SECTION 6

WASTE MANAGEMENT

6.1 General Discussion

"Waste management" is a broad category of activities encompassing the handling, transportation, treatment, storage, and disposal of wastes. UST-related activities which typically generate wastes are listed in Table 6.1. All wastes generated during UST closure, release investigation, and cleanup activities must be managed in a manner which is protective of human health and the environment and in compliance with all applicable local, State, and Federal laws and regulations.

Functionally, waste management is an integral part of the release response process. The proper management of wastes is critical in ensuring that investigative and cleanup activities at a UST cleanup site are conducted in a protective manner. All waste management activities at a UST cleanup site are therefore subject to oversight, and ultimate approval, by DOH. DOH prioritizes its oversight and approval responsibilities for waste management activities based on the severity of releases, knowledge of questionable practices, complaints, and other factors.

Regardless of whether DOH is actively overseeing a UST cleanup site or not, owners and operators must include sufficient information in their Release Response Reports to document that they are managing their wastes in a proper and acceptable manner.

6.1.1 Planning for Waste Management

A critical consideration in conducting investigative and cleanup activities is planning for the proper management of all wastes. If not properly managed, wastes from a UST cleanup site may pose more of an immediate threat to human health and the

Table 6.1 Wastes Generated from UST-Related Activities

Activity	Waste Generated
Tank Cleaning	Petroleum Product
	Sludge and Sediments
	Contaminated Rinsewater
Tank Removal	Tank and Piping
	Contaminated Debris
	Contaminated Soil
Emergency Response Activities	Contaminated Soil
	Cleanup-related Materials (absorbent pads, booms, etc.)
Free Product Recovery	Petroleum Product
	Contaminated Ground Water
Excavation	Contaminated Soil and Debris
Soil Borings	Contaminated Soil
Monitoring Well Installation and Development	Contaminated Soil and Ground Water
Pump and Slug Tests	Contaminated Ground Water
Excavation Dewatering	Contaminated Ground Water
Pump-and-treat Ground Water Remediation	Contaminated Ground Water
	Cleanup-related Materials (spent GAC units, etc.)

environment when removed from the ground (e.g., excavated, pumped out, exposed to the air, etc.) than when left in place. Owners and operators are encouraged to develop plans, prior to commencing site activities, which encompass the following objectives: (1) minimization of the volume or quantity of wastes generated; (2) effective segregation of wastes by type and degree of contamination; and (3) proper management of all wastes. Adherence to these objectives will not only assist in fulfilling remedial goals, but will also help control the costs associated with remedial activities.

To the extent practicable, owners and operators ideally should make an effort to identify the types and quantities of wastes expected at a site, as well as, the potential releases to the environment associated with the waste-generating or waste-management activities, in order to plan more effectively for the management of those wastes. For example, prior to excavation of contaminated soil, one might conduct a soil investigation to determine the approximate extent, concentrations, and volume of contaminated soil present, so as to more realistically plan for excavation and allocation of space and materials for stockpiling contaminated soil onsite.

One particularly significant issue in the management of petroleum-contaminated soils, especially regarding short-term impacts to workers and nearby residents, is the uncontrolled emission of volatile compounds and airborne dust. If preventive measures are not planned for and undertaken, the excavation or removal of petroleum-contaminated soil may result in significant air emissions. When planning for site investigation, cleanup, or other waste management activities, especially soil excavation, owners and operators should evaluate the potential for air emissions caused by the planned activity, and should plan accordingly to eliminate, or at least minimize, the air emissions associated with that activity. It should be noted that the inhalation of certain organic petroleum constituents, especially benzene, is generally the impact which poses the most significant risk to human health.

An equally important issue is that of the exacerbation of existing contamination. The improper management of wastes from a UST cleanup may exacerbate the contamination already present, and also expand the scope and increase the cost of the required investigation and cleanup. For example, the stockpiling of contaminated soil without following proper storage procedures (e.g., proper use of liners and covers) may result in contamination of the (previously uncontaminated) soil underneath and surrounding the pile due to runoff and leaching of contaminants from the pile. The owner and operator would then not only be required to clean up the contaminants in the original stockpile, but would also be required to investigate the extent of, and

clean up, the contaminants which had leached from the pile into the underlying soil at the stockpile location.

6.1.2 Planning for Effective Cleanups

It should be noted that the most effective soil and groundwater cleanups at a site may often result from the use of several treatment methods -- either concurrently, in succession, or a combination thereof -- rather than the use of a single method from start to finish. The use of such a "treatment train" of different methods is often desirable for both economic and technical reasons, since one can take advantage of the strengths of each treatment method, without concurrently restricting the cleanup to a single method's weaknesses. In addition, naturally occurring processes should be fully exploited to utilize their availability and relatively low cost. (Examples of these processes include gravity flow, vapor pressure differentials, density differentials, photochemical oxidation, and indigenous species of petroleum-degrading microbes.) The use of these naturally occurring processes should be strategically integrated as appropriate into the planning, design, and operation of a soil and groundwater remediation project.

6.1.3 Hazardous Waste Management Issues

Several types of waste generated during UST investigation and cleanup activities may be considered hazardous wastes, and if so must be managed as such. Federal regulations on hazardous waste (40 CFR 260 through 268) and State rules (HAR 11-260 to 266, 268, 270, 271, 279, and 280) set forth requirements for the management of hazardous wastes, including requirements for the proper identification, transport, treatment, storage, and disposal of these wastes.

The Federal regulations on the identification of hazardous wastes are found in 40 CFR 261 and the State regulations are found in HAR 11-261 through HAR 11-268. Generally, a waste is defined as a hazardous waste if either it is specifically named (i.e., it is a "listed waste") or if it fails any of four tests for hazardous waste characteristics (i.e., it is a "characteristic waste") as set forth in the regulations. These four characteristics are: (1) **ignitability**; (2) **corrosivity**; (3) **reactivity**; and (4) **toxicity**.

Petroleum-contaminated wastes associated with UST cleanups are not "listed wastes". Furthermore, these materials rarely fail the **corrosivity** or **reactivity** characteristic tests. More typically, these wastes may fail the **ignitability** or **toxicity** characteristic tests, and if so, would be considered hazardous wastes for those reasons.

However, an exclusion from the hazardous waste regulations exists specifically for petroleum-contaminated media and debris associated with UST cleanups. This exclusion, found in 40 CFR 261.4(b)(10) and HAR 11-261-4(b)(10), reads as follows:

> "**§261.4 Exclusions.**
>
> [...]
>
> (b) *Solid wastes which are not hazardous wastes.* The following solid wastes are not hazardous wastes:
>
> [...]
>
> (10) Petroleum-contaminated media and debris that fail the test for the Toxicity Characteristic of §261.24 (Hazardous Waste Codes D018 through D043 only) and are subject to the corrective action regulations under part 280 of this chapter."

In making this exclusion, EPA has stated that it is deferring a final decision on the application of the toxicity characteristic rule to this category of wastes while it evaluates the extent and nature of the impact of this rule on UST cleanups. In the interim, until this evaluation is completed, EPA believes that the existing UST regulations governing these cleanups will be adequate to protect human health and the environment (55 **Federal Register** 11836, 3/29/90).

Note that this exclusion applies only to wastes which meet all of the following criteria:

1. **Petroleum-contaminated.** The contamination must be caused by a release of petroleum, rather than other regulated substances such as halogenated solvents, pesticides, etc.

2. **Media and debris.** "Media" means environmental media such as soil, ground water, surface water, and air. "Debris" means material such as rocks, concrete and asphalt rubble, tree stumps and other plant material, etc. **This criterion does not include wastes such as free product, tank sludge and sediments, rinsate, the actual tanks and piping, or other cleanup-related materials.**

3. **Failing the test for the Toxicity Characteristic.** Note that if a waste fails any of the other three hazardous waste characteristics (**ignitability**, **corrosivity**, or **reactivity**), it is still considered a hazardous waste regardless of this exclusion. In particular, the waste may fail the **ignitability** characteristic, especially if it is heavily contaminated with a low flashpoint petroleum product such as gasoline.

4. **Hazardous Waste Codes D018 through D043 only.** Note that if a waste fails the toxicity characteristic test for any of the other Hazardous Waste Codes (D004 to D017) specified in 40 CFR 261.24 and HAR 11-261-24, it is still considered a hazardous waste regardless of this exclusion. (Codes D004 to D017 are the codes for the first 14 compounds placed on the toxicity characteristic list. Generally, these compounds are heavy metals or pesticides.) In particular, petroleum wastes such as used motor oil or waste oil may fail the toxicity characteristic test for heavy metals such as cadmium, chromium, or lead.

5. **Subject to cleanup regulations under Part 280 and HAR 11-62.** Finally, this exclusion applies only to those petroleum-contaminated media and debris which are subject to the regulations governing underground storage tank

cleanups. Petroleum-contaminated media and debris not relating to the underground storage tank cleanup requirements of 40 CFR 280 and HAR 11-281 are not covered by this exclusion. This means that petroleum-contaminated media and debris from leaking UST systems which are not regulated by 40 CFR 280 and HAR 11-281, such as heating oil USTs and residential fuel USTs, may potentially be regulated as hazardous wastes.

In summary, this exclusion only covers contaminated soil, ground water, and debris at UST cleanups which fail the toxicity characteristic test due to high concentrations of contaminants in Hazardous Waste Codes D018 to D043 (in particular, benzene). All other UST-related wastes are not covered by this exclusion and therefore may be subject to regulation as hazardous waste if the waste fails tests for any of the four hazardous waste characteristics discussed earlier.

It is important to note that the identification of a waste as a "hazardous waste" is simply a regulatory definition indicating that the waste must be managed in accordance with Federal and State hazardous waste laws and rules. These laws and rules are intended to ensure the adequate management of those wastes which are generally considered to pose the greatest threat to human health and the environment. If a waste is not identified as a "hazardous waste," such identification should not be construed to mean that the waste poses no threat to human health or the environment. In the case of wastes associated with UST cleanups, owners and operators must still manage these wastes in accordance with State UST laws and rules, as well as with all other applicable laws and rules.

6.1.4 Solid Waste Management Issues

Wastes associated with UST closures, investigations, and cleanups are generally considered to be solid wastes. As a consequence, solid waste management laws and rules (Hawaii Revised Statutes [HRS] 342H and Hawaii Administrative Rules [HAR] 11-58.1) are generally applicable to UST waste management activities. Under State solid waste management rules, the DOH Office of Solid Waste Management

(OSWM) requires permits for certain solid waste management activities, including off-site remediation, recycling and disposal. Also, transportation of petroleum-contaminated soil requires a permit unless transportation is to a permitted soil remediation facility and written notification is provided to OSWM at least 48 hours prior to transport. Owners and operators should consult with OSWM to determine whether a solid waste management permit is required for any particular waste management activity.

6.1.5 Health and Safety Issues

The improper management of petroleum-contaminated wastes may result in adverse short-term impacts to the health and safety of both onsite workers and the general public. In some cases, these short-term impacts (e.g., exposure of workers and the general public to air emissions, contaminated soil, contaminated water, sludge and sediments, etc.) may be of greater significance than the long-term impacts posed by the contamination. For a more extensive discussion of health and safety issues, see Section 8.

6.1.6 Other Regulatory Issues

The management of petroleum-contaminated wastes may also be regulated by several agencies other than DOH, depending on the type of waste management activity and the nature of the contaminants and waste streams involved. Table 6.2 presents a list of agencies which may also regulate waste management activities. Owners and operators should consult with the appropriate agencies to obtain all necessary approvals, authorizations, and permits for their waste management activities.

Table 6.2 Other Regulatory Agencies

Agency	Waste Management Issue
DOH Solid and Hazardous Waste Branch, Hazardous Waste Section	Hazardous waste management
DOH Solid and Hazardous Waste Branch, Office of Solid Waste Management	Solid waste management
DOH Clean Air Branch	Air emissions
DOH Clean Water Branch	Discharge of wastes to surface water
DOH Safe Drinking Water Branch	Discharge of wastes to drinking water sources; use of injection wells
DOH Office of Hazard Evaluation and Emergency Response	Emergency response
U.S. EPA Pesticides and Toxics Branch	PCB disposal
State Department of Labor and Industrial Relations, Division of Occupational Safety and Health (DOSH)[1]	Occupational safety and health
State Department of Transportation[2]	Transportation of hazardous materials; discharge of wastes to State-operated storm drains
U.S. Coast Guard	Releases into the navigable waters of the United States
County Fire Departments	Fire prevention and emergency response
County Land Use and Planning Departments	Land use ordinances
County Public Works Departments	Stockpiling of soil
	Discharge of wastes to County-operated storm drains
	Discharge of wastes to County-owned wastewater treatment plants (WWTPs)

Note 1: The U.S. Occupational Safety and Health Administration (OSHA) also regulates worker safety and health; however, DOSH implements OSHA's regulations in the State of Hawaii.

Note 2: The U.S. Department of Transportation also regulates the transport of hazardous materials.

6.2 Contaminated Soil

Petroleum-contaminated soil resulting from releases from USTs may fall under the hazardous waste exclusion discussed above in Paragraph 6.1.3 ("Hazardous Waste Management Issues") and therefore may be excluded from consideration as hazardous waste under Federal and State hazardous waste laws. However, other Federal and State environmental laws do apply to petroleum-contaminated soil. Specifically, UST

requirements are applicable, and solid waste management requirements may be applicable, especially if contaminated soil is transported offsite for treatment, storage, and/or disposal.

6.2.1 Excavation and Storage

As mentioned earlier, the excavation of contaminated soil can generate significant air emissions and dust which may pose risks to the health of both workers and the general public, as well as create nuisance odors. Owners and operators should take mitigative steps to ensure that any excavation undertaken at a UST cleanup site is conducted in a manner which will eliminate, or at least minimize, these risks and odors. Owners and operators should consider such steps as: using covers effectively on soil piles to reduce volatilization and fugitive dust; leaving excavated soil exposed and excavation(s) opened only for the minimum time necessary; and conducting excavations at times when the number of nearby workers, business patrons, residents, and passersby is at a minimum.

Owners and operators should, at all times, store all excavated contaminated soil in a manner which effectively prevents uncontrolled releases of contaminants to the environment. Examples of uncontrolled releases include: excessive emissions of volatile compounds and fugitive dust; the generation of leachate; and run-on and run-off due to rainfall.

To prevent the migration of leachate into the underlying soil, soil should be stored on an impermeable liner. The liner should be durable enough to withstand the mechanical stresses induced by heavy equipment and machinery used to load, unload, and work the soil. If a single sheet of liner is not adequate to line the soil management unit, then several sheets should be effectively seamed to prevent the migration of any leachate through the seams. Depending on the planned duration and intensity of use of the soil management unit, the use of bedding layers or protective working layers of

soil to further protect the integrity of the liner may be warranted. Furthermore, the soil management unit should be bermed to prevent run-on and run-off, and in some cases a leachate collection system may be necessary for the unit.

To prevent excessive emissions of volatile compounds and fugitive dust, and to prevent infiltration of rainfall into the soil pile, excavated soil should be kept covered, and the cover anchored to secure it from wind effects. (Flexible membrane liners are often used for this purpose. Foam covers are also used; however, one should consider that foam may not prevent the infiltration of rainfall and the subsequent generation of leachate.) Owners and operators should note that most synthetic covers will deteriorate over time due to exposure to the elements, and must be regularly inspected and repaired or replaced in order to maintain the integrity of the cover.

6.2.2 Transport

DOH encourages owners and operators to manage contaminated soil onsite whenever practicable and appropriate. However, in some cases it may be necessary to transport contaminated soil offsite for subsequent storage, treatment, and disposal. In which case, contaminated soil can only be taken to a permitted storage, treatment and/or disposal facility. If transportation is to a permitted facility other than a treatment facility, the transporter is required to obtain a permit. In addition, transporters are required to notify DOH OSWM in writing of their intent to transport contaminated soil offsite at least 48 hours prior to the planned transportation date.

To protect against any future potential liabilities associated with improper or questionable final management of contaminated soil, it would be in the best interest of owners and operators to "manifest" all contaminated soil which is excavated from a UST cleanup site and transported offsite. Laboratory data sheets (and other information, as appropriate) presenting data which is representative of the contaminants in the soil should be attached to the "manifest". Owners and operators

should keep copies of all "manifests" on file, and should include applicable "manifests" in all reports on release response actions taken regarding that contamination.

6.2.3 Treatment

DOH prefers and encourages the effective treatment of contaminated soils over disposal or reuse of the soil without treatment of the contaminants. In fact, DOH discourages the outright disposal or reuse of contaminated soil without treatment. Treatment generally increases the long-term effectiveness and permanence of the final remedy, and minimizes the need for long-term monitoring and maintenance.

Furthermore, whenever practicable and appropriate, DOH encourages *in situ* and onsite treatment, rather than transferring the soil offsite for treatment and disposal. Minimization of the offsite transfer of contaminated soil reduces the potential for improper management and the spread of contamination to other sites. DOH believes that there are several field-proven, cost-effective *in situ* and onsite soil treatment technologies available to owners and operators. The use of *in situ* treatment also can substantially reduce the risk of short-term exposure of workers and the general public to contaminants during site cleanup.

Some methods which are commonly used for the treatment of petroleum-contaminated soil are briefly described as follows:

- **Volatilization.** Contaminants are volatilized from the soil under ambient or enhanced temperatures and pressures.
  - The *in situ* application of this method is commonly called **soil vapor extraction**, and involves the removal of volatile contaminants from the vadose zone via vapor extraction wells. Air pollution control permits may be required.
  - The *ex situ* application of this method is commonly called **aeration**. It simply involves spreading out, and in most cases tilling, excavated soil to

expose it to the air to enhance volatilization. However, DOH recommends that aeration be limited to small volumes of soil. Air pollution control permits may be required.

- **Bioremediation.** The metabolic activities of indigenous or introduced microbial organisms in the soil are used to transform toxic compounds into less- or non-toxic compounds. Critical parameters such as oxygen, moisture, nutrient levels, and pH are monitored and controlled to optimize microbial activity and contaminant degradation. This basic concept has several variations:

  - **Composting.** Contaminated soil is excavated, mixed with bulking agents (e.g., sawdust, wood chips, manure), and placed in reactor vessels or in piles.

  - ***In situ* biodegradation.** Microbial activity is optimized to induce the metabolization of contaminants in soil without excavation.

  - **Slurry-phase biodegradation.** Contaminated soils are excavated and mixed with water to create a slurry. The slurry is then agitated continuously to ensure contact between microorganisms and contaminants.

  - **Solid-phase biodegradation.** Soils are excavated and treated in an aboveground unit, such as a treatment bed or a soil pile.

- **Thermal desorption.** Excavated soil is loaded into a process unit and heated to volatilize contaminants, which are then scrubbed or incinerated before the exhaust is emitted. Air pollution control permits are typically required. The type of contaminants dictates the specific design of the thermal process.

Other common treatment methods include soil washing, asphalt batching, and incineration.

6.2.4 Disposal

Treated soil which meets DOH soil cleanup criteria may be left in place at the UST site, or used as a fill material at the UST site. If treated soil meeting DOH soil cleanup criteria is transported offsite, owners/operators should contact the DOH OSWM for current petroleum-contaminated soil reuse standards. Depending on the concentration

of the contaminants, restrictions may be placed on the final disposition of the soil. If reuse standards cannot be met, the petroleum-contaminated soil must be transported to a permitted treatment or disposal facility. A permitted treatment facility may either be a one-time treatment site or a permanent facility. Details on permitting requirements for treatment facilities can be obtained from the OSWM. Note that permitted treatment and disposal facilities may require additional laboratory analyses prior to acceptance.

If the shipment of contaminated soil to a permitted out-of-state facility is considered, owners and operators considering this option must coordinate closely with the out-of-state treatment or disposal facility, and the appropriate State permitting agency, to ensure that all approvals, authorizations, and other requirements are met prior to shipping any soil from Hawaii. (Owners and operators should note that in some states, petroleum-contaminated soil is defined as a hazardous waste and must be managed as such.) Also, if the soil is transported to a permitted facility other than a treatment facility, the transporter shall obtain a permit to transport PCS. All transporters shall notify DOH, OSWM in writing of the transportation of the petroleum-contaminated soil at least 48 hours prior to transport.

Finally, after the removal of grossly contaminated soil, residual contaminated soil which exceeds DOH soil cleanup criteria may be left in place at the UST site or used as a fill material at the UST site provided that either: (1) it can be demonstrated through a **quantitative risk assessment** that the collective contaminant levels at the proposed disposal site are protective of human health and the environment; or (2) it can be demonstrated that no exposure of contaminants to potential receptors will occur, and an **exposure prevention management plan** is developed, approved, and implemented to monitor for and prevent development of any future exposures due to changes in site conditions.

6.3 Contaminated Ground Water

Petroleum-contaminated ground water resulting from releases from USTs may fall under the hazardous waste exclusion discussed above in Paragraph 6.1.3 ("Hazardous Waste Management Issues") and therefore may be excluded from consideration as hazardous waste under State hazardous waste laws. However, other Federal and State environmental laws do apply to petroleum-contaminated ground water. **Unless permitted or approved to do so, owners and operators may not discharge treated or untreated ground water to state waters, injection wells, or wastewater systems.**

6.3.1 Storage

Contaminated ground water which is pumped out and cannot be treated immediately must be stored. Depending on the volume involved, contaminated ground water may be stored in small containers such as drums, or in larger field-constructed containment units and tanker trucks. Clearly, any activities involving pumping of ground water at UST sites must be carefully planned in advance to avoid the considerable logistical difficulties inherent in properly storing large volumes of contaminated ground water onsite.

6.3.2 Treatment and Disposal

Petroleum-contaminated ground water often may have a layer of floating petroleum (i.e., free product) at its surface. This free product layer is the primary source of petroleum constituents solubilizing into the ground water. Owners and operators are required to remove free product from ground water to the extent practicable. Removal of this free product layer serves to eliminate the primary source of continuing ground water contamination.

After free product has been removed, some of the treatment methods typically used to remove the remaining petroleum constituents dissolved in ground water include air

stripping, granular activated carbon (GAC) treatment, and bioremediation. Air stripping and GAC treatment are *ex situ* methods which are commonly found as a part of "pump-and-treat" remediation systems. Bioremediation may be either *ex situ* or *in situ*.

(Owners and operators should note that the operation of pump-and-treat remediation systems causes a drawdown of the groundwater table, and consequently creates an artificially-induced vadose zone. When using this type of remediation system, owners and operators must not overlook the cleanup of contaminants remaining in the artificially-induced vadose zone created by the drawdown.)

The following are options for the disposal of ground water which has been pumped out and treated:

- **Discharge to storm drains or surface water bodies.** Owners and operators may apply for a National Pollutant Discharge Elimination System (NPDES) permit to discharge treated water to a storm water drainage system or directly to a surface water body (e.g., streams, the ocean, etc.). Owners and operators considering this option should contact the DOH Clean Water Branch (CWB) to obtain a NPDES permit. Owners and operators should be aware that CWB has a NPDES General Permit for discharges from UST cleanup sites in order to facilitate the permitting process for such discharges (HAR 11-55 Appendix D). Those owners and operators considering discharge into storm drains must also obtain approval from the owner of the storm water drainage system considered, as a part of their NPDES permit application. (Most storm water drainage systems are owned by County governments.) Generally, discharged water must meet State Water Quality Standards, as found in HAR Chapter 11-54.

- **Discharge to a wastewater treatment plant (WWTP).** A wastewater treatment plant may, at its discretion, accept discharges of treated ground water from UST cleanup sites if allowed in the conditions of its NPDES permit. Owners and operators considering this option must obtain approval from the owner of the WWTP considered. (Most WWTPs are owned by County governments. Owners and operators should note that the City and County of Honolulu has stated that it will not accept petroleum-contaminated wastewater from UST cleanup sites into its sewer system at this time.) Generally, water discharged to WWTPs must meet State Water Quality Standards.

- **Disposal via underground injection.** Owners and operators may obtain an Underground Injection Control (UIC) permit to dispose of treated ground water via an underground injection well. Owners and operators considering this option should contact the DOH Safe Drinking Water Branch to obtain a UIC well permit. Generally, injected water must meet either drinking water standards or State Water Quality Standards, depending on the location.

- **Disposal via infiltration galleries.** Owners and operators may dispose of treated ground water by disposal into an infiltration gallery onsite. Owners and operators considering this option should provide a Notice of Intent of their planned action to the DOH Safe Drinking Water Branch. Generally, water disposed of in this manner must meet either drinking water standards or State Water Quality Standards, depending on the location.

6.4 Petroleum Product

When closing a UST system used to store petroleum products, the first step is to pump out or otherwise remove the remaining petroleum product from the system. Additionally, petroleum product floating on the groundwater surface ("free product") which was released from UST systems must be recovered as an initial cleanup activity. In all cases, petroleum products generated during UST closures and cleanups must be properly handled, transported, reused, recycled, treated, stored, and disposed of.

6.4.1 Reuse and Recycling

Whenever practicable and appropriate, DOH encourages owners and operators to reuse pure petroleum product from UST closures for its intended purpose, to reuse impure petroleum product as a fuel supplement, or to recycle petroleum product by re-refining, rather than to dispose of the petroleum product as waste. All applicable federal and state regulations shall be followed in reusing and recycling petroleum products. Currently, used oil transporters, and recyclers are required to obtain permits from the DOH, OSWM. State rules regarding used oil are currently being revised,

thus, the DOH, OSWM should be consulted regarding the latest regulations pertaining to used oil.

6.4.2 Burning for Energy Recovery

If it meets the required fuel specifications, recovered petroleum product may be used as a fuel supplement in boilers and furnaces. Use of recovered petroleum product in this manner must comply with the specific hazardous waste requirements in 40 CFR 266 and HAR 11-266. Used oil burned for energy recovery is subject to the requirements in 40 CFR 279. The DOH, Clean Air Branch shall also be consulted regarding applicable clean air regulations and requirements.

6.4.3 Disposal as Waste

If recycling or reuse is not feasible, then the petroleum product must be treated or disposed of as a waste. This type of waste may be assumed to be a hazardous waste due to **toxicity**, **ignitability**, or both. The handling, treatment, storage, and disposal of this waste must comply with applicable solid and/or hazardous waste management requirements.

6.5 Sludge and Sediments

Sludge and sediments accumulate at the bottom of USTs and are typically removed during tank cleaning and tank closure. There are health and safety hazards involved in cleaning USTs, particularly during tank cutting and entry. See Sections 3 and 8 for additional health and safety information on UST cleaning.

6.5.1 Hazardous Waste Status

Sludge and sediments from USTs typically fail the toxicity and/or ignitibility characteristic tests for hazardous waste determinations. However, in instances where sludge and sediments are not considered hazardous waste, treatment, particularly for sediments, should be considered.

6.5.2 Handling, Transporting and Disposal

Sludge and sediments must be handled, transported, treated, stored, and disposed of in accordance with all applicable solid and/or hazardous waste management requirements.

6.6 Rinsate

Contaminated rinsate will most likely be generated during UST cleaning, and also during decontamination of equipment during investigation and cleanup activities.

6.6.1 Minimization of Volume

DOH encourages owners and operators to use UST cleaning methods and techniques which minimize the volume of rinsate generated when cleaning USTs. These methods and techniques can range from the use of more efficient spray nozzles to the use of spray solution supplements (such as detergents, surfactants, etc.).

6.6.2 Treatment and Disposal

If it fails hazardous waste characteristic tests, rinsate must be managed as hazardous waste. If not, then rinsate may be treated and disposed of similar to contaminated groundwater.

6.7 Tanks and Piping

Tanks and piping are typically removed from the ground as a part of the UST closure process. Before disposal, the tanks and piping must be cleaned by removing all residual product, water, and accumulated sludge and sediments. (For additional information on cleaning a UST system, see Section 3.) The proper management of these liquids and accumulated sludge and sediments, once removed, is discussed above in Subsections 6.4, 6.5, and 6.6. This particular subsection focuses on the management of the tanks and piping themselves.

6.7.1 Transport of Uncleaned Tanks and Piping Offsite

In some cases (e.g., due to limited space, heavy onsite traffic, proximity of neighboring residents, or other reasons) it may not be feasible to clean USTs onsite. Uncleaned UST systems can pose significant vapor, fire, and explosion hazards. When transporting USTs to an offsite location for cleaning and disposal, all applicable Federal and State Department of Transportation requirements on transportation of hazardous materials must be complied with. One of the greatest concerns in this activity is the transportation of potentially explosive tanks on public roadways. The UST closure process includes certain purging and inerting procedures to minimize this potential explosion hazard prior to transporting an uncleaned UST offsite. See Section 8 for additional information.

6.7.2 Recycling as Scrap Metal

Empty steel tanks and piping are often recycled as scrap metal. Owners and operators should note that some scrap metal recyclers may not accept steel tanks and piping which are coated with nonmetallic materials such as epoxy or fiberglass-reinforced plastic. Scrap metal recyclers should be contacted in advance to determine the conditions for accepting the particular tanks and piping to be recycled. If the scrap metal recycler also cleans contaminated USTs at their facility, then the recycler may

be required to meet certain additional solid and/or hazardous waste management requirements regarding the operation of their facility. As mentioned earlier, there are health and safety hazards involved in cleaning USTs, particularly during tank cutting and entry. See Sections 3 and 8 for additional health and safety information on UST cleaning. It may be in the interest of owners and operators to send their empty steel tanks and piping only to DOH-permitted scrap metal recyclers. Owners and operators may call OSWM for the current list of permitted scrap metal recyclers.

6.7.3 Reuse of Tanks and Piping

In some cases, owners and operators may consider reusing tanks and piping after they have been effectively cleaned. These uses may be for either underground or aboveground storage of regulated or nonregulated substances.

If reused for the underground storage of regulated substances, the tanks and piping are considered to be newly installed UST systems and must meet all requirements for new UST systems, as found in HAR 11-281 Subchapter 2 and Subchapter 3. Owners and operators should consult with the UST manufacturer regarding the suitability of the UST for reinstallation. Generally, DOH does not recommend the reuse of old tanks and piping in this manner since the stress and strain of the UST removal process often may damage tanks and piping and render them unsuitable for reinstallation. Furthermore, it is generally more cost-effective in the long run to install new tanks and piping rather than to attempt to upgrade older tanks and piping to meet the current design and operating standards for new USTs.

Tanks and piping may be reused, after cleaning, for the storage of nonregulated substances either underground or aboveground. **However, tanks and piping which have previously stored petroleum products must not be used for the subsequent**

storage of food or liquids for human or animal consumption. All reused tanks and piping should be clearly labeled to indicate their former use as storage tanks for petroleum.

Finally, cleaned USTs may be reused to store regulated substances aboveground provided that they meet the requirements of the local fire authority (typically the County Fire Department) for this use. In all cases, one should be cautious of the structural integrity of any former underground storage tank which is reused for any purpose.

6.7.4 Landfill Disposal

Fiberglass-reinforced plastic (FRP) tanks and piping are typically not reusable or recyclable, and after cleaning they are usually crushed and disposed of at a permitted solid waste landfill.

6.8 Debris

"Debris" means material such as rocks, concrete and asphalt rubble, tree stumps and other plant material, etc., which are encountered during cleanup activities. Petroleum-contaminated debris resulting from releases from USTs falls under the hazardous waste exclusion discussed above in Paragraph 6.1.3 ("Hazardous Waste Management Issues") and therefore is excluded from consideration as hazardous waste under Federal and State hazardous waste management laws. However, UST and solid waste management requirements remain applicable.

6.9 Cleanup-related Materials

"Cleanup-related materials" are materials used to collect, absorb, or otherwise remove contaminants from the environment. This category includes absorbent booms and

pads used to collect free product, and spent granular activated carbon (GAC) units used in "pump-and-treat" groundwater remediation systems or other wastewater treatment systems.

6.9.1 Absorbent Materials

Petroleum-contaminated absorbent materials may be considered to be hazardous due to **toxicity**, **ignitability**, or both. Since absorbent materials are not typically reusable or recyclable, they may be burned for energy recovery as per 40 CFR 266 if they meet the required fuel specifications, or disposed of as a hazardous waste. If these materials are not considered hazardous waste, disposal of these materials shall meet applicable solid waste regulations.

6.9.2 Granular Activated Carbon

Granular activated carbon (GAC) is used to remove contaminants from groundwater in pump-and-treat remediation systems or other wastewater treatment systems. A spent GAC unit containing accumulated contaminants may be refurbished through carbon regeneration, and if handled in this manner would not be considered a waste *per se*. However, if they are not regenerated, GAC units must be handled and disposed of as solid or hazardous waste, depending on whether contaminants in the GAC unit would fail the hazardous waste characteristic tests.