroleum contaminated soil must be performed in accordance with Section 660.B of the VSWMR.

2.3.1 Analytical Testing Requirements for the Disposal/Treatment of Petroleum Contaminated Soil at a Permitted Solid Waste Management Facility

The VSWMR require that one composite sample be collected for every 250 cubic yards of soil to be disposed and analyzed by appropriate SW-846 methods. DEQ staff in the Solid Waste Program will determine on a case-specific basis the appropriate the tests that are appropriate for the soil to be disposed. Typical tests often required when disposing petroleum contaminated soil include:

1. Paint Filter Liquids (EPA Method 9095);
2. Total Petroleum Hydrocarbons (EPA Method 8015C);
3. The concentration of benzene, toluene, ethylbenzene, and xylene (EPA Method 8021B);
4. Total Organic Halogens (TOX) (EPA Methods 9020B or 9022); and
5. Toxicity by the Toxicity Characteristic Leaching Procedure (TCLP).

NOTE: Petroleum contaminated soil that is treated under a CAP approved by the DEQ Storage Tank Program is conditionally exempt from the VSWMR. Testing requirements for soil that will be treated under the CAP shall be specified in the approved CAP.

2.3.2 Application of Knowledge of Waste in Lieu of Testing

As an alternative to analyzing the waste prior to disposal, the person generating the waste may apply his/her knowledge of the hazardous characteristics of the waste based on the materials and processes involved and certify that the waste is not hazardous. With regards to petroleum contaminated soil, the person generating the waste often can certify that a waste is non-hazardous as long as the sole source of contamination is an unleaded motor fuel (see Volume 1 of the Storage Tank Program Technical Manual for a definition of *motor fuel*), fuel oil, or unused motor oil from a regulated or partially excluded UST.

Providing a certification that petroleum contaminated soil is non-hazardous is more difficult when the source is not a regulated or partially excluded UST. The reason for this is that sources other than regulated or partially excluded USTs are subject to the complete testing requirements of TCLP. Persons wanting to dispose of soil that was contaminated by petroleum from sources other than regulated or partially excluded USTs often can certify that the soil is non-hazardous if the sole source of contamination is an unleaded motor fuel, fuel oil, or unused motor oil and the total BTEX concentration in the soil is less than 10 mg/kg. For example, petroleum contaminated soil from a home heating oil release may be a non-exempt material where one could use their knowledge in lieu of testing. Unleaded motor fuels, fuel oils, and unused motor oil are not expected to contain significant concentrations of metals and halogenated compounds, nor are they expected to contain pesticides. Soil contaminated solely by these petroleum products, therefore, would not be expected to fail TCLP for metals, halogenated solvents, or pesticides. If the benzene concentration in the soil is less than 10 mg/kg, the soil would not be expected to fail TCLP for benzene because a 20:1 dilution factor is used in that analytical procedure.

Persons applying knowledge of a waste in lieu of testing should be aware that operators of treatment or disposal facilities might not accept wastes without analyses. It is recommended that responsible persons wishing to pursue this option contact the facility where the waste will be disposed and/or treated in order to evaluate whether a certification that the soil is not hazardous will be acceptable.

NOTE: Petroleum contaminated media and debris from USTs subject to the corrective action requirements of the UST Technical Regulation (i.e. regulated and partially excluded USTs) are exempt from the TCLP testing requirements for constituents D018 through D043 (organics; 40 CFR 261.4). For example, petroleum contaminated soil from a release of a regulated UST at a gasoline station would typically be considered exempt from TCLP testing for constituents D018 through D043. Petroleum contaminated media and debris from sources other than regulated USTs do not enjoy this exemption and persons generating these wastes may have a greater difficulty certifying that the waste will not fail TCLP for one or more of the organic constituents (e.g. benzene).

2.4 Management of Petroleum Contaminated Soil at VDOT Road Construction Sites

During the course of constructing and maintaining roads, the Virginia Department of Transportation (VDOT) often encounters petroleum contaminated soil and sometimes, old USTs. DEQ and VDOT reached an agreement whereby VDOT may excavate petroleum contaminated soil and stockpile that material near the excavation in order to complete a maintenance or installation project. Upon completion of the project, VDOT may re-deposit this soil in the excavation from which it originally came without triggering the requirements of the Solid and Hazardous Waste Management Regulations. VDOT may not place petroleum contaminated soil back in the excavation if it's saturated with petroleum nor may the excavation of soil interfere with ongoing corrective actions. When petroleum contaminated soil is encountered during a road construction project, VDOT also needs to advise the appropriate DEQ Regional Office so that DEQ may ensure that the release has been or will be evaluated.

NOTE: Responsibilities for USTs in Right-of-Way areas are discussed in Chapter 3 of the Fourth Edition of the Storage Tank Program Technical Manual (Volume 3 when it is issued).

The VSWMR allows persons excavating non-hazardous petroleum contaminated soil to use that material as backfill in the original excavation or other excavations at the same site provided that the surrounding materials contain similar contaminants at equal or greater concentrations (9 VAC 20-81-95.C.7.d). This exemption to the requirements of the VSWMR may allow VDOT additional flexibility when managing petroleum contaminated soil at road construction sites. Section 95.C.7.f of the VSWMR conditionally exempts from regulation non-hazardous petroleum contaminated soil when that soil is incorporated into asphalt pavement projects.

Soils may also be managed as outlined in [DEQ's Management and Reuse of Contaminated Media guidance \(LPR-SW-04-2012\)](#) if appropriate.

NOTE: Utility companies performing maintenance or installation work along a right of way may manage petroleum contaminated soil as described above.

2.5 Management of Petroleum Contaminated Soil at Sites Closed by DEQ Storage Tank Program

Remedial endpoints at leaking storage tank sites are based upon risks to known receptors at the time that the site is characterized and corrective actions are undertaken. Closure of a leaking storage tank case by DEQ does not guarantee that all contamination has been removed from the site. Persons developing or otherwise working on sites that formerly contained leaking storage tanks may find contaminated materials. Persons encountering petroleum contaminated soil at sites that have been evaluated and closed by DEQ have the following soil management options:

1. Place the soil back in the excavation from which it came,
2. Place it in another excavation on the same site provided that the surrounding material is also contaminated by petroleum at equal or greater concentrations than the backfill (see 9 VAC 20-81-95.C.7.d),
3. Dispose the material per the requirements of section 660.D of the VSWMR, or
4. Treat or dispose of the material at a permitted waste management facility.
5. Review [DEQ's Management and Reuse of Contaminated Media guidance \(LPR-SW-04-2012\)](#) for applicability, or
6. Enroll the site into DEQ's Voluntary Remediation Program.

Costs associated with contaminated soil management and/or disposal at closed petroleum release sites are not eligible for reimbursement.

The DEQ Storage Tank Program has the ability to re-open cases should the need arise. DEQ is likely to re-open cases only in those instances where: (1) significant free product is encountered; or (2) risks to a receptor exceed our risk management thresholds and the receptor and pathway were present at the time of Site Characterization. Additional information and guidance related to removing petroleum-contaminated or petroleum-saturated soil at sites with known future use issues is provided in Chapter 5 of the Fourth Edition of the Storage Tank Program Technical Manual (this will be Volume 5 of the Technical Manual when it is issued as guidance).

NOTE: If a site owner encounters petroleum contaminated soil and is unsure whether DEQ has evaluated a release at that site, that person must contact DEQ. Staff must evaluate previously un-reported instances of petroleum contamination and decide whether the information provided indicates a release occurred. If staff believe that a release occurred, the RP must be identified and release response and corrective action must be initiated.

3.0 Emission of Petroleum Constituents into the Atmosphere

Petroleum releases and the cleanup of petroleum releases may cause the emission of petroleum constituents into the atmosphere. There are two basic issues that must be considered regarding the emission of petroleum vapors following a release and during the ensuing cleanup. The first issue that must be addressed is whether the vapor emission is sufficiently large as to require a DEQ air permit for that emission. The second issue involves determining whether the emissions pose unacceptable risks to

specific receptors. These two issues must be considered because air permit requirements are not based upon site specific conditions and do not consider risks to individual receptors.

3.1 Air Discharge Permitting Requirements

Petroleum constituents may be released into the atmosphere as a result of activities related to cleaning up petroleum releases. Examples of vapor emitting remedial activities include soil aeration, vapor extraction, air stripping, and soil incineration. Soil incinerators are often used to remove petroleum constituents in soil. All incinerators must have a DEQ air permit prior to operation (see 9 VAC 5-80-1105 E2).

Additional permits for individual incinerators are not required when an incinerator is relocated provided that a minor New Source Review (NSR) permit authorizing that incinerator as a portable emission unit has already been granted by DEQ and:

1. The emissions from the unit at the new site would be temporary;
2. Any new emissions from the unit are secondary emissions;
3. The unit would not undergo modification or replacement that would be subject to 9 VAC 5 Chapter 80, Article 6;
4. The unit is suitable to the area in which it is located; and
5. Reasonable notice is given to DEQ permit staff prior to locating the unit to the site identifying the proposed site and the probable duration of operation at the site. Such notice shall be provided to DEQ not less than 15 days prior to the date the emissions unit is to be located at the site unless a different notification schedule is previously approved by the board.

Responsible persons conducting corrective actions involving the discharge of constituents to the atmosphere may need to obtain a permit for those discharges. The primary constituents which will evaluate whether an air permit is needed for corrective action are volatile organic compounds (VOCs), toxic pollutants⁶, and lead. Facilities having an uncontrolled volatile organic compound (VOC) emission rate less than 10 tons per year and an uncontrolled lead emission rate less than .6 tons per year are exempt from permitting. Exemption levels for toxic pollutants are based on threshold limit values (TLVs, please see Appendix A for TLV definitions). Facilities with uncontrolled emission rates equal to or less than the exempt emission rates calculated by using the exemption formulas for the applicable threshold limit values for all emitted toxic pollutants (and also exempt for VOC and lead as described above) shall be exempt from permitting requirements (9 VAC 5-80-1105). If more than one exemption formula applies to a toxic pollutant emitted by a facility, the uncontrolled emission rate of that pollutant shall be equal to or less than both applicable exemption formulas in order for the source to be exempt for that pollutant. Please see Appendix A for the exemption formulas and threshold limit values for selected petroleum constituents.

⁶ A "toxic pollutant" means any air pollutant (i) listed in § 112(b) of the federal Clean Air Act, as amended by Subpart C of 40 CFR Part 63 and (ii) incorporated by reference into the regulations of the board at subdivision 1 of 9 VAC5-60-92, or any other air pollutant that the board determines, through adoption of regulation, to present a significant risk to public health. This term excludes asbestos, fine mineral fibers, radionuclides, and any glycol ether that does not have a TLV®. See the most current version of the Form 7 application instructions (<http://www.deq.virginia.gov/Programs/Air/Forms.aspx>) for a list of toxic pollutants subject to permitting.

Air emissions from petroleum liquid storage and transfer operations may be regulated (i.e. need a permit) depending upon facility throughput and storage capacity of individual tanks. As a general rule, only large bulk storage and transfer facilities (i.e. oil terminals) are required to have air permits. If a facility is required to have an air emission permit, additional emissions from petroleum cleanup activities may also be covered under that permit. It is recommended that responsible persons conducting petroleum cleanups at bulk facilities contact the Air Permits section of the appropriate DEQ Regional Office if cleanup activities may result in a significant emission of volatile organics, toxic pollutants, or lead into the atmosphere in order to evaluate whether the existing permit may need to be modified.

NOTE: It is recommended that staff advise responsible persons who are planning to conduct vapor emitting corrective actions to contact the Air Permits staff to evaluate whether a permit is needed for the planned activity.

3.2 Determining Risks from Air Emissions

Permit requirements for toxic constituents emitted from a petroleum release or cleanup activity are based upon TLVs for individual constituents. It is believed that the use of TLVs to identify acceptable emission limits may not be protective of human health in all instances. TLVs are established with the intention of protecting workers in an occupational exposure setting and assume a 40 hour per week exposure duration and a robust worker population. The approach used to establish TLVs does not consider non-occupational exposures nor does it consider the exposure of sensitive receptors to the regulated substance. ACGIH (1993) states:

"These limits are intended for use in the practice of industrial hygiene as guidelines or recommendations in the control of potential health hazards and for no other use, e.g, in the evaluation or control of community air pollution nuisances; in estimating the toxic potential of continuous, uninterrupted exposures or other extended work periods; ..."

Tank owners/operators proposing to undertake corrective actions that result in the release of petroleum constituents into the atmosphere must estimate the risks to receptors posed by the proposed corrective action. If risks from vapor phase constituents emitted during corrective action exceed the applicable risk management thresholds (i.e. excess lifetime cancer risk of one in one million and a hazard index of 1), the owner/operator must take the necessary actions to reduce risks to meet the program's risk management thresholds before DEQ staff will approve the proposed corrective action.

APPENDIX A

Air Emission Exemption Formulas and Threshold Limit Values for Selected Petroleum Constituents

Air Emission Exemption Formulas and Threshold Limit Values for Selected Petroleum Constituents

Exemption formulas for toxic pollutants (See 9 VAC 5-60-300.C):

1. For toxic pollutants with a TLV-C

$$\text{Exempt emission rate (lbs/hour)} = \text{TLV-C (mg/m}^3\text{)} \times .033$$

2. For toxic pollutants with both a TLV-STEL and a TLV-TWA

$$\text{Exempt emission rate (lbs/hour)} = \text{TLV-STEL (mg/m}^3\text{)} \times .033$$

$$\text{Exempt emission rate (tons/year)} = \text{TLV-TWA (mg/m}^3\text{)} \times .145$$

3. For toxic pollutants with only a TLV-TWA

$$\text{Exempt emission rate (lbs/hour)} = \text{TLV-TWA (mg/m}^3\text{)} \times .066$$

$$\text{Exempt emission rate (tons/year)} = \text{TLV-TWA (mg/m}^3\text{)} \times .145$$

Definitions:

toxic pollutant - means any air pollutant (i) listed in § 112(b) of the federal Clean Air Act, as amended by Subpart C of 40 CFR Part 63 and (ii) incorporated by reference into the regulations of the board at subdivision 1 of 9 VAC 5-60-92, or any other air pollutant that the board determines, through adoption of regulation, to present a significant risk to public health. This term excludes asbestos, fine mineral fibers, radionuclides, and any glycol ether that does not have a TLV®.

threshold limit value (TLV) - the maximum airborne concentration of a substance to which the American Conference of Governmental Industrial Hygienists believes that nearly all workers may be repeatedly exposed without adverse effects.

TLV-C (threshold limit value ceiling) - the concentration of an airborne constituent that should not be exceeded during any part of the working exposure.

TLV-STEL (threshold limit value short term exposure limit) - the concentration of a constituent to which workers can be exposed continuously for a short period of time without suffering from (1) irritation, (2) chronic or irreversible tissue damage, or (3) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency, and provided that the daily TLV-TWA is not exceeded. A STEL is defined as a 15 minute time weighted average exposure which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA.

TLV-TWA (threshold limit value time weighted average) - the time weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effects.

The American Conference of Governmental Industrial Hygienists (ACGIH) has established TLVs for numerous petroleum constituents. Threshold limit values for selected petroleum constituents are listed in Table A-1.

Table A-1. Threshold Limit Values for selected petroleum constituents

Constituent	TLV-TWA (ppm)	TLV-TWA (ug/m ³)	TLV-STEL (ppm)	TLV-STEL (mg/m ³)
benzene	10	32	---	---
ethylbenzene	100	434	125	543
hexane	50	176	---	---
naphthalene	10	52	15	79
toluene	100	377	150	565
xylene	100	434	150	651
m-xylene	100	434	150	651

Source: American Conference of Governmental Industrial Hygienists. 1991. 1991 - 1992 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

Example A-1. Example to determine if an air permit is needed for a corrective action activity

A tank owner or operator plans to initiate corrective action at a site. Corrective action involves the removal of free product and contaminated ground water. Free product will be separated from the contaminated water via an oil/water separator. Contaminated water will be sent through an air stripper in order to remove dissolved petroleum constituents. Total dissolved BTEX concentration in the influent (into the air stripper) is 50 mg/l with 12.5 mg/l benzene. The concentration of MTBE in the influent is 150 ppm. The rate at which influent enters the air stripper is 4 gallons of water per minute. It is assumed that the air stripper is 100 percent efficient in removing the volatile petroleum constituents.

Toxic Pollutants:

Benzene has the lowest TWA of any of the toxics and, therefore, is the constituent most likely to trigger the permitting requirement. The following calculations were used to determine if a permit would be required for the example system.

$$\begin{aligned}\text{Influent} &= 4 \text{ gal/minute} \times 3.785 \text{ l/gallon} = 15.14 \text{ liters/minute} \\ &15.14 \text{ liters/minute} \times 60 \text{ minutes/hour} = 908.4 \text{ liters/hour} \\ \text{mass of benzene} &= 908.4 \text{ liters/hour} \times 12.5 \text{ mg/liter} = 11,355 \text{ mg/hour} \\ &11,355 \text{ mg/hr} \times 1 \times 10^{-6} \text{ kg/mg} = .011355 \text{ kg/hour} \\ &.011355 \text{ kg/hour} / .4525 \text{ kg/lb} = .025 \text{ lbs/hour} \\ &.025 \text{ lbs of benzene will be discharged from the air stripping unit into the atmosphere every hour}\end{aligned}$$

The TLV-TWA for benzene is 32 mg/m³. No other TLVs have been established for benzene. According to the Virginia Air Regulations, discharges of this toxic constituent of less than the following do not need a permit:

$$\begin{aligned}\text{Exempt emission rate (lbs/hour)} &= \text{TLV-TWA (mg/m}^3\text{)} \times .066 \\ \text{Exempt emission rate (tons/year)} &= \text{TLV-TWA (mg/m}^3\text{)} \times .145\end{aligned}$$

$$32 \times .066 = 2.11 \text{ lbs/hour (this is the maximum rate at which benzene may be discharged without a permit)}$$

In the example site, the remediation system discharges benzene at a rate of .0215 lbs per hour. This is less than the exempt rate for benzene of 2.11 lbs/hour. The tank owner or operator, therefore, does not need a permit to discharge benzene at this rate into the atmosphere.

Total VOCs emitted from the air stripper:

If total VOC emissions from the site exceed 10 tons per year, a permit will be required. It is assumed that benzene, toluene, ethylbenzene, xylene, and MTBE comprise 80 percent of the dissolved petroleum constituents in ground water at the site.

$$\begin{aligned}\text{total BTEX concentration} &= 50 \text{ mg/l} \\ \text{MTBE concentration} &= 150 \text{ mg/l} \\ \text{influent VOC mass} &= 908.4 \text{ l/hr} \times 200 \text{ mg/l} = 181,680 \text{ mg/hr} \\ &= .181 \text{ kg/hr} \\ &.181 \text{ kg/hr} / .4525 \text{ kg/lb} = .400 \text{ lbs/hr} \\ 24 \text{ hours/day} \times 365 \text{ days/year} \times .400 \text{ lbs/hour} &= 3,504 \text{ lbs/year} \\ &= 1.75 \text{ tons of MTBE and BTEX per year}\end{aligned}$$

MTBE and BTEX account for 80 % of the total VOC discharge. The total VOC discharge from the system is 2.19 tons per year.