Information Regarding the Management of Petroleum Contaminated Soil

Colorado Department
of Public Health
and Environment

Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment

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Purpose of this Booklet

This document is intended for anyone wanting to know which Colorado regulatory agency should be contacted in case of a petroleum contaminated soil incident or situation. Nothing in this document either replaces or changes any aspects of state regulation: it is intended to provide information to assist in identifying and following regulatory requirements applicable to the situation. Some regulations pertaining to petroleum contaminated soils are complex, and this document does not address all situations in detail. It remains the responsibility of the owner/operator to comply with all applicable statutes and regulations.

Suggestions or comments may be sent to the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment at the address provided in Chapter 12.

Colorado Department of Public Health and Environment
Information Regarding the Management of
Petroleum Contaminated Soil (PCS)

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CHAPTER 1 - REGULATORY REQUIREMENTS FOR PETROLEUM CONTAMINATED SOIL

For the purposes of this guidance document, Petroleum Contaminated Soil (PCS) is defined as any earthen material or artificial fill that has human or natural alteration of its physical, chemical, biological, or radiological integrity resulting from the introduction of crude oil, any fraction or derivative thereof (such as gasoline, diesel, or motor oil), or oil-based product.

Several State agencies are involved in regulating the disposal, treatment, transportation, remediation, and reuse of petroleum contaminated soil, including the Colorado Departments of Labor and Employment, Natural Resources, and Public Health and Environment. The source of contamination, the nature or type of contamination, the amount of contamination present, and effects that the contamination may have on the environment determine which agency(ies) governs the management of the petroleum contaminated soil.

Generally, a specific agency, division, or unit should be contacted regarding notification, oversight of remediation or disposal, and release from regulatory concern. The appropriate division or agency will be the one designated by State statutes and regulations that cover the situation of concern. For example, petroleum contaminated soil from a regulated storage tank would be regulated by the Division of Oil and Public Safety at the Department of Labor and Employment, and petroleum contaminated soil from an oil well would be regulated by the Oil and Gas Conservation Commission (OGCC) at the Department of Natural Resources. If the petroleum contaminated soil situation is not specifically regulated elsewhere, cleanup falls under oversight by the Solid Waste Unit of the Hazardous Materials and Waste Management Division at the Department of Public Health and Environment. This Division's Voluntary Cleanup Program may also be an alternative in many cases.

Flow Chart 1 is a guide to help the user decide which agency (and division within the agency) must be contacted. The flow chart is generally organized from higher priority petroleum contaminated soil situations to lower priority situations. To complete the flow chart, some questions regarding the type of petroleum contaminated soil and the source of the contamination must be answered. Help in answering these questions may be found in the remaining sections of this guidance document. Please note that although the flow chart leads the user to a single division or unit, more than one division or unit may ultimately be involved in regulating the management of the petroleum contaminated soil. For example, a release from an unregulated, aboveground storage tank that contaminated both soil and surface water may involve oversight from the Water Quality Control Division as well as the Hazardous Materials and Waste Management Division within the Department of Public Health and Environment. For efficiency, one division or agency will usually be designated as the lead agency for that situation.

CHAPTER 2 - RELEASE REPORTING REQUIREMENTS

Whenever there is a spill or release of petroleum products, there may be a number of reporting requirements that must be followed by the company or person responsible for the spill.

Emergency situations that involve the release of hazardous substances, including the release of flammable petroleum products, require that the local response agency be notified immediately,

Flowchart 1 Management of Petroleum Contaminated Soil

Within the state of Colorado, petroleum contaminated soil (PCS) may be regulated by one or more state agencies, including the Colorado Department of Public Health and Environment (CDPHE).

If the PCS poses an immediate threat to human health or the environment, or involves a spill along the highway or at a facility, the Emergency Management Unit and the local designated response unit should be contacted immediately. If the spill is from a regulated storage tank, the Division of Oil and Public Safety at the Colorado Department of Labor and Employment must be contacted within 24 hours.

If the PCS may impact state waters, the Water Quality Control Division of the Colorado Department of Public Health and Environment must be contacted. Contacting the Emergency Management Unit satisfies this requirement. Failure to report a spill may result in fines or other penalties.

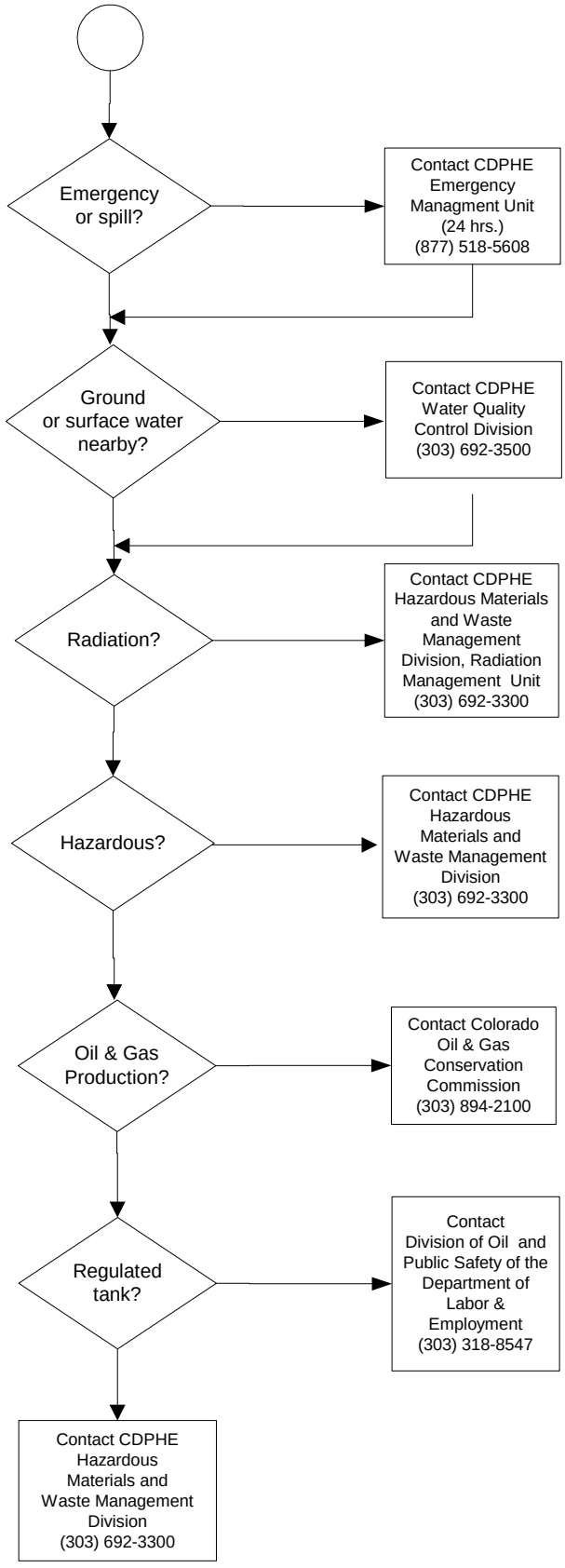
If the PCS is also radioactive, the Radiation Management Unit of the Hazardous Materials and Waste Managment Division at the Colordo Department of Public Health and Enviornment should be contacted.

If the PCS is "hazardous waste," the Hazardous Materials and Waste Management Division at the Colorado Department of Public Health and Environment should be contacted. (Refer to Chapter 3)

If the PCS is related to exploration and production activities on an oil and gas lease, the Colorado Oil and Gas Conservation Commission may regulate the waste. (Refer to Chapter 4)

If your PCS is from a regulated storage tank unit, notify the Division of Oil and Public Safety of the Colorado Department of Labor and Employment. (Refer to Chapter 5)

If none of the above agencies regulates the PCS, then the Solid Waste Unit of the Hazardous Materials and Waste Management Division of CDPHE would oversee the proper management of the PCS. **Note**: There may be situations where the PCS may be managed through the Voluntary Cleanup Program. (Refer to Chapter 6)



in most areas by calling **9-1-1**. In addition, the Emergency Management Unit of the Colorado Department of Public Health and Environment maintains a 24-hour emergency spill reporting line at **1-877-518-5608** (statewide, toll-free). This line should be used to report spills to the state health department and the Colorado Emergency Planning Commission (CEPC), and to get advice on other reporting requirements for that particular incident.

All spills or releases in amounts equal to or greater than the Reportable Quantity (RQ) for substances listed under Section 304 of the Emergency Planning and Community Right-to Know Act (EPCRA), also known as SARA Title III, must be reported to the National Response Center at **1-800-424-8802** as well as to the state spill reporting line and local response agencies. A consolidated list of chemicals subject to reporting under this Act may be found in the SARA Title III List of Lists, which is available on the US EPA website (www.epa.gov). Among those chemicals listed are benzene, ethylbenzene, toluene, xylene, butane, pentane, hexane, and other pure hydrocarbons. Most hydrocarbon fuels, hydraulic oils and lubricating oils are mixtures and are not specifically listed. As a rule of thumb, petroleum product releases greater than 25 gallons should be reported because it takes approximately 25 gallons of product to trigger reporting requirements under the Reportable Quantity for benzene. This is consistent with reporting requirements from the Colorado State Patrol for highway accidents and with requirements for regulated petroleum storage tanks.

Any release of petroleum that enters or has the potential to enter waters of the State (surface water, ground water, dry gullies or storm sewers leading to surface water, etc.) must be reported to the Department of Public Health and Environment's Water Quality Control Division immediately. Written notification should follow verbal notification. Generally, reporting the spill to the 24-hour emergency spill reporting line would satisfy the reporting requirement. Releases to a sanitary sewer must be reported immediately to the local sewer authority and wastewater treatment plant. Failure to report spills or discharges to waters of the state may result in a fine and/or imprisonment.

Releases greater than 25 gallons from aboveground and underground storage tanks regulated by the Division of Oil and Public Safety at the Department of Labor and Employment must be reported to that agency within 24 hours of the spill. This includes spills from associated fuel pumps and dispensers. Releases can be reported to the Division of Oil and Public Safety at **(303) 318-8547** during regular business hours. If the release occurs after normal business hours, it may be reported to the Department of Public Health and Environment's 24-hour spill reporting line at **(877) 518-5608**. A release of less than 25 gallons of petroleum does not need to be reported if it does not impact waters of the state and if it is adequately cleaned up within 24 hours. Site assessment and cleanup activities are overseen by the Division of Oil and Public Safety.

Releases on oil and gas exploration and production sites must be reported to the Oil and Gas Conservation Commission at the Department of Natural Resources in accordance with their Rule 900 Series "Exploration and Production (E&P) Waste Management." Generally, spills and releases of waste or produced fluid exceeding five (5) barrels must be reported in writing on the appropriate form within ten days, those exceeding twenty (20) barrels must be reported verbally within 24 hours in addition to the written notification, and those impacting or threatening to impact any waters of the state, residence or occupied structure, livestock, or public byway must

be verbally reported as soon as practical after discovery. If a spill of any size reaches waters of the state, it must also be reported to the Department of Public Health and Environment.

Releases of 5 or more gallons of hazardous liquids, including oil or petroleum products, from intrastate or interstate pipelines must be reported to the National Response Center and the US Department of Transportation Office of Pipeline Safety [49 CFR 195 Subpart B]. Releases of oil or petroleum products that have or may enter waters of the state must also be reported to the Department of Public Health and Environment. Site assessment and cleanup activities are usually overseen by state solid or hazardous waste requirements.

For non-emergency situations where the petroleum release is not specifically regulated elsewhere (refer to Flowchart 1), the Hazardous Materials and Waste Management Division at the Department of Public Health and Environment should be notified. Technical staff from the Solid Waste Unit will oversee assessment and cleanup activities. Under State statutes, discarded material is a solid waste.

For more information on spill reporting requirements, refer to the Department of Public Health and Environment website at http://www.cdphe.state.co.us/emp/spillsandreleases.htm.

CHAPTER 3 - IS IT A RADIOACTIVE MIXED WASTE?

If radioactive wastes are mixed with petroleum contaminated soils, the commingled waste is regulated under both radiation management regulations and the appropriate regulatory program for the petroleum contamination. Where the requirements differ, the more stringent regulations apply. The owner/operator responsible for radioactive petroleum contaminated soil should notify both the Hazardous Materials and Waste Management Division of the Department of Public Health and Environment and the agency that would normally oversee remediation and disposal of the petroleum contaminated soil.

CHAPTER 4 - IS IT A HAZARDOUS WASTE OR A PCB WASTE?

Hazardous Waste

The owner or generator of petroleum contaminated soil is required to determine whether or not the material is a hazardous waste. Results of this determination will be requested by regulatory authorities and whomever takes the contaminated soil for disposal or reuse. If it is a hazardous waste, the material must be handled, treated, stored, and disposed of in accordance with State hazardous waste regulations, administered by the Hazardous Materials and Waste Management Division of the Department of Public Health and Environment. There are two ways a soil may be hazardous waste: 1) the soil contains contaminants specifically listed in the state hazardous waste regulations as hazardous, called a “listed hazardous waste,” or 2) the waste exhibits one or more of the defined hazardous waste characteristics and is a “characteristic hazardous waste.”

Listed Hazardous Waste

Listed hazardous wastes are listed in three categories in the Colorado Hazardous Waste Regulations, 6 CCR 1007-3 Part 261 Subpart D:

1. non-specific source wastes listed in Section 261.31, which include spent solvents and metal finishing solutions. These wastes are assigned EPA hazardous waste numbers of three digits preceded by the letter "F."
2. specific source wastes listed in Section 261.32, covering numerous industries. These wastes are assigned EPA hazardous waste numbers of three digits preceded by the letter "K."
3. discarded commercial chemical products listed in Section 261.33. These wastes are assigned EPA hazardous waste numbers of three digits preceded by the letters "P" or "U."

If the petroleum contaminated soil is mixed with, or contains, a listed hazardous waste, the entire waste stream is considered to be hazardous waste and must be managed accordingly. Remediation and disposal of these soils will be carried out with the Hazardous Materials and Waste Management Division as the lead regulatory agency. All work plans must be reviewed and approved by the Division.

Characteristic Hazardous Waste

A waste is characteristically hazardous if it exhibits any of the four hazardous waste characteristics of ignitability, reactivity, corrosivity, or toxicity. The EPA has established specific test methods to determine if a waste exhibits one or more hazardous characteristics. Sampling and analysis protocols are outlined in EPA's SW-846, "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods."

- **Ignitability:** A waste exhibits the characteristic of ignitability if it is a liquid and has a flash point less than 60º C (140º F). If the waste is a solid, such as petroleum contaminated soil, it must be capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes under standard temperature and pressure, and when ignited, burn so vigorously and persistently that it creates a hazard. A waste is also considered to exhibit this characteristic if it is an ignitable compressed gas as defined by the US Department of Transportation. When a waste is determined to be "ignitable," it is assigned the EPA hazardous waste number D001.

- **Corrosivity:** A waste exhibits the characteristic of corrosivity if it is aqueous and has a pH less than or equal to 2, or more than or equal to 12.5, or it is a liquid that corrodes steel faster than 0.250 inches per year at 130º F. When a waste is determined to be "corrosive," it is assigned the EPA hazardous waste number D002.

- **Reactivity:** A waste exhibits the characteristic of reactivity if it is normally unstable, reacts violently with water, forms potentially explosive mixtures with water, or generates toxic gases when mixed with water. Wastes that are capable of detonation if subjected to

a strong initiating source or if heated under confinement, that are readily capable of detonation at standard temperature and pressure, and those that are forbidden explosives as defined by the US Department of Transportation are also reactive hazardous wastes. Certain sulfide and cyanide bearing wastes also fit into this category. When a waste is determined to be "reactive," it is assigned the EPA hazardous waste number D003.

- **Toxicity:** The toxicity characteristic is meant to identify those wastes that have the potential of leaching any of 39 constituents to the environment in levels at or above regulatory thresholds. These constituents include 8 heavy metals, 4 insecticides, 2 herbicides, and 25 other organic compounds. The laboratory test to determine the toxicity characteristic is an artificial leaching of the waste material with acetic acid and analysis of the extract (leachate) for constituents of concern. This test is the Toxicity Characteristic Leaching Procedure (TCLP). If the extract contains any of the constituents at or above the prescribed regulatory concentration limits, the waste exhibits the toxicity characteristic and is a hazardous waste. Table 1 lists the TCLP constituents, their concentration limits in ppm (mg/l), and the hazardous waste number (code) assigned if that constituent fails the TCLP. "Failure" in this context means that the constituent is present in the extract at or above the regulatory limit, and therefore the waste is hazardous by the toxicity characteristic.

  Total constituent analysis is sometimes used as a screening tool because this test is less expensive than a TCLP test. Because the TCLP test involves a dilution factor of twenty, petroleum contaminated soil samples with total constituent concentrations less than twenty times the specified regulatory constituent concentration limit are considered to pass the TCLP test for that constituent. If the total constituent analysis is greater than twenty times the TCLP level, a TCLP test should also be conducted on a representative sample or the soil should be assumed to be hazardous waste. There are many instances where the total concentration is more than twenty times the TCLP limit, but the waste will still pass TCLP. This may occur if that constituent does not readily leach. Keep in mind, however, that this rule of twenty applies only to material containing no free liquids. For liquid wastes, or those containing less than 0.5% solids, the liquid itself is considered to be the extract, and the total concentrations are equivalent to TCLP results. The Paint Filter Liquids Test, EPA Method 9095A, is used to determine if a waste contains free liquid.

Instances of petroleum contaminated soil being characteristically hazardous because of ignitability, corrosivity, or reactivity are relatively rare. However, the chances of petroleum contaminated soil being characteristically hazardous because of toxicity are greater, and the regulatory situation is much more complicated. If the petroleum contaminated soil might be hazardous due to the toxicity characteristic, it is advisable to seek assistance from the Hazardous Materials and Waste Management Division.

Petroleum contaminated soil resulting from a spill or release may not require extensive analyses if it can be shown through specific knowledge about the source of the product and spill incident that the soil will not exceed any of the standards listed above. This knowledge used must be sufficient to accurately characterize the waste and may include process knowledge, the facility's

records of past analyses, or a combination of these with actual chemical analysis of this waste. Lacking this specific knowledge, the generator of the petroleum contaminated soil must characterize the waste based on laboratory data using valid sampling and analytical techniques to determine whether or not it may be a listed or characteristic hazardous waste.

Exemptions to the hazardous waste regulations

1. Certain exploration and production wastes from oil and gas field operations are excluded from regulation as hazardous waste. Exploration and production wastes are defined as "those wastes generated during the drilling of and production from oil and gas wells or during primary field operations." Please refer to Chapter 5 for more details.

2. Petroleum contaminated media and debris generated during the remediation of an underground storage tank (UST) release regulated by the Division of Oil and Public Safety that fail the test for the toxicity characteristic for hazardous waste numbers D018 through D043[1] are not considered to be hazardous waste if the constituent is naturally present in the original petroleum fuel product. For example, some fuel products contain benzene (D018) or 1,2-dichloroethane (D028). If this type of petroleum product was stored in a regulated underground storage tank and subsequently leaked out of that tank, it is then a solid waste. However, the petroleum contaminated soil would not be considered to be a hazardous waste, even if the TCLP level is exceeded for either of those constituents. This exemption does not include heavy metals such as lead (D008), which was a constituent added to gasoline for many years. Petroleum contaminated soil that fails the TCLP test for lead is regulated as a hazardous waste.

   The underground storage tank exemption does not apply to petroleum contaminated media resulting from spills or releases from aboveground storage tanks or other surface spills. Remember also that if the petroleum contaminated soil contains a listed hazardous waste, the soil is considered to be hazardous waste if the listed constituent was not part of the original petroleum product, regardless of the source of the release. Please refer to Chapter 6 for more details.

Polychlorinated Biphenyls (PCBs) Waste

PCBs were commonly used in electrical equipment, but since 1977 they are no longer manufactured in this country. The dielectric fluid in capacitors in certain submersible pump motors manufactured before 1979 included PCBs and some old hydraulic fluids may also contain PCBs.

In Colorado, wastes containing PCBs are regulated by US EPA Region VIII in accordance with the Toxic Substances Control Act (TSCA) 40 CFR Part 761. TSCA covers, among other things, PCBs in oil at concentrations ≥50 parts per million (ppm) and most PCB remediation wastes resulting from a spill, release, or other unauthorized disposal of PCB-contaminated materials.

[1] A Dxxx designation refers to the hazardous waste number referenced in the hazardous waste regulations Section 261.24.

Used oil containing PCBs in any quantifiable level is also regulated under the used oil management standards of Part 279 of the state hazardous waste regulations.

Generally, cleanup target levels are ≤ 1 ppm without further conditions in high occupancy areas and ≤25 ppm in low occupancy areas. Higher concentrations (up to 100 ppm) may remain at a cleanup site if appropriate institutional controls are put in place. Refer to 40 CFR Part 761.61 or call EPA Region VIII (303) 312-6312 for more information.

Petroleum contaminated soils with PCB concentrations <50 ppm may be disposed of in a municipal or industrial solid waste landfill, a hazardous waste disposal facility or a PCB disposal facility. Petroleum contaminated soils with PCB concentrations ≥50 ppm must be disposed of in a permitted hazardous waste disposal facility or a PCB disposal facility. Written notice, including the quantity to be shipped and highest concentration of PCBs, should be provided to municipal, industrial and hazardous waste landfills at least 15 days prior to the first shipment of remediation waste from each cleanup site.

Spills of PCBs ≥1 pound must be reported to the National Response Center and the Colorado Department of Public Health and Environment 24-hour spill reporting line. These agencies can assist you in determining other applicable reporting requirements.

Characterization (Testing) of Petroleum Releases

Solid waste is any discarded material, including contaminated soil. Any person that generates a solid waste must determine if that waste is a hazardous waste [6 CCR 1007-3 Section 262.11]:

a) Is it excluded in the state hazardous waste regulations Section 261.4?
b) Is it a listed hazardous waste?
c) Does it exhibit one or more hazardous waste characteristics?

When using laboratory analytical methods to determine if it is a hazardous waste, the methods must be carefully selected to accurately reflect the types and concentrations of substances present, or suspected to be present, at a release site. Process knowledge, history of use, and origin of the waste can be used to help make the hazardous waste determination and may preclude the need for some tests. In the case of unknown petroleum products, it is recommended that the sample with the highest apparent contamination, as evaluated in the field, be analyzed for Total Petroleum Hydrocarbons (TPH) in the gasoline, diesel, and oil & grease organic ranges. Once the type of petroleum product is narrowed down, appropriate testing can be conducted for other constituents as needed. The methods listed below are the preferred test methods; other analytical methods not listed may be used if pre-approved by the overseeing agency.

Preferred test methods:

- Ignitability
    - Pensky-Martens Closed Cup Tester using ASTM Standard D-93-79 or D-93-80 or
    - Setaflash Closed Cup Tester using ASTM standard D-3278-78 or
    - Miniflash Continuously Closed Cup Tester using ASTM standard D-6450-99

- Corrosivity
  - pH meter using SW-846 Method 9040
  - National Assoc of Corrosion Engineers Standard TM-01-69 as standardized in SW-846
- Reactivity
  - performance-based, no specific test methods
- Toxicity
  - Toxicity Characteristic Leaching Procedure SW-846 Method 1311
- TPH (Total Petroleum Hydrocarbons)
  - SW-846 Method 8015B modified
  - SW-846 Method 1664
  - SW-846 Method 418.1
  - SW-846 Method 413.1

  (use method appropriate to hydrocarbon range of released material, if known; otherwise test in the gasoline, diesel and oil & grease organic ranges)
- BTEX (Benzene, Toluene, Ethylbenzene, Xylenes)
  - SW-846 Method 8021
  - SW-846 Method 8020
  - SW-846 Method 8260
- PCBs or PCB-containing Pesticides
  - SW-846 Method 8082
  - SW-846 Method 8270
  - SW-846 Method 1656
- PAHs (Polynuclear Aromatic Hydrocarbons)
  - SW-846 Method 8270
  - SW-846 Method 8310
  - SW-846 Method 8100
- Paint Filter Test
  - SW-846 Method 9095A

Table 1 - Toxicity Characteristic Leaching Procedure (TCLP)

Maximum Contaminant Concentrations

	Hazardous Waste No.	Contaminant	TCLP (ppm)/(mg/l)
Metals	D004	Arsenic	5.0
	D005	Barium	100.0
	D006	Cadmium	1.0
	D007	Chromium	5.0
	D008	Lead	5.0
	D009	Mercury	0.2
	D010	Selenium	1.0
	D011	Silver	5.0
Pesticides	D012	Endrin	0.02
	D013	Lindane	0.4
	D014	Methoxychlor	10.0
	D015	Toxaphene	0.5
	D016	2,4-D	10.0
	D017	2,4,5-TP (Silvex)	1.0
	D020	Chlordane	0.03
	D031	Heptachlor	0.008
Volatiles	D018	Benzene	0.5
	D019	Carbon Tetrachloride	0.5
	D021	Chlorobenzene	100.0
	D022	Chloroform	6.0
	D028	1,2-Dichloroethane	0.5
	D029	1, 1 -Dichloroethylene	0.7
	D035	Methyl ethyl ketone	200.0
	D039	Tetrachloroethylene	0.7
	D040	Trichloroethylene	0.5
	D043	Vinyl Chloride	0.2
Base Neutrals	D027	1,4-Dichlorobenzene	7.5
	D030	2,4-Dinitrotoluene	0.13
	D032	Hexachlorobenzene	0.13
	D033	Hexachlorobutadiene	0.5
	D034	Hexachloroethane	3.0
	D036	Nitrobenzene	2.0
	D038	Pyridine	5.0
Acid Extract	D023	o-Cresol	200.0
	D024	m-Cresol	200.0
	D025	p-Cresol	200.0
	D037	Pentachlorophenol	100.0
	D041	2,4,5-Trichlorophenol	400.0
	D042	2,4,6-Trichlorophenol	2.0

CHAPTER 5 - IS IT REGULATED BY THE OIL & GAS CONSERVATION COMMISSION?

The Oil and Gas Conservation Commission (OGCC) at the Department of Natural Resources is the state agency providing regulatory oversight of oil field activities, which include seismic operations, drilling of wells, and oil and gas exploration and production operations. Under this scope of responsibility, OGCC regulates a category of oilfield wastes known as exploration and production (E & P) wastes. OGCC defines these wastes as "wastes associated with operations to locate or remove oil or gas from the ground or to remove impurities from such substances, and which are uniquely associated with and intrinsic to oil and gas exploration, development or production operations of which are exempt from regulation under Subtitle C of the Resource Conservation and Recovery Act (RCRA), 42 USC Sections 6921, et. seq." This exemption removes certain exploration and production wastes only from hazardous waste regulation, but does not exempt these wastes from other applicable regulations.

Subsection 261.4(b)(5) of state and federal hazardous waste regulations defines the exemption applicable to oilfield wastes as "drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of crude oil, natural gas or geothermal energy." These wastes are exempt from state and federal hazardous waste regulations whether or not chemical analyses indicate the waste would be characteristically hazardous.

There are misconceptions about which wastes are truly exploration and production wastes and qualify for the exemption. To expand on the RCRA Subtitle C exemption quoted above, EPA has specified that to be exempt, the waste must be both intrinsic to and uniquely associated with exploration, development, or production activities, and not generated as part of a transportation or manufacturing operation. EPA has further stated that a waste is exempt if it 1) has come to the surface from down-hole, or 2) has been in contact with the oil or gas production stream prior to or during removal of produced water or other contaminants from the product. These requirements limit the exemption to wastes generated during primary field operations at or near the wellhead and before the point of transfer from the field facility to a carrier for transport to market or refinery.

Primary field operations for crude oil include processing for de-watering, degassing, de-emulsifying, and storage at tank batteries on the lease property. Petroleum contaminated soils from these sources are regulated by OGCC. Wastes generated at facilities located along the transportation network downstream from the production site, such as intrastate or interstate pipelines, pipeline compressor stations, pump stations and bulk oil storage facilities, are not covered by this exemption. Petroleum contaminated soils from these sources are regulated by the Department of Public Health and Environment.

For natural gas production, primary field operations include those production-related activities at or near the wellhead and at the gas plant (regardless of whether or not the gas plant is at or near the wellhead), but prior to transport of the natural gas from the gas plant to market. Wastes derived from natural gas along the gas plant feeder pipelines are considered exempt wastes, even if a change of custody in the natural gas has occurred between the wellhead and the gas plant. Petroleum contaminated soils from these sources are regulated by OGCC. Wastes or releases from intrastate or interstate pipelines, compressor stations and other facilities located along the transportation and distribution network downstream from the gas plant are not covered by this

exemption. Petroleum contaminated soils from these sources are regulated by the Department of Public Health and Environment. More detailed discussions of the exemption may be found in EPA's regulatory determination dated July 6, 1988 (53 FR 25446), and clarification dated March 22, 1993 (58 FR 15284).

Some examples of wastes from exploration and production operations that qualify for the hazardous waste exemption, including soils contaminated by them, are:

a.) used drilling fluids, cuttings, pit sludges, and rig wash;
b.) used completion, treatment, and stimulation fluids;
c.) crude oil and condensate spills/releases on the lease property before transfer to a carrier;
d.) produced fluids from onsite storage tanks, separators, and treatment vessels;
e.) gas plant dehydration and sweetening wastes (glycols and amines, etc.).

Some sources of contamination in the oilfield that are not exempt include:

a.) unused completion, treatment or stimulation fluids;
b.) waste solvents;
c.) painting waste;
d.) used lube-, compressor-, and hydraulic oil;
e.) fuel spills.

If a material is brought to the lease property for use down-hole or in primary field operations, but it becomes a waste before being used for its intended purpose, then that waste is not exempt.

As a result of Senate Bill 95-17, remediation, storage, treatment and disposal of exploration and production wastes are regulated by OGCC, even after the wastes are removed from the lease property of origin. Exploration and production wastes must be managed and disposed of in accordance with OGCC Rule 900 Series "Exploration and Production Waste Management." The Department of Public Health and Environment would not be involved in disposal of exploration and production wastes unless the waste is brought to a commercial solid waste facility. In that case, the exploration and production waste is subject to state solid waste regulation.

Mixing Exploration and Production Wastes

Mixing of wastes should be undertaken only with a clear understanding of the source and nature of the wastes and the resulting mixture, as well as all regulations that apply to the wastes. If a non-exempt hazardous waste is mixed with an exempt exploration and production waste, the entire resulting mixture may be hazardous waste and may have to be handled and disposed of under the hazardous waste regulations. The act of mixing a hazardous waste with anything else may also be in violation of state and federal regulations. Mixing a non-hazardous waste with exempt exploration and production waste results in a mixture that is also exempt, providing the mixture does not exhibit any characteristics of a hazardous waste (See Chapter 4).

CHAPTER 6 - IS IT FROM A REGULATED PETROLEUM STORAGE TANK?

Petroleum storage tanks are frequently the source of petroleum contamination in soil. An underground storage tank (UST) means a tank or combination of tanks, including associated

underground piping, that is ten percent or more beneath the surface of the ground, unless the tank is on or above the floor of an underground area (such as a basement, cellar, mine-working, drift, shaft or tunnel). An aboveground storage tank (AST) is ninety percent or more above the surface of the ground. Many, but not all, petroleum storage tanks are regulated by the Division of Oil and Public Safety at the Department of Labor and Employment. These tanks generally include underground tanks >110 gallons and aboveground tanks ≥660 gallons but <40,000 gallons storing petroleum products for non-residential purposes. Among other things, regulated petroleum storage tanks do not include tanks used to store heating oil for consumptive use on the property where stored, tanks used to store crude oil or natural gas liquids at oilfield production sites, tanks used to store petroleum products used for operational purposes on site (e.g., hydraulic lift oil tanks), flow through process tanks (e.g., oil/water separators), or most farm and residential tanks storing fuel for noncommercial purposes. Refer to the storage tank statute and regulations for specific details on which tanks are and are not regulated by the Division of Oil and Public Safety.

Remediation of releases from regulated petroleum storage tanks is overseen by the Division of Oil and Public Safety. Their regulations have specific requirements for release reporting, investigation, and corrective actions. The Division of Oil and Public Safety regulates all onsite management of non-hazardous petroleum contaminated media.

Petroleum contaminated soil generated as a result of a release from a regulated underground storage tank is deferred from regulation as hazardous waste for certain toxicity characteristic waste numbers, but this deferral does not apply to petroleum releases from any aboveground storage tank, non-regulated underground storage tank, or surface spills. Though relatively uncommon, petroleum contaminated soil may exhibit one or more toxicity characteristics and actually be regulated as hazardous waste. It should also be noted that the deferral does not apply to the contents removed from the tank, including unusable product, sludges or other wastes. The Division of Oil and Public Safety works cooperatively with the Department of Public Health and Environment on sites where regulatory authority overlaps.

CHAPTER 7 - COMMENTS ON CLEANUP LEVELS

Colorado has water quality standards for most petroleum constituents, but does not have state-wide numerical cleanup standards for petroleum constituents in soil. Some regulatory agencies have rules or policies concerning soil cleanup levels, but cleanup target levels are frequently determined on a case-by-case basis in consultation with the appropriate regulatory agency.

Water Quality Standards

The Colorado Water Quality Control Commission has adopted standards for groundwater and surface water quality, as well as established classification and numeric standards for specific river basins and stream segments. The Water Quality Control Division of the Department of Public Health and Environment is the primary authority for implementation of these standards and classifications. However, the Department of Natural Resources - Oil and Gas Conservation Commission, Department of Labor and Employment - Division of Oil and Public Safety, and Department of Public Health and Environment - Hazardous Materials and Waste Management

Division are implementing agencies for the groundwater standards adopted by the Commission. This means that these agencies can oversee groundwater remediation in conjunction with soil remediation occurring on sites under their jurisdiction.

If the potential exists for surface and/or groundwater to be impacted by a petroleum release, regardless of what regulatory program oversees the petroleum contaminated soils, water samples should be obtained and analyzed to detect the presence of hydrocarbons in the water and to define the nature and extent of contamination. In general, groundwater is expected to meet the groundwater standards at the point(s) of compliance as determined by the implementing agency. Alternative site-specific groundwater standards may be adopted by the Water Quality Control Commission.

Table 2 - Groundwater Standards for Petroleum Constituents

Contaminant	**Standard (micrograms per liter (ug/l))**
Benzene	5
Ethylbenzene	700
Toluene	1000
Xylenes	10,000
Acenaphthene	420
Anthracene	2100
Benzo(a)-anthracene	0.0048
Benzo(a)-pyrene	0.0048
Benzo(b)-fluoranthene	0.0048
Benzo(k)-fluoranthene	0.0048
Chrysene	0.0048
Dibenzo(a,h)-anthracene	0.0048
Fluoranthene	280
Fluorene	280
Indeno(1,2,3-CD) pyrene	0.0048
Naphthalene	28
Pyrene	210

There are currently no groundwater standards for total petroleum hydrocarbons (TPH) or methyl-tert butyl ether (MTBE). Standards for additional constituents in groundwater can be obtained in Water Quality Regulation 41 "The Basic Standards for Ground Water." Site specific water quality classifications and standards can be obtained in Regulation 42. Surface water quality classifications and standards can be obtained in Water Quality Regulations 31 – 39. These regulations are on the Internet at http://www.cdphe.state.co.us/op/regs/waterqualityregs.asp.

Soil Cleanup Levels

Radioactive Mixed Waste

Cleanup levels of radioactive mixed waste will frequently be dictated by the requirements for handling the radioactive component, and will be based on the following standards:

- 40 CFR 192 standards for radium-226 (also see 6 CCR 1007-1, Part 18, Appendix A)
- 40 CFR 61, Subpart T standards for radon-222 emissions
- standards for protection against radiation specified in 6 CCR 1007-1, Part 4

- criteria relating to the operation of mills and disposition of radioactive tailings or wastes specified in 6 CCR 1007-1, Part 18, Appendix A
- Colorado water quality standards for surface and groundwater
- site-specific risk assessment and negotiated standards.

A site-specific radiological risk assessment is usually required. This involves estimates of short- and long-term exposures, an evaluation of the risks to both workers and the public, analysis of exposure pathways, and potential land use scenarios. Descriptive procedures for minimizing potential exposures, handling, packaging, transportation and disposal are needed. The risk assessment should follow appropriate U.S. Nuclear Regulatory Commission and Environmental Protection Agency guidance.

Hazardous Waste

Petroleum contaminated soils resulting from releases from petroleum underground storage tanks previously containing leaded gasoline or used oil may fail the toxicity test for lead or other hazardous waste constituents, like solvents, not normally present in the original product. Also, releases from aboveground storage tanks may fail the toxicity test for benzene or other constituents. Remediation of these soils will be overseen by the Hazardous Waste Corrective Action Unit of the Hazardous Materials and Waste Management Division at the Department of Public Health and Environment. Cleanup levels will be based on site-specific risk conditions, utilizing the Proposed Soils Remediation Objectives Policy Document or other guidance.

Oil & Gas Exploration and Production Waste

Remediation of petroleum contaminated soils resulting from spills and releases of exploration and production waste, including produced fluids, will be overseen by the Oil and Gas Conservation Commission at the Department of Natural Resources. Such releases must be controlled and contained immediately upon discovery. Impacts resulting from spills and releases must be investigated and cleaned up as soon as practicable to the levels found in OGCC Rule 900 Series, Table 910-1, which can be obtained on the Internet at http://oil-gas.state.co.us/ following the link to Rules. The Oil and Gas Conservation Commission may require additional activities to prevent or mitigate threatened or actual significant adverse environmental impacts.

Regulated Petroleum Storage Tanks

Remediation of petroleum contaminated soils resulting from spills and releases from a regulated underground or aboveground petroleum storage tank will be overseen by the Division of Oil and Public Safety at the Department of Labor and Employment. If a leak, spill or other release is detected or suspected from a regulated storage tank system, the owner/operator must immediately take all necessary actions to stop the release and mitigate any safety hazards. Once any immediate hazards are taken care of, the tank owner/operator must determine the nature and extent of contamination. Based on this information, potential routes of exposure to the contamination must be identified and evaluated. This evaluation will help determine site-specific cleanup levels.

In general, the owner/operator compares site contaminant levels to a look-up table called the Tier 1 Risk Based Screening Levels (RBSLs). If the contamination is below the Tier 1 RBSLs and the total petroleum hydrocarbons (TPH) threshold of 500 ppm has not been exceeded, the owner/operator may request that no additional remediation be required. Total petroleum hydrocarbons greater than 500 mg/kg may be allowed to remain in place if the contamination levels are below the Tier 1 RBSLs and polynuclear aromatic hydrocarbon (PAH) concentrations are below the PAH screening levels as stated in the Division of Oil and Public Safety Guidance Document Table 7-3. If the contamination levels exceed the Tier 1 RBSLs, the owner/operator may use site specific data as input into the Tier 1 computational model (available from the Division of Oil and Public Safety) in order to develop potentially less stringent, yet adequately protective cleanup goals. Alternatively, the owner/operator may submit a Corrective Action Plan (CAP) that includes Tier 2 site-specific cleanup levels and proposed remedial actions. The Tier 2 computational model is a more sophisticated predictive model that allows for a decreasing contaminant source, vertical separation between the contamination and groundwater, and biodegradation. Information on the RBSLs and computational models can be found on the Division of Oil and Public Safety website at http://oil.cdle.state.co.us/.

Solid Waste

Petroleum contaminated soils not directly regulated by another agency, authority, or program falls under the jurisdiction of the state solid waste regulations as unauthorized disposal of solid waste. Remediation of petroleum spills, releases from unregulated tanks, contamination of unknown origin and other types of unauthorized disposal are overseen by the Hazardous Materials and Waste Management Division at the Department of Public Health and Environment, most frequently by the Solid Waste Unit. For consistency, the Solid Waste Unit generally follows those sections of the Division of Oil and Public Safety Petroleum Storage Tank Owner/Operator Guidance Document pertaining to characterization, assessment and cleanup of petroleum contaminated soil since the physical and chemical situations are so similar. It is recommended that site owners refer to Section 5 of the storage tank regulations and the Petroleum Storage Tank Owner/Operator Guidance Document for additional guidance.

Nature and Extent of Contamination

The vertical and lateral extent of contamination must be defined in both soil and groundwater. Soil samples should be collected from the areas where the highest levels of contamination are most likely to exist. From there, the vertical and lateral extent of contamination at the site must be delineated to levels that are at or below the subsurface soil Tier 1 Risk Based Screening Levels (RBSLs) developed by the Division of Oil and Public Safety **and** where total petroleum hydrocarbons (TPH) are less than or equal to 500 mg/kg.

If the type of petroleum product released is not known, initial analyses should include gasoline range, diesel range and oil & grease range organics, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbon (PAHs), halogenated compounds, and toxicity testing for cadmium, chromium and lead. Other analyses may be required based upon owner/operator knowledge and observations made at the site.

Table 3 - Tier 1 Subsurface Soil Risk Based Screening Levels (RBSLs)

Constituent	RBSL (mg/kg)
Benzene	0.26
Ethylbenzene	200
Toluene	170
Xylenes	1900

If ground water is present in an excavation or is anticipated to be in close proximity to the vertical extent of soil contamination, it should be sampled and analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX), TPH, and any other constituent reasonably expected to be present based on previous uses of the property. (NOTE: reference the Hazardous Materials and Waste Management Division policy on volatile organic compounds sample preservation prior to sampling.) Groundwater contamination must be delineated to a level at or below State groundwater standards.

Cleanup Levels

Site owners must determine appropriate cleanup levels for their site. These may be based on established remediation objectives such as those discussed under the Regulated Petroleum Storage Tank section above, or should be developed based on the site-specific degree of actual or potential risk of exposure to a contaminant and the toxicity of the contaminant. The potential for mobile contaminants to leach and degrade water quality should also be a factor to take into consideration when establishing site-specific cleanup levels. Consideration should be given to the transfer of contaminants from one media, where it may not pose a risk, to another, where it may pose a risk. Agreed-upon cleanup levels should be protective of human health and the environment and may take into consideration the current and proposed future uses of the site.

Approval may be granted to a site owner to allow some contamination to remain on site if it can be demonstrated that there is no threat to human health or the environment and the minimum standards outlined in the solid waste regulations can be met. These standards mainly entail containing the contamination so it does not spread or threaten surface or ground water, preventing nuisance conditions, and possibly restricting public access. An environmental real covenant may be required for sites where contamination is allowed to remain on site. A covenant provides an enforceable mechanism to ensure that institutional controls and/or engineered structures are protected and maintained in order to continue to be protective of human health and the environment for as long as any residual contamination remains a risk. Examples of where an environmental real covenant would be required include property where restrictions are placed on use of contaminated groundwater, soil contamination left on site precludes some uses, or when an active treatment system requires ongoing operation and maintenance.

After remediation is completed and residual contaminant levels are at or below the target cleanup levels, or if initial contaminant levels are below the Tier 1 RBSLs and TPH is less than or equal to 500 mg/kg, the site owner may request "No Further Action" status.

Site Remediation

A corrective action plan must be submitted for all sites that do not meet the minimum standards (i.e., maximum contaminant levels below the Tier 1 Risk Based Screening Levels (RBSLs) and total petroleum hydrocarbons (TPH) less than 500 ppm). This plan should include details of the remediation strategy that will be applied, how and when it will be implemented, and verification sampling to demonstrate achievement of the cleanup levels. If groundwater has been impacted or if contaminated soils have the potential to impact groundwater, a groundwater remediation and/or monitoring plan should also be included.

There are several corrective action methods that may be used to remediate petroleum contaminated soil, including soil excavation and in-situ remediation. If the remedial action includes soil excavation, confirmatory samples must be obtained from the limits of the excavation, including excavation sidewalls and bottom. It is up to the site owner to determine how many samples are needed to be representative of the conditions remaining in the excavation. If in-situ remediation is selected, samples must be collected from the areas of highest contamination to verify cleanup levels have been achieved before active in-situ remediation activities cease.

Discrete soil samples should always be collected from the excavation and soil borings for analyses. Composite samples are acceptable only from the soil stockpile when used for waste characterization prior to disposal. Compositing of water samples for analyses is not acceptable.

Report Format

For sites overseen by the Solid Waste Unit, reports using the Division of Oil and Public Safety format are accepted, but using that format is not mandatory. However, if the site owner chooses to use that format, the correct report format must be submitted based on Division of Oil and Public Safety guidelines. The No Further Action report format can be used ONLY if petroleum contamination levels are below the Risk Based Screening Levels (RBSLs). Sites that require soil removal or remediation due to contaminant concentrations above RBSLs may use the Site Characterization Report (SCR) format, or a non-formatted (narrative) report that includes all pertinent information. The report formats for the Division of Oil and Public Safety are located on their web site http://oil.cdle.state.co.us.

If the site owner chooses to submit a non-formatted narrative report, it must include (at a minimum):

1) facility name and address,
2) owner's name and address,
3) a site map(s) drawn to scale showing the layout of the site, areas of contamination, sample locations, and ground water flow direction if known ,
4) type and size of tank (aboveground or underground storage tank) or description of other source,
5) proposed land use of site,
6) vertical and horizontal delineation of contamination in soil and groundwater,
7) waste characterization (gasoline, diesel, etc., and volume in cubic yards),

8) dimensions of the excavation, if applicable,
9) waste manifests with corresponding analytical data,
10) confirmatory analyses to document completion of remediation, and
11) any other information which will allow the Solid Waste Unit to assess the nature and extent of contamination and to determine if target cleanup levels were achieved.

Voluntary Cleanup

Property owners may want to remediate their site in order to facilitate land transfers or for other reasons, whether or not they fall under a specific regulatory program. From the state's perspective, there are clear benefits to encouraging voluntary cleanup of contaminated properties. Several state programs have developed informal mechanisms for reviewing, approving and overseeing voluntary cleanup efforts. In addition, the Voluntary Cleanup and Redevelopment Act (VCRA) was passed by the Colorado General Assembly to address sites not covered by existing regulatory programs and to provide an alternative to some existing regulatory programs. This Act is implemented by the Voluntary Cleanup Program within the Hazardous Materials and Waste Management Division at the Department of Public Health and Environment. Participation in the Voluntary Cleanup Program is specifically excluded for regulated underground storage tank (UST) sites, sites which have or should have a hazardous waste permit for treatment, storage, or disposal of hazardous waste, sites which are subject to orders under the state hazardous waste program, sites listed or proposed for listing on the National Priorities List (NPL/Superfund sites), and sites which are subject to orders under the Clean Water Act.

The purpose of the Voluntary Cleanup Program is to provide for protection of human health and the environment while fostering the transfer, redevelopment, and reuse of properties that have been contaminated with hazardous substances or petroleum products. The program allows property owners to apply site-specific cleanup levels based on planned use of the property and established standards, remediation objectives or a risk assessment. The program also provides a "No Action Determination" if it can be demonstrated that there is an acceptable risk to human health and the environment without conducting active remediation activities. There is a short review time of less than 45 days, making this an ideal program for the sale or other transfer of properties with historical contamination. There is no application form as such, but certain types of information must be provided. This generally includes detailed site history, site characterization, sampling and analytical rationale and results, a remediation plan, and proposed cleanup objectives. The "Voluntary Cleanup Roadmap," available on the Internet at http://www.cdphe.state.co.us/hm/vcradoc.pdf, is a how-to guide for voluntary cleanup projects under this program as well as other regulatory programs within the Department of Public Health and Environment.

CHAPTER 8 - DISPOSAL OF PETROLEUM CONTAMINATED SOIL

Petroleum contaminated soils that are removed from an excavation may be managed by several accepted methods including:

1) disposal at an approved landfill,
2) landfarming,

3) recycling by incorporation into an asphalt batch plant or thermal treatment,
4) onsite treatment and reuse, or
5) offsite reuse.

Site-specific guidance for landfarming, incorporation into an asphalt batch plant, thermal treatment, or other proposed management methods may be received by contacting the Solid Waste Unit at the Hazardous Materials and Waste Management Division, Department of Public Health and Environment.

Excavation and Disposal at a Landfill

Many times, the simplest method of cleaning up a contaminated site is to dig out the petroleum contaminated soil and haul it to a landfill. Many municipal solid waste landfills have petroleum contaminated soil waste plans pre-approved by the Solid Waste Unit and are authorized to accept petroleum contaminated soils that fall within their plan specifications. Each landfill operator will have particular documentation and testing requirements to be completed before acceptance is approved by the facility, so it's always a good idea to check with the landfill operator to determine what analytical tests are required for that facility. Waste characterization usually includes benzene, toluene, ethylbenzene, and xylenes (BTEX), total petroleum hydrocarbons (TPH), ignitability, a paint filter test for free liquids, and the toxicity characteristic leaching procedure (TCLP) test for lead. The landfill may also require a test for reactivity and corrosivity. In the case of a release from a used oil tank, where common practice may have been to discard a number of different organic wastes in with the used oil, additional analyses may be required. Additional tests may include volatile and semi-volatile organic compounds (VOCs and SVOCs), toxicity characteristic heavy metals, and polychlorinated biphenyls (PCBs).

Municipal solid waste landfills without pre-approved petroleum contaminated soils waste plans may be allowed to accept petroleum contaminated soil if prior approval is received from the Solid Waste Unit for that specific disposal operation. Approval by the Solid Waste Unit will be based on satisfactory demonstration by the waste generator that the petroleum contaminated soil meets waste characterization criteria as outlined above. Other factors, such as compatibility of the petroleum contaminated soil with the proposed disposal facility, will also be used to determine whether or not the Solid Waste Unit will allow disposal at a particular landfill. Although petroleum contaminated soil may be deemed acceptable for disposal as a solid waste, some municipal solid waste landfills choose not to accept that type of waste.

Solid waste landfills in Colorado are not permitted to accept hazardous waste for disposal. The waste generator is the one responsible for ensuring that their petroleum contaminated soil is not a hazardous waste. Petroleum contaminated soils that exhibit a characteristic of hazardous waste and are not included in the underground storage tank exemption, and soils that contain listed hazardous wastes, must be managed as hazardous wastes (6 CCR 1007-3). In some cases, it may be possible to treat petroleum contaminated soil that exhibits only a characteristic of hazardous waste to the point that it may be disposed of in a solid waste landfill. Contact the Hazardous Materials and Waste Management Division at the Department of Public Health and Environment for guidance on treatment of hazardous wastes.

Landfarming

Landfarming is the process of remediating petroleum contaminated soil by spreading it out on the site where generated and allowing natural microbes in the soil to degrade the petroleum. Although there are no formal requirements for landfarm design and operations, approval for landfarming petroleum contaminated soils is based on factors such as the adequacy of the site to physically accommodate these operations, having an adequate berm and liner system to ensure contamination containment, having a process to turn the soil and keep it moist in order to enhance biodegradation, having a plan to monitor performance of the operation, and having plans for final disposition of the remediated soil.

Recycling

Petroleum contaminated soil may be "recycled" by sending it to an asphalt plant or to a thermal treatment facility. The waste generator must ensure that the contaminated soil meets the acceptance criteria for the recycling facility. The Solid Waste Unit does not maintain a list of recycling facilities, but some are listed in the telephone directory yellow pages.

Onsite Treatment and/or Reuse

In some instances, petroleum contaminated soil may be treated on site, and if cleanup target levels are accomplished, the soil may remain in place or be reused elsewhere on that same property. There are many factors involved with approval for onsite reuse of petroleum contaminated soil: type and degree of contamination, site geology and hydrology, land use, and so forth. In order for an onsite reuse plan to be approved, it should demonstrate that the contamination will be contained on the property, that there is minimal threat to groundwater, that surface water run-on and run-off controls are present, that public access is restricted as necessary, and that the remaining contamination does not pose an unacceptable threat to human health or the environment.

Offsite Reuse

Disposal at other locations must be evaluated on a case-by-case basis and is based on an evaluation of site-specific and waste-specific risks. Petroleum contaminated soil may be allowed to be reused on a property other than the site of origin if it can be demonstrated that such reuse would not pose an unacceptable threat to human health or the environment. In addition, the owner of the receiving property must give explicit approval, and the local governing body or their environmental agency must also review and approve offsite reuse. Requirements for offsite reuse will be determined on a case-by-case basis by the Solid Waste Unit.

CHAPTER 9 - MANAGING A MIXTURE OF PETROLEUM AND WATER

During the process of remediation of petroleum contamination, it is sometimes necessary to manage petroleum contaminated groundwater and/or surface water. This occurs in situations where the owner has pumped or bailed water from bore holes, monitoring wells, or sumps during sampling events or during remediation activities such as a "pump and treat" system. In addition, petroleum product may be skimmed from groundwater in free product recovery wells at more

heavily contaminated sites. Management of the contaminated water may involve separation and/or treatment of the petroleum and water mixture, resulting in the need to dispose of or otherwise manage the separated components. If the petroleum product can be successfully separated from the water, it may be suitable for continued use as a fuel and would therefore not be subject to regulation as a waste.

Unless contaminant levels are already low enough to meet discharge criteria, petroleum contaminated water must either be treated in a wastewater treatment unit or sent to a water treatment service company that is permitted to accept it. Once treated to meet appropriate standards, petroleum contaminated water may be discharged under a water quality discharge permit. State water quality control regulations determine under what conditions petroleum contaminated water can be discharged to surface waters, storm sewers, sanitary sewers, an impoundment or onto the land. "Individual permits" and "general permits" are issued by the Water Quality Control Division of the Department of Public Health and Environment. The difference between an individual permit and a general permit is that an individual permit is for facilities that require site specific considerations and conditions. Facilities eligible for a general permit have discharges that are consistent and are typical for that type of facility. In addition, the facility's discharge readily lends itself to predetermined limits established in the general permit. A general permit has a 30-day "turn around time" while an individual permit must be issued within 180 days. The Water Quality Control Division prefers to provide general permits for petroleum contaminated sites as much as possible. Discharges to sanitary sewers must also be coordinated with the local publicly-owned wastewater treatment works. Permit forms and instructions can be obtained at http://www.cdphe.state.co.us/wq/PermitsUnit/wqcdpmt.html.

Contaminated Groundwater in Tanks or Containers

Petroleum contaminated water is often containerized in drums or tanks while it awaits treatment and/or disposal. Since contamination resulting from surface spills or releases from aboveground storage tanks is not exempt from regulation as hazardous waste, it may be hazardous waste if the water exhibits the characteristic of toxicity for benzene or other hazardous constituents. Management of petroleum contaminated water exhibiting these characteristics must comply with hazardous waste management and disposal requirements, including among other things, container and tank labeling, inspections and storage time limits. Guidance on the management of investigation derived wastes is available from the Hazardous Materials and Waste Management Division. Petroleum contaminated water resulting from a release from a regulated underground storage tank is exempt from regulation as hazardous waste and is not subject to specific labeling, inspections or storage time limits.

Spreading of Minimally Contaminated Ground Water

In situations where the ground water has been tested and shown to have no contaminants above State groundwater and surface water standards, the site owner may request approval from the Water Quality Control Division to spread the water over portions of the site to evaporate. The rate of spreading the water must be slow enough to allow evaporation and there must be no surface runoff to gutters or other drainages.

CHAPTER 10 - DEFINITIONS

Note: Definitions followed by the words "UST only" are definitions taken from the Underground Storage Tank regulations and apply only in the context of those regulations. Other regulations may contain the same words or phrases that have a different legal definition.

AQCD - Air Quality Control Division of the Colorado Department of Public Health and Environment

AST - aboveground storage tank

"Beneath the surface of the ground" - beneath the ground surface or otherwise covered by earthen materials. (*UST only*)

CCR - Code of Colorado Regulations

CRS - Colorado Revised Statutes

de Minimis - (De Minimis Non Curat Lex) "The law does not care for, or take notice of, very small or trifling matters. The law does not concern itself about trifles." ["Black's Law Dictionary" by Henry Campbell Black, M.A.; Revised Fourth Edition, 1968.] Case law establishes the concentration/quantity which is considered "small" or "trifling."

DOPS - Division of Oil and Public Safety, Colorado Department of Labor and Employment

EPA - US Environmental Protection Agency

Flow-through process tank - a tank that forms an integral part of a production process through which there is a steady, variable, recurring, or intermittent flow of materials during the operation of the process. Flow-through process tanks do not include tanks used for the storage of materials prior to their introduction into the production process or for the storage of finished products or by-products from the production process. (*UST only*)

Gathering lines - any pipeline, equipment, facility, or building used in the transportation of oil or gas during oil or gas production or gathering operations. (*UST only*)

Generator - any person or site whose act or process produces waste.

Hazardous waste number (code) - the number assigned by the EPA to each hazardous waste listed in Part 261, Subpart D, of the Colorado Hazardous Waste Regulations, and of each characteristic identified in Part 261, Subpart C, of the Colorado Hazardous Waste Regulations 6 CCR 1007-3.

Hazardous waste disposal facility - a facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at which hazardous waste will remain after closure.

HSWA - Hazardous and Solid Waste Amendments of 1984. All of the hazardous waste regulations were developed under the statutory authority of the Resource Conservation Recovery Act (RCRA) of 1976, or the Hazardous and Solid Waste Amendments (HSWA) of 1984

Hazardous - poses a significant present or future threat to human health or the environment.

Hazardous characteristic - one of four characteristics (ignitability, reactivity, corrosivity, and toxicity) used to classify a solid waste as a hazardous waste.

Hazardous waste - a solid waste or combination of solid wastes that because of its quantity, concentration, physical or chemical characteristics may pose a threat to human health or the environment. According to state regulations, a solid waste is a hazardous waste if it is not excluded from regulation as a hazardous waste and meets one or more of the following conditions:

a) the waste exhibits a "characteristic" of hazardous waste
b) the waste has been "listed" as being hazardous
c) the waste is a mixture containing a listed hazardous waste and a nonhazardous solid waste

Refer to 6 CCR 1007-3, the State of Colorado Hazardous Waste Regulations, for more information.

Hazardous waste constituent - a chemical compound within hazardous waste that causes the waste to be considered a hazardous waste.

Heating oil - petroleum that is No. 1, No. 2, No. 4--light, No. 4--heavy, No. 5--light, No. 5--heavy, and No. 6 technical grades of fuel oil; other residual fuel oils (including Navy Special Fuel Oil and Bunker C); and other fuels when used as substitutes for one of these fuel oils. Heating oil is typically used in the operation of heating equipment, boilers, or furnaces. *(UST only*)

HMWMD - Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment

Hydraulic lift tank - a tank holding hydraulic fluid for a closed-loop mechanical system that uses compressed air or hydraulic fluid to operate lifts, elevators, and other similar devices. (*UST only*)

LUST - Leaking Underground Storage Tank

Leachate - any liquid, including the suspended components in the liquid, that has percolated through or drained from waste.

Listed hazardous waste - a solid waste is listed as a hazardous waste if it is found on one of the following lists:

a) Non-specific source wastes, "F" wastes (6 CCR 1007-3, Sec. 261.31)
b) Specific sources wastes, "K" wastes (6 CCR 1007-3, Sec. 261.32)

c) Commercial chemical products, "P" and "U" wastes (6 CCR 1007-3, Sec. 261.33(e) and (f))

Listed constituent - chemical compounds listed as hazardous wastes. See "listed hazardous waste."

Municipal solid waste landfill - a sanitary landfill where one of the main waste streams is municipal waste, which is solid waste from household, community, commercial and industrial sources.

OGCC - Oil and Gas Conservation Commission of the Colorado Department of Natural Resources

Operator - the person responsible for overall operation of the facility.

Owner - the person who owns a facility or part of a facility.

PCS - Petroleum Contaminated Soil - any earthen material or artificial fill that has human or natural alteration of its physical, chemical, biological, or radiological integrity resulting from the introduction of crude oil, any fraction or derivative thereof (such as gasoline, diesel, or motor oil), or oil-based product (such as oil-based paint).

PCBs - Polychlorinated Biphenyls - a fire resistant and thermally stable chemical often used as hydraulic and heat transfer fluid. Commonly used in hydraulic systems and electrical capacitors.

Paint Filter Liquids Test - a test, EPA Method 9095A, contained in SW-846, to determine whether or not a waste material contains free liquid.

Pipeline facilities (including gathering lines) - new and existing pipe rights-of-way and any associated equipment, facilities, or buildings. (*UST only*)

RCRA - means the Solid Waste Disposal Act as amended by the Resource Conservation Recovery Act of 1976. All of the hazardous waste regulations were developed under the statutory authority of the Resource Conservation Recovery Act (RCRA) of 1976, or the Hazardous and Solid Waste Amendments (HSWA) of 1984.

RCRA C - Subtitle C of RCRA which deals with the regulation of hazardous wastes.

RCRA C Permit - is a permit for hazardous waste facilities to store, treat, and dispose of hazardous waste.

RCRA D - Subtitle D of RCRA which deals with the regulation of solid wastes.

RCRA I - Subtitle I of RCRA which deals with the regulation of underground storage tanks.

Regulated Substance - The definition in the Storage Tank Statute (Title 8, Article 20, Section 502) reads:

> (a) Any substance defined in section 101 (14) of the federal "Comprehensive Environmental Response, Compensation, and Liability Act of 1980," as amended, but not including any substance regulated as hazardous waste under subtitle (C) of the federal "Resource Conservation and Recovery Act of 1976," as amended; or
> (b) Petroleum, including crude oil, and crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).
>
> This definition applies to discussions of regulated petroleum storage tanks only.

Risk assessment - using the results of published health data to estimate the various risks associated with exposure to different types of environmental contamination.

Solid waste - any material that is discarded; does not have to be a solid - it could be a semi-solid, liquid, or even a contained gaseous material.

SW-846 - the reference number for "Test Methods for the Evaluation of Solid Waste, Physical/Chemical methods," a methods manual for sampling and analyzing waste.

State waters - any surface water or groundwater present within the state of Colorado.

Storm-water or waste water collection system - piping, pumps, conduits, and any other equipment necessary to collect and transport the flow of surface water run-off resulting from precipitation, or domestic, commercial, or industrial waste water to and from retention areas or any areas where treatment is designated to occur. The collection of storm water and waste water does not include treatment except where incidental to conveyance. (*UST only*)

Surface impoundment - a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials) that is not an injection well. (*UST only*)

TCLP - Toxicity Characteristic Leaching Procedure - a method used to determine the leachability of hazardous constituents present within a waste. If significant concentrations of hazardous constituents will leach from the waste, it may be characterized as being a hazardous waste because it exhibits the Toxicity Characteristic. This test replaced the Extraction Procedure Toxicity Test or EP Toxicity.

TC - Toxicity Characteristic - One of the four characteristics used to determine whether a waste is hazardous waste.

Treatment - any method technique or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any waste.

UST - underground storage tank.

CHAPTER 11 - REFERENCES

Statutes

Colorado Hazardous Waste Act [Title 25 Article 15 Parts 1-5 CRS]

Colorado Oil and Gas Conservation Act [Title 34 Article 60 Part 1 CRS]

Colorado Solid Waste Disposal Sites and Facilities Act [Title 30 Article 20 Part 1 CRS]

Colorado Radiation Control Act [Title 25 Article 11 Parts 1-3, Title 24 Article 60 Part 22 CRS]

Colorado Underground Storage Tank Act [Title 8, Article 20.5 Parts 1-3 CRS]

Colorado Water Quality Control Act [Title 25 Article 8 Parts 1-7 CRS]

Voluntary Cleanup and Redevelopment Act [Title 25 Article 16 Part 3 CRS]

Regulations

Basic Standards for Ground Water - Regulation 41 [5 CCR 1002-41]
http://www.cdphe.state.co.us/op/regs/waterregs/100241.pdf

Basic Standards and Methodologies for Surface Water - Regulation 31 [5 CCR 1002-31]
http://www.cdphe.state.co.us/op/regs/waterregs/100231.pdf

Colorado Discharge Permit System - Regulation 61 [5 CCR 1002-61]
http://www.cdphe.state.co.us/op/regs/100261wqccdischargepermitsystem22.pdf

Hazardous Waste regulations [6 CCR 1007-3]
http://www.cdphe.state.co.us/op/regs/solidwastehazmatregs.asp

Oil and Gas Conservation Commission Rules and Regulations
http://oil-gas.state.co.us/rr%20docs/rulescomplete.pdf

Petroleum Storage Tank Regulations [7 CCR 1101-14]
http://oil.cdle.state.co.us/OIL/StatutesRegulations/regsindex.asp

Pretreatment Regulations - Regulation 63 [5 CCR 1002-63]
http://www.cdphe.state.co.us/op/regs/waterregs/100263.pdf

Regulation Controlling Discharges to Storm Sewers - Regulation 65 [5 CCR 1002-65]
http://www.cdphe.state.co.us/op/regs/waterregs/100265.pdf

Regulations Pertaining to Solid Waste Disposal Sites and Facilities [6 CCR 1007-2]
http://www.cdphe.state.co.us/op/regs/solidwastehazmatregs.asp

Rules and Regulations Pertaining to Radiation Control [6 CCR 1007-1]
http://www.cdphe.state.co.us/op/regs/radiationregs.asp

Guidance

Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know Act (EPCRA) and Section 112(r) of the Clean Air Act (List of Lists)
http://www.epa.gov/ceppo/pubs/title3.pdf

Corrective Action Guidance Document - Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment
http://www.cdphe.state.co.us/hm/caguidance.pdf

Guide to Generator Requirements of the Colorado Hazardous Waste Regulations - Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment http://www.cdphe.state.co.us/hm/handbk01.pdf

Guide to Implementing the Division's Wastewater Treatment Unit Policy - Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment
http://www.cdphe.state.co.us/hm/wwtuguide.pdf

Groundwater VOC Sample Preservation Policy - Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment
http://www.cdphe.state.co.us/hm/vocplcy.pdf

Hazardous Waste Identification Guidance Document - Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment
http://www.cdphe.state.co.us/hm/hwid.pdf

Interim Final Policy and Guidance on Management of Investigation Derived Wastes (IDW) at RCRA Facilities - Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment http://www.cdphe.state.co.us/hm/idwplcy.pdf

Interim Final Policy and Guidance on Risk Assessments for Corrective Action at RCRA Facilities - Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment http://www.cdphe.state.co.us/hm/riskplcy.pdf

Petroleum Storage Tank Owner/Operator Guidance Document - Division of Oil and Public Safety, Colorado Department of Labor and Employment
http://oil.cdle.state.co.us/OIL/Technical/Guidance%20Documents/guidancedoc.asp

Proposed Soil Remediation Objectives Policy Document - Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment
http://www.cdphe.state.co.us/hm/soilplcydraft.asp

Region VIII Guidance for Using Bioremediation in Response to Oil Spills, Revised Draft, US EPA, August 25, 1994.

Reporting Chemical Spills and Releases in Colorado: A Guide to the Regulations - Emergency Management Program, Colorado Department of Public Health and Environment http://www.cdphe.state.co.us/emp/spillsandreleases.htm

Voluntary Cleanup Roadmap - Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment http://www.cdphe.state.co.us/hm/vcradoc.pdf

Sampling & Analytical Methods

SW-846, "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods," a methods manual describing how to sample and analyze wastes, US EPA, latest edition. http://www.epa.gov/epaoswer/hazwaste/test/main.htm

CHAPTER 12 - CONTACT INFORMATION

Spill Reporting

Local emergency responders	9-1-1 (in many areas)
Colorado Department of Labor and Employment	
Division of Oil and Public Safety (>25 gal)	303-318-8547 (business hours)
	1-877-518-5608 (after hours)
Colorado Department of Public Health and Environment	
24-hour spill reporting and assistance	1-877-518-5608 (24 hours)
Oil and Gas Conservation Commission (>20 bbls)	303-894-2100 ext. 121
National Response Center	1-800-424-8802 (24 hours)

General Information

Colorado Department of Labor and Employment	
Division of Oil and Public Safety	303-318-8500
Colorado Department of Public Health and Environment	
Air Pollution Control Division	303-692-3100
Hazardous Materials and Waste Management Division	303-692-3300
Water Quality Control Division	303-692-3500
Colorado Department of Natural Resources	
Oil and Gas Conservation Commission	303-894-2100
US EPA Region 8 - Information Center	303-312-6312

Mailing Addresses

Colorado Department of Labor and Employment
Division of Oil and Public Safety
1515 Arapahoe Street
Tower 3, Ste. 600
Denver, CO 80203
Website http://oil.cdle.state.co.us/
E-mail oil.publicsafety@state.co.us

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, CO 80246-1530
Website http://www.cdphe.state.co.us/hm/
E-mail comments.hmwmd@state.co.us

Colorado Department of Public Health and Environment
Water Quality Control Division
4300 Cherry Creek Drive South
Denver, CO 80246-1530
Website http://www.cdphe.state.co.us/wq/wqhom.asp
E-mail comments.wqcd@state.co.us

Colorado Department of Public Health and Environment
222 S. 6th Street, Room 232
Grand Junction, CO 81501

Colorado Oil and Gas Conservation Commission (OGCC)
1120 Lincoln Street, Suite 801
Denver, CO 80203
Website http://oil-gas.state.co.us/
E-mail dnr.ogcc@state.co.us

US EPA Region 8
999 18th Street, Suite 500
Denver, CO 80202-2466
Website http://www.epa.gov/region08/
E-mail http://www.epa.gov/region08/feedback.html