

UST Cleanup Manual

Cleanup Rules for Leaking Petroleum UST Systems
OAR 340-122-0205 through 340-122-0360

and Associated Guidance Documents



State of Oregon
Department of
Environmental
Quality

**Land Quality Division
Underground Tanks
Program**

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INTRODUCTION

This manual contains guidance on using the Department of Environmental Quality (DEQ, or Department) underground storage tank (UST) cleanup rules. These rules, which include Oregon Administrative Rule (OAR) 340-122-0205 through 340-122-0360, describe the actions you (the responsible party) must take if petroleum products leak from your regulated UST, and define the procedures and standards for cleaning up the released product.

This document contains:

- General Information on the UST program including information on reporting releases of petroleum products from USTs, contacting DEQ UST regional staff, permit requirements, cost recovery, *etc.*;
- UST Cleanup Rules with revisions adopted in November, 1998, along with a flowchart, outline and an explanation of each of the rules;
- UST Cleanup Guidance on topics such as writing reports, analytical requirements, use of institutional controls, options for handling soil piles, *etc.*; and
- Forms Used for UST Cleanup Projects including copies of the release report form, decommissioning/change-in-service forms, soil matrix checklist and scoresheet; and
- References and Additional Guidance containing a list of documents from DEQ, EPA, and other sources, including the internet address where each can be obtained, that you may find useful for UST cleanup projects.

Note on Heating Oil Tanks: This UST Cleanup Manual does not apply to underground heating oil tank cleanups except as specified in OAR Chapter 340, Division 177. The Division 177 rules were updated in February 2000 to include provisions for voluntary decommissioning of underground heating oil tanks. In 1999, the Oregon Legislature changed the heating oil tank program significantly by having contractors, rather than DEQ, certify cleanups and decommissionings. If you have questions about heating oil tanks, please leave a message on the UST Program Helpline, 1-800-742-7878 (toll free in Oregon). You may also wish to refer to the heating oil tank rules and guidance documents that can be found on the UST Program web site (see address below).

This manual will be updated as new guidance becomes available. We invite you to visit our web site frequently to look for updates and other guidance documents and forms relevant to the UST Cleanup and Compliance Program. Our web site address is:

<http://www.deq.state.or.us/lq/tanks/ust/index.htm>

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An earlier draft was released for public comment, and many others contributed ideas and helped to review this document.

Suggestions for Improvement: Comments and suggestions for improvement of this guidance document are welcome. Please send your comments to:

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CONTENTS

INTRODUCTION	i
Acknowledgments	ii
SECTION 1: GENERAL INFORMATION	1
Section 1.1: How to Report an Underground Storage Tank Petroleum Release	1
Section 1.2: UST Program Offices	3
Section 1.3: Transition Policy for Ongoing UST Cleanup Projects	5
Section 1.4: Permit Requirements for UST Cleanup Sites	6
Section 1.5: Policy for Reuse of Petroleum Contaminated Soil	9
Section 1.6: UST Supervisor and Service Provider Requirements	10
Section 1.7: Cost Recovery for Departmental Oversight Work	11
SECTION 2: UST CLEANUP RULES	13
Section 2.1: Overview of UST Cleanup Rules	13
Section 2.2: Rules Flowchart	14
Section 2.3: Outline of Rule Sections	15
Section 2.4: Cleanup Rules for Leaking Petroleum UST Systems	16
Section 2.5: Summary of Each Rule	42
SECTION 3: UST CLEANUP GUIDANCE	56
Section 3.1: Writing Cleanup Reports and Corrective Action Plans	56
Section 3.2: Example Reports and Outlines	69
Section 3.3: Analytical Requirements	76
Section 3.4: Site Controls	86
Section 3.5: How to Handle Sites With Multiple Cleanup Options	87
Section 3.6: Handling and Treating Petroleum-Contaminated Soil	88
Section 3.7: Sample Calculations for Air Emissions	91
Section 3.8: Answers to Common UST Cleanup Questions	93
SECTION 4: FORMS USED FOR UST CLEANUP PROJECTS	96
Section 4.1: Petroleum Release Form	97
Section 4.2: Cost Recovery Agreement	100
Section 4.3: UST Decommissioning Checklist and Site Assessment Report Report	102
Section 4.4: Soil Matrix Checklist and Score Sheet	110
SECTION 5: REFERENCES AND ADDITIONAL GUIDANCE	112
Section 5.1: References	112
Section 5.2: Additional Guidance Documents	113

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SECTION 1: GENERAL INFORMATION

SECTION 1.1: HOW TO REPORT AN UNDERGROUND STORAGE TANK PETROLEUM RELEASE

OAR 340-122-0220 requires the responsible person to report confirmed and suspected releases from UST systems to the Department within 24 hours. In addition, OAR 340-160-0020(9) requires licensed UST service providers to report a release to the Department within 72 hours if the responsible person does not.

1.1.1: What is a release?

There are two types of petroleum releases, “suspected” and “confirmed.”

A **“Confirmed Release”** (OAR 340-122-0210(8)) means that petroleum contamination has been observed in soil or groundwater as a sheen, stain, or petroleum odor, or petroleum contamination has been detected in soil by the analytical method NWTPH-HCID, or detected in groundwater by any appropriate analytical method specified in OAR 340-122-0218. In other words, you have actually seen, smelled, or measured the contamination using some acceptable method. These observations are usually made in and around the tank pit so that there is no doubt that the release came from your tank system.

A **“Suspected Release”** (OAR 340-122-0210(31)) generally means finding evidence at your site or in the surrounding area (*e.g.*, the presence of free product or vapors in soils, basements, sewer and utility lines, and nearby surface water) that indicates that your tank very likely has a leak. Other such evidence could include unusual tank system operating conditions (*e.g.*, the erratic behavior of product dispensing equipment, the sudden loss of product from the UST system, or an unexplained presence of water in the tank); and monitoring results from a release detection method that indicates a release may have occurred.

1.1.2: How to Report a Release

When a release is suspected or confirmed, you must report it within 24 hours¹ of discovery. Telephone the appropriate DEQ regional office (see Section 1.2: UST Program Offices) to contact a UST Cleanup project manager or leave a voice mail message during regular business hours. To report an emergency situation or to report a release when DEQ offices are closed, call the Oregon Emergency Response System (OERS) at 1-800-452-0311 (in state). Be prepared to provide the following types of information to DEQ or OERS:

- Facility name, address, and, if the tank has an UST permit, the UST facility identification number
- Name, address, and phone number of the responsible person, a contact person, and the person who is reporting the release
- Date the release was discovered
- How release was discovered or confirmed
- What caused the release (leak, overfill, spill)
- Date the release was stopped
- What type of product was released
- The amount of product released
- What emergency response measures were taken, if any
- What is the environmental impact (soil contamination, groundwater contamination, surface water contamination, vapors in buildings)
- Is there any off-site migration
- Date cleanup was initiated
- What is the current status of cleanup activities, and
- If any contaminated materials have been removed from the site, where they have been disposed.

You may also report a release by completing a *DEQ Petroleum Release Form* and faxing the information to the appropriate regional office. A copy of the form, which you can photocopy, fill out, and fax to the appropriate DEQ regional office, can be found in Section 4.1: Petroleum Release Form². Be sure to complete all sections that apply to the release.

¹ For heating oil tanks you are required to report releases within 72 hours. See OAR 340-177-0055.

² Check for updated versions of this release form on the UST website: <http://www.deq.state.or.us/lq/tanks/ust/index.htm>

NOTE: The most current versions of UST and UST cleanup forms, including interactive forms that can be filled out right on the screen and then printed, can be found on DEQ's Website at: <http://www.deq.state.or.us/pubs/forms.htm>. DEQ recommends you either use the interactive forms or download the most current versions to use.

1.1.3: Obtaining a Project Log Number (also known as a Petroleum Release Number)

Whether you fax a release report to DEQ or report the release by leaving a voice mail message, the release has not been officially reported until DEQ assigns a Log Number to the project. Generally this number will be faxed back or your phone call will be returned the same day. However, if you do not receive this confirmation, please check back with the regional office to confirm that the fax transmission went through or the voice-mail message was received. DEQ may require additional information depending on how severe the release is.

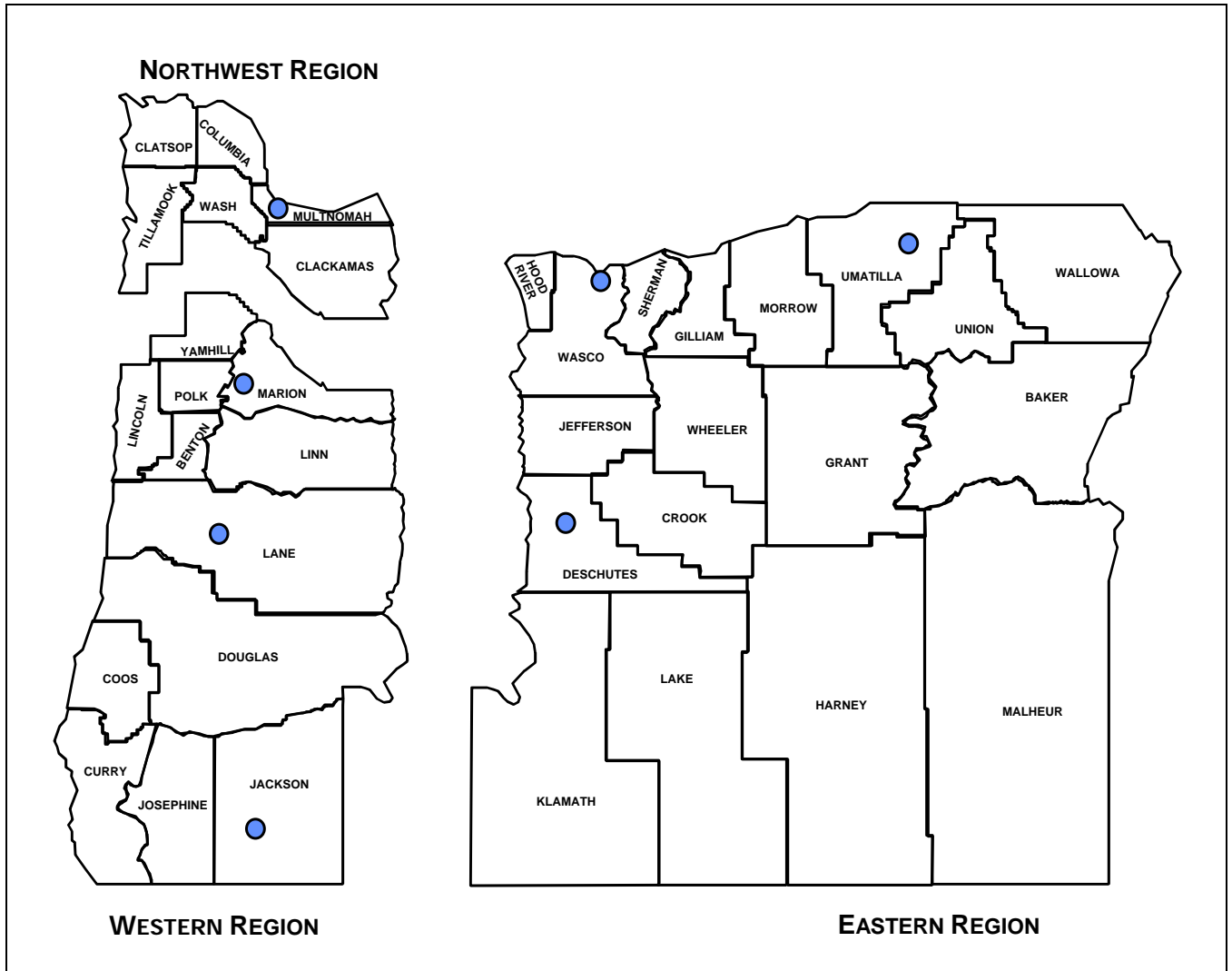
Note: Since the Cleanup Manual was published in December 2000, DEQ has developed an on-line release reporting protocol for UST and HOT Service Providers. To learn more about the on-line release reporting protocol go to: <http://www.deq.state.or.us/lq/tanks/report.htm>

1.1.4: What Happens After a Release is Reported?

After a release is reported, DEQ begins certain administrative actions, such as entering information into our statewide database. We then send you a letter with information about applicable regulations, report requirements and due dates, and cost recovery. This letter will also inform you that you have an opportunity to request expedited review by DEQ. For more information, refer to Section 1.7: Cost Recovery for Departmental Oversight Work.

SECTION 1.2: UST PROGRAM OFFICES

The following map shows the three DEQ regions. The locations of regional offices that include UST program staff are marked with circles. A table containing the address, phone number, and fax number for each of these offices can be found on the next page. A list of the counties covered by each regional office is also provided for your reference.



REGION		
Regional Office	Address/Phone/Fax	Counties Covered
NORTHWEST REGION		
Portland	2020 SW Fourth, Suite 400 Portland, OR 97201 Phone: (503) 229-5263* Fax: (503) 229-6945	Clackamas, Clatsop, Columbia, Multnomah, Tillamook, Washington
EASTERN REGION		
The Dalles	400 E. Scenic Drive, Bldg. 2 Suite 307 The Dalles, OR 97058 Phone: (541) 298-7255 ext. 0** Fax: (541) 298-7330	Baker, Crook, Deschutes, Harney, Hood River, Gilliam, Grant, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wasco, Wallowa, Wheeler
WESTERN REGION		
Salem	750 Front Street, NE, Suite 120 Salem, OR 97301 Phone: (503) 378-8240 ext. 0** Fax: (503) 373-7944	Benton, Lincoln, Linn, Marion, Polk, Yamhill
Eugene	165 East 7 th Avenue Suite 100 Eugene, OR 97401 Phone: (541) 686-7838 ext. 0** Fax: (541) 686-7551	Lane
Coos Bay	381 N. Second Street Coos Bay, OR 9797420 Phone: (541) 269-2721 ext. 31 Fax: (541) 269-7984	Coos, Curry, Douglas, Jackson, Josephine

** This phone number will connect you with a receptionist. Ask to speak with the UST Duty Officer.*

NOTE: The information in this table was updated in May 2009.

SECTION 1.3: TRANSITION POLICY FOR ONGOING UST CLEANUP PROJECTS

The following is a copy of the Underground Storage Tank Program Policy Statement signed by Michael H. Kortenhof, UST Program Manager, on March 3, 1999.

Transition into the 11/2/98 Amendments to the UST Cleanup Rules OAR 340-122-0205 through 340-122-0360

I. Background

On October 30, 1998, the Environmental Quality Commission approved revisions to the Underground Storage Tank Cleanup Rules (OAR 340-122-0205 through 340-122-0360). The revisions became effective on November 2, 1998. Since there are many sites in various stages of cleanup under the previous version of the rules (10/1/92), the UST program has developed the following policy to ensure a fair and consistent approach for handling UST cleanup sites during the transition to the revised rules.

II. Policy Statements

1. Sites reported to the Department on or after 11/2/98 must meet all applicable requirements of the revised UST Cleanup Rules.
2. Sites reported to the Department prior to 11/2/98 must take one of the following actions based on where they were in the cleanup process at the time the rule revisions went into effect:
 - a. Sites which were operating under a Department-approved cleanup plan prior to 11/2/98 may continue under the approved plan including eventual closure based on cleanup levels and requirements in effect at the time the plan was approved.
 - b. Sites which have not completed an investigation, or submitted a cleanup proposal to the Department prior to 11/2/98 must carry out all future actions under the revised cleanup rules.
 - c. Sites which submitted proposals for cleanup to the Department prior to 11/2/98, but which were not yet approved at that time, will be considered for completion under the old rules. The decision to complete site work under the old rules will be based on the completeness of the reported investigation, and the apparent adequacy of the proposed remedy.
 - d. Sites which would be allowed to complete work and seek closure under the old rules may opt to seek closure under the revised rules. Such closures may not be based on a combination of old and revised rules unless pre-approved by the Department.
3. Notwithstanding Policy Statement 2, the Department may apply the requirements of the revised rules to sites reported prior to 11/2/98 if necessary to adequately protect public health, safety, and welfare and the environment.

SECTION 1.4: PERMIT REQUIREMENTS FOR UST CLEANUP SITES

Depending on the site-specific conditions of your UST cleanup project, you may need to obtain up to three additional permits to carry out the cleanup work at your site:

- Air Quality Discharge Permit;
- Water Quality Permit; and/or
- Solid Waste Letter Authorization Permit.

1.4.1: Air Quality Discharge Permit

You must give prior notice to the DEQ if your proposed method of cleanup will produce emissions to air (such as air strippers or vapor extraction systems). An air quality permit may be required if you expect to discharge more than 10 tons (20,000 pounds) of volatile organic compounds (VOCs) in any given calendar-year (January 1 – December 31). Emissions of 10 tons/year or more of any individual hazardous air pollutant (HAP)³, or 25 tons/year or more total HAPs also require an air quality permit. Remediation systems with emission rates that are below these thresholds but cause nuisance conditions may also be required to get a permit.

Note: In Lane County, Air Quality Permits are issued by the Lane Regional Air Pollution Authority (LRAPA). For more information, please contact LRAPA at 541-726-2514.

Most UST remediation systems do not approach the 10-ton limit. However, many of these systems do have the potential of causing nuisance conditions or impacting the health and safety of individuals working or residing in the vicinity of the site. To address this concern the DEQ asks that you evaluate the human health risks resulting from exposure to hazardous air pollutants discharged from your remediation system. If the calculated health risks are significant, you will be asked to treat or otherwise control the impacts of the discharge. A sample calculation is provided for your reference in Section 3.7: Sample Calculations for Air Emissions. For more information, please contact the UST project manager assigned to your site.

1.4.2: Water Quality Permit

Some cleanup projects may require a DEQ water quality permit to discharge water from an excavation or to discharge treated water from a groundwater treatment system.

Water Quality 1500-A and 1500-B permits relate to the discharge of petroleum-contaminated water that has been treated to limits specified in those permits. How and where the contaminated water is discharged — to surface waters or applied to the land — will determine which permit is required.

The 1500-A Permit is a General-National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit, which is a federal permit issued by the Department of Environmental Quality. This permit is required any time contaminated groundwater or surface water needs to be discharged and has the potential of reaching any surface water (e.g., streams, storm sewers, ditches, intermittent streams). The conditions of the permit cannot be modified. A minimum of 10:1 dilution (streamflow versus discharge flow) must be maintained in the stream receiving your site's petroleum-contaminated water.

³ Hazardous air pollutants (HAPs), also known as air toxics, are those air pollutants known or suspected to cause serious health effects including cancer.

Note: Even if you get a NPDES permit from the Department, you still have to obtain permission from the local jurisdiction before you can discharge into a storm sewer. You should document this approval in your report by including the name of the authorizing agency, the contact person's name and phone number, and the date of approval. If approval was given in a letter, please include a copy of the letter.

The 1500-B Permit is a General-Water Pollution Control Facilities Permit, which is a state permit also issued by DEQ. The 1500-B permit governs treated contaminated water that is applied on land. Although the permit does have higher discharge limits than the 1500-A, it prohibits other conditions, such as surface run-off and overloading the land with nutrients and organics.

A 1500-B Permit must also be obtained when conducting bioremediation activities at a petroleum hydrocarbon cleanup site. Bioremediation activities covered by the permit include *in situ* treatment of contaminated soil and groundwater. One of the primary conditions of the permit is that these activities shall not cause adverse impacts to groundwater beyond the project area. An application for this type of permit must include a Bioremediation Management Plan as described in Schedule C of the general permit. All underground injection wells used in the bioremediation project must be registered with the Department.

Note: A water quality permit from DEQ is not required for contaminated water that is otherwise managed through a public treatment system or other treatment facility authorized by DEQ. However, you must have prior permission from that municipal authority.

You should document this approval in your report by including the name of the authorizing facility, the contact person's name and phone number, and the date of approval. If approval was given in a letter, please include a copy of the letter.

You do not need a permit to discharge clean (*i.e.*, non-treated and non-contaminated) water meeting the turbidity standards.

In any discharge situation, whether a permit is required or not, the violation of any local, state or federal rules and regulations is prohibited. If a permit is required, you must complete an application and pay applicable fees. If you have any questions or need copies of the permit application, please contact your regional DEQ office and ask for the Water Quality Permit Coordinator. Information about Water Quality permits can also be found on the DEQ website at: <http://www.deq.state.or.us/wq/wqpermit/permits.htm>

1.4.3: Solid Waste Letter Authorization Permit

You may need a Solid Waste Letter Authorization permit (SWLA) if your proposal to handle petroleum-contaminated soils (PCS) includes “treatment” or if removed soils will remain on your site for more than 30 days.

If you remove PCS during an investigation or cleanup of petroleum contamination from an underground storage tank, you must either:

- Dispose of this material at an approved solid waste treatment or disposal facility; or
- Propose to treat and re-use the soil under an SWLA. “Treatment” includes on-site or off-site soil aeration, bioremediation, or thermal treatment with a mobile unit.

You have 30 days to make this decision: you must get a SWLA if removed soils will remain on your site for more than 30 days.

Note: You cannot use a SWLA to treat or dispose of soils contaminated with non-petroleum compounds or which are otherwise classified as “hazardous waste.”

If you take the PCS to an approved treatment or disposal facility, you don't need a permit from DEQ. However, if you intend to treat and re-use the PCS either on- or off-site, you must apply for a SWLA before beginning treatment. The SWLA is a six-month letter permit with a potential one-time six-month extension. To get an extension of a SWLA, you will need to demonstrate to DEQ that your treatment method is effective and that you will reach the remediation goal within the second six-month period.

To obtain a SWLA, you must also get approval from your local land-use authority (a city or county planning department) to use the property for this purpose. While you can typically get land-use approval for on-site treatment with a simple phone call, off-site treatment will require a Land Use Compatibility Statement (LUCS) signed by your local authority. In residential or other restricted use areas, your local land-use contact may require a formal review – even for on-site treatment – by asking that you submit a request for a LUCS before land use is approved or denied.

Your SWLA application must include:

- A Soil Treatment Plan stating how you will effectively treat the PCS, and demonstrate treatment progress and compliance with cleanup requirements. It must include how you intend to manage the PCS so that you do not create public safety concerns, environmental hazards, or nuisance conditions (such as water run-on/run-off, odors or dust).
- Signed Property Owner Statements from owners of the properties where treatment will occur, and where the treated soil will be reused. The statements document that the owners understand the restrictions that apply to these activities.
- A \$500 fee to DEQ or a signed cost recovery agreement. (For additional information on fees, please see Section 1.7: Cost Recovery for Departmental Oversight Work.)
- A LUCS if off-site treatment is proposed (see above).

The SWLA has specific permit conditions that must be met throughout the treatment period, including quarterly sampling and reporting. It does not exempt you from complying with any state, federal, or local rules or regulations. DEQ may rescind authorization for treatment at any time if the soil is not being managed properly. If you have any questions or need a SWLA application, contact your regional DEQ office and ask for an UST Cleanup project manager.

SECTION 1.5: POLICY FOR REUSE OF PETROLEUM CONTAMINATED SOIL

This is a copy of Environmental Cleanup Division Policy No. 550, which was approved for use in the UST Cleanup Program on September 9, 1992.

A. BACKGROUND

Many leaking underground storage tank sites produce significant volumes of petroleum contaminated soils (PCS). Frequently the owners and operators of these sites wish to treat and reuse the PCS rather than dispose of the soils in landfills. In order to protect human health, welfare, and the environment, it is necessary for DEQ to establish a formal policy recommending standards for treatment and reuse of PCS. The purpose of the policy is to define the recommended treatment standards which should be met in order to reuse PCS.

B. APPLICABILITY

This policy applies to treatment and reuse of soils contaminated by releases of petroleum products only.

C. POLICY STATEMENT

1. Soils which will be used as backfill in the excavation from which they were removed are required to be treated to the matrix cleanup standard applicable to the site of origin in accordance with OAR 340-122-0335.⁴
2. Soils which will be used off-site should meet the appropriate Level 1 matrix cleanup standard for the substance released; if the soils are used off-site, the property owner receiving the treated soil should acknowledge in writing that the soils have been placed in accordance with this policy; this acknowledgment should also indicate that the owner of the property accepting the contaminated soil understands the nature and origin of the soils.
3. In all cases, reuse of the treated PCS should be such that soils are placed above the seasonal high groundwater level and are isolated from human contact or possible exposure. Treated PCS should not be placed in wetlands or within the 100-year floodplain.
4. In all cases, disposition of soils (including reuse on-site or off-site) must be reported to DEQ in accordance with OAR 340-122-0360.
5. In accordance with OAR 340-122-0250 (corrective action plan requirements), DEQ will consider alternate cleanup standards for reuse of PCS on a case by case basis; under no circumstances will DEQ approve of cleanup standards which do not adequately protect human health, safety, welfare, and the environment.

Although these treatment standards and reuse control measures are considered adequate to protect human health, safety, welfare and the environment, the Department strongly supports and encourages efforts to attain the lowest practicable treatment levels and thereby reduce the impact to the environment.

DISCLAIMER

This policy statement is intended solely as guidance for employees of the Department of Environmental Quality. It does not constitute rulemaking by the Environmental Quality Commission and may not be relied upon to create a right or benefit, substantive or procedural, enforceable at law or in equity, by any person. DEQ may take action at variance with this policy statement.

⁴ For specific rule requirements, please refer to Section 2.4: Cleanup Rules for Leaking Petroleum UST Systems.

SECTION 1.6: UST SUPERVISOR AND SERVICE PROVIDER REQUIREMENTS

The following is a list of the types of licenses required effective March 15, 2000 for companies and individuals working on underground storage tanks in Oregon. The rules listed for each license (for example, “OAR Chapter 340, Division 163”) pertain to the rules that describe the service provider and supervisor requirements, not the cleanup regulations discussed in this document. To obtain copies of the rules mentioned below, please refer to Section 5.2: Additional Guidance Documents.

SERVICE PROVIDERS

TYPE OF LICENSE	ACTIVITIES COVERED, APPLICABLE RULES AND FEES
Heating Oil Tank Service Provider License	Heating oil tank services - site assessment, cleanup, decommissioning OAR Chapter 340, Division 163 \$750 fee, 12 months
UST Service Provider License	Regulated tank services - decommissioning, installation/ retrofit, tightness testing, cathodic protection (company designates which activities they perform) OAR Chapter 340, Division 160 \$300 fee, 12 months
UST Soil Matrix Cleanup Service Provider License	Regulated petroleum tank cleanups - <i>This license no longer covers heating oil cleanups as of March 15, 2000</i> OAR Chapter 340, Division 162 \$300 fee, 12 months

Each license is separate and covers different services. There are certain regulations that apply only to the specific license category. Depending on the type of services a company provides, it may need one, two, or three separate service provider licenses. Companies are responsible for obtaining each license required for the work to be performed.

SUPERVISORS

UST Supervisors must have different types of licenses depending on the type of on-site work they are responsible for. A specific exam administered by International Code Council (go to <http://www.iccsafe.org/certification/ust-ast>) must be taken and passed for each license category. The UST Program issues these licenses.⁵

TYPE OF LICENSE	APPLICABLE RULES AND FEES
Regulated Tank - Installation and Retrofit	OAR Chapter 340, Division 160, \$150 fee, 24 mo.
Regulated Tank - Decommissioning	OAR Chapter 340, Division 160, \$150 fee, 24 mo.
Regulated Tank - Tightness Testing	OAR Chapter 340, Division 160, \$150 fee, 24 mo.
Regulated Tank - Cathodic Protection	OAR Chapter 340, Division 160, \$150 fee, 24 mo.
Regulated Tank - Soil Matrix Cleanup	OAR Chapter 340, Division 162, \$150 fee, 24 mo.
Heating Oil Tank Services	OAR Chapter 340, Division 163, \$150 fee, 24 mo.

⁵ For more information on UST Program licensing, contact the program office at 503-229-6652, or leave a message on the UST Helpline at 1-800-742-7878 (toll-free in Oregon) and request a copy of the latest ICC UST/AST Examination Information.

SECTION 1.7: COST RECOVERY FOR DEPARTMENTAL OVERSIGHT WORK

1.7.1: Who pays and why?

Owners and operators of facilities or property contaminated by hazardous substances are responsible, under Oregon law, for cleaning up their sites. The UST Cleanup Program is responsible for ensuring that the cleanup is done in a way that protects human health and the environment. Oregon law requires the DEQ to recover from the responsible parties, the costs of carrying out this responsibility. DEQ invoices the responsible party for oversight of the project when more than \$25 in costs have been incurred. Payment is due within 30 days.

1.7.2: What DEQ costs are charged to responsible parties?

Oregon laws authorize DEQ to charge all reasonable costs *attributable to or associated with* cleanup at a particular site. DEQ accounts for these costs as *direct* and *indirect* costs.

Direct costs include DEQ staff salaries and wages, employee benefits such as health care, and employer payroll taxes. Direct costs attributable to a site may include but are not limited to time, equipment, and materials used by staff:

- Consulting with the owner and/or consultant
- visiting the site
- reviewing proposed cleanup actions
- reviewing data and reports describing the type and extent of contamination
- processing photos and covering other expenditures made specifically for the site
- updating databases
- making and receiving phone calls pertaining to the site
- and enforcing against violations.

Indirect costs support the operation of the program, but are not directly related to specific projects. Typical indirect costs include:

- Office space, office equipment and supplies
- supplies and equipment used in site investigations and other field activities
- non-site-specific activities of project staff, such as training and administration
- clerical, computer network, time accounting, invoicing, and grants management
- development of technical guidance and policies
- a share of DEQ centralized services, such as accounting, budgeting, human resources, and information systems.

1.7.3: How are individual site costs figured?

DEQ does not use standard hourly billing rates. Instead, DEQ calculates costs incurred directly for site work and then adds a factor to cover indirect costs. DEQ accounting systems record the time each employee works on a project. Staff time is charged to the project using an hourly rate calculated for each employee (salary and benefits). Indirect costs are calculated as a percent of directly charged personnel costs. Other costs incurred for specific cleanup projects, such as use of state cars, are also recorded and invoiced as direct costs.

1.7.4: How are the indirect rates established?

The Land Quality Division's indirect rate is recalculated each year based on the actual ratio of indirect to direct costs from the previous year. DEQ prepares an annual report, which describes the methodology and shows expenditures used in the calculation.

The DEQ agency indirect rate is negotiated annually with the federal Environmental Protection Agency (EPA), so that indirect charges can be charged against federal grants and cooperative agreements. EPA requires that this indirect rate be charged to all DEQ activities.

1.7.5: Project Prioritization

Federal funding allows DEQ to provide a minimum program to carry out the federal requirements and Oregon's legislative mandates to protect human health, safety and the environment. While cost recovery supplements the federal funding, it does not provide enough funding to keep pace with the demands on DEQ staff. The information below describes how DEQ is handling this workload.

The Department's High Priority Sites

If your site is a high environmental priority, you can expect to hear from us

DEQ uses a risk prioritization system to focus its limited resources on those sites with the greatest risk to human health, safety and welfare, and the environment. The prioritization system gives high scores to sites contaminating groundwater or surface water, or where there are off-site impacts. These high priority projects are assigned to an UST Cleanup project manager for technical assistance, review and general oversight during the cleanup process. As each cleanup of a high priority site is completed, the next highest priority site is assigned.

Responsible Party's High Priority Sites

If your site is a high priority for you, let us know through the agreement process

An "agreement letter" option has been set up for people whose sites are lower on DEQ's priority list. This option is for those people whose own priorities are driving their cleanup and need DEQ sign-off on their site (*e.g.*, to sell their property, obtain financing or insurance, *etc.*). You should receive an agreement letter in the packet of information sent to you when you first report the release. If you sign and return this agreement, the DEQ knows that you are willing to cooperate and pay oversight costs. Under these circumstances we can schedule the review of your site on a first-come, first-served basis.

Important Note

You are required by rule to proceed immediately with your site investigation and cleanup regardless of the priority of your site or when DEQ assigns a project manager to oversee your project. You must also comply with all environmental regulations, including all reporting requirements. Waiting for your site to work its way up DEQ's priority list carries some risks. By taking no action you will be in violation of the rules and potentially subject to enforcement. Also, contamination at your site may continue to move making future cleanup more difficult and more expensive. For these reasons you are encouraged to take action immediately as outlined in this guidance document.

Eventually, your site will move up our priority list and we will get to it. We expect that if a competent service provider or consultant carefully follows the rules and the guidance, there should be no surprises when your site comes up for DEQ review.

SECTION 2: UST CLEANUP RULES

SECTION 2.1: OVERVIEW OF UST CLEANUP RULES

The Department of Environmental Quality's *Cleanup Rules for Leaking Petroleum Underground Storage Tank (UST) Systems* (OAR 340-122-0205 through 340-122-0360) provide several options for cleaning up petroleum-contaminated soil and groundwater. After carrying out all appropriate reporting, abatement, and investigation requirements in OAR 340-122-0205 through 340-122-0240, you can complete an UST cleanup by demonstrating that your facility⁶ meets one or more of the following:

- Low-impact site (LIS) requirements (OAR 340-122-0243);
- Risk-based concentrations (OAR 340-122-0244);
- Generic remedy requirements developed by the Department (OAR 340-122-0252); or
- Soil Matrix cleanup levels (OAR 340-122-0320 through OAR 340-122-0360).

The option you select will depend on site-specific factors including the magnitude and extent of contamination, age of the release, contaminants found at the site, and land and water use.

This section of the UST Cleanup Manual summarizes the requirements of the UST Cleanup Rules. A flowchart is included to show how the different rules relate to each other. The purpose of this section is to explain how the rules are intended to be applied. Although the summary and flowchart are provided for your guidance, you should always refer to the rules themselves for the specific requirements.

Information about other guidance documents that may be helpful for UST cleanup projects can be found in Section 5.2: Additional Guidance Documents at the back of this manual.

REMINDER

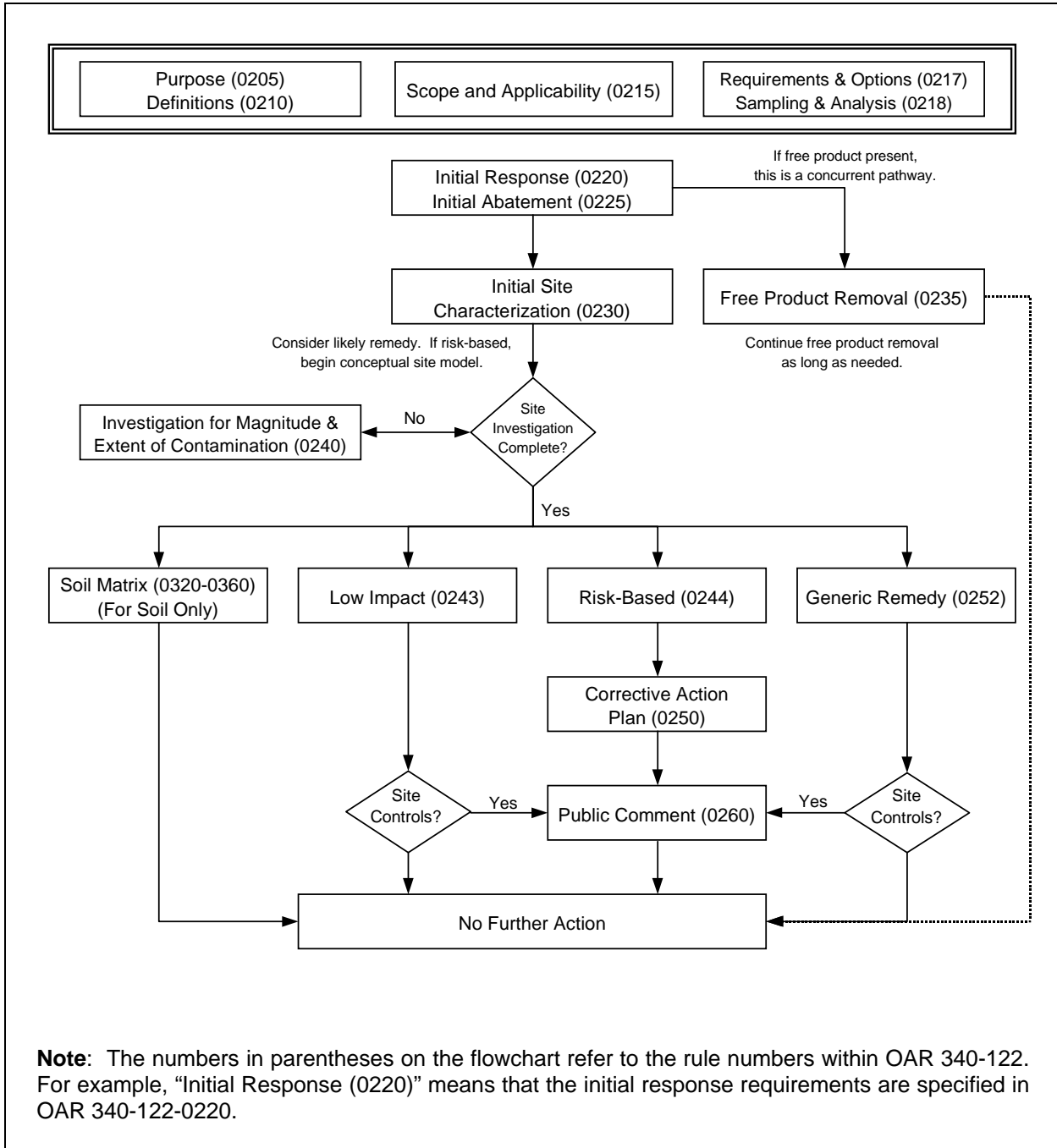
This guidance document is limited to a discussion of Oregon Department of Environmental Quality UST Program cleanup rules. For you to properly comply with these rules, however, you will often need to understand and comply with other rules and regulations including but not limited to the following:

- Monitoring well installation and well decommissioning requirements (Department of Water Resources);
- Service Provider licensing by DEQ and construction contractor registration requirements (Construction and Contractors Board);
- Professional geologist or engineer registration requirements (separate Boards for Registered Geologists and Professional Engineers);
- Other DEQ rules such as Hazardous Waste, Solid Waste, Water Quality, and Air Quality, depending on site-specific situations; and
- Local land use and fire prevention rules and ordinances.

It is your responsibility to ensure that you comply with all applicable rules and regulations when carrying out UST cleanup activities, and that you only employ people who are qualified to perform these tasks.

⁶ "Facility" or "Site" means any building, structure, installation, equipment, pipe or pipeline including any pipe into a sewer or publicly owned treatment works, well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, above ground tank, underground storage tank, motor vehicle, rolling stock, aircraft, or any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located and where a release has occurred or where there is a threat of a release, but does not include any consumer product in consumer use or any vessel.

SECTION 2.2: RULES FLOWCHART



SECTION 2.3: OUTLINE OF RULE SECTIONS

Cleanup Rules For Leaking Petroleum UST Systems

OAR 340-122-0205 through 340-122-0360

Effective Date: November 2, 1998

340-122-0205	Purpose
340-122-0210	Definitions
340-122-0215	Scope and Applicability
340-122-0217	Requirements and Remediation Options
340-122-0218	Sampling and Analysis
340-122-0220	Initial Response
340-122-0225	Initial Abatement Measures and Site Check
340-122-0230	Initial Site Characterization
340-122-0235	Free Product Removal
340-122-0240	Investigation for Magnitude and Extent of Contamination
340-122-0243	Low-Impact Sites
340-122-0244	Risk-Based Concentrations
340-122-0250	Corrective Action Plan
340-122-0252	Generic Remedies
340-122-0260	Public Participation
340-122-0320	Soil Matrix Cleanup Options
340-122-0325	Evaluation of Matrix Cleanup Level
340-122-0330	Evaluation Parameters
340-122-0335	Numeric Soil Cleanup Standards
340-122-0340	Sample Number and Location
340-122-0345	Sample Collection Methods
340-122-0355	Evaluation of Analytical Results
340-122-0360	Reporting Requirements

SECTION 2.4: CLEANUP RULES FOR LEAKING PETROLEUM UST SYSTEMS

Note: Official copies of the Oregon Administrative Rules are contained in the Administrative Orders filed at the Archives Division, 800 Summer St. NE, Salem, Oregon 97310. The copy provided below is for your convenience only. Any discrepancies with the published version are satisfied in favor of the Administrative Order. The Oregon Administrative Rules are copyrighted by the Oregon Secretary of State.

340-122-0205 Purpose

These rules establish the standards and process for the investigation, monitoring, and remedial activities necessary to protect public health, safety, and welfare and the environment in the event of a release or threat of a release from a petroleum UST system subject to ORS 466.705 through 466.835, 466.994, 465.200 through 465.455, and 465.900.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 15-1991, f. & cert. ef. 8-14-91; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0210 Definitions

Terms not defined in this rule have the meanings set forth in ORS 465.200 and 466.706. Additional terms are defined as follows unless the context requires otherwise:

- (1) "Above-Ground Release" means any release to the land surface or to surface water. This includes but is not limited to releases from the above-ground portion of a petroleum UST system and releases associated with overfills and transfer operations during petroleum deliveries to or dispensing from a petroleum UST system.
- (2) "Acceptable Risk Level" has the meanings set forth in OAR 340-122-0115(1) through (6).
- (3) "Ancillary Equipment" means any device, including but not limited to piping, fittings, flanges, valves, and pumps, used to distribute, meter, or control the flow of petroleum to and from a petroleum UST system.
- (4) "Aquatic Sediments" means any collection of fine-, medium-, and coarse-grained minerals and organic particles that are found within aquatic habitats.
- (5) "Below-Ground Release" means any release to the land subsurface having concentrations detected by the Northwest Total Petroleum Hydrocarbon Identification Analytical Method (NWTPH-HCID, DEQ, December 1996), or to groundwater having concentrations detected by any appropriate analytical method specified in OAR 340-122-0218. This includes but is not limited to releases from the below-ground portion of a petroleum UST system and releases to the land subsurface or groundwater associated with overfills and transfer operations as the petroleum is delivered to or dispensed from a petroleum UST system.
- (6) "Buildings" means any structure occupied by residents, workers, or visitors, including convenience stores for retailing of food. For purposes of these rules, "buildings" does not include service station kiosks under 45 square feet in size if the kiosk is exclusively dedicated to services for motor vehicles.
- (7) "Certified Drinking Water Protection Area" is an area that has been delineated by the Oregon Health Division in accordance with OAR 333-061-0057 and certified by the Department in accordance with OAR 340-040-0180.

Note: To obtain information about certified drinking water protection areas, contact the Oregon Health Division's Drinking Water Program (503-731-4010).

(8) “Confirmed Release” means petroleum contamination observed in soil or groundwater as a sheen, stain, or petroleum odor, or petroleum contamination detected in soil by the Northwest Total Petroleum Hydrocarbon Identification Analytical Method (NWTPH-HCID, DEQ, December 1996), or detected in groundwater by any appropriate analytical method specified in OAR 340-122-0218.

(9) “Contaminant of Concern” means a hazardous constituent contained in petroleum present at a concentration posing a potentially unacceptable risk to public health, safety, or welfare or the environment.

(10) “Engineering Control” means a remedial method used to prevent or minimize exposure to petroleum and hazardous substances, including technologies that reduce the mobility or migration of petroleum and hazardous substances. Engineering controls may include but are not limited to capping, horizontal or vertical barriers, hydraulic controls, and alternative water supplies.

(11) “Excavation Zone” means an area containing a petroleum UST system and backfill material bounded by the ground surface, walls, and floor of the pit and trenches into which the petroleum UST system is placed at the time of installation.

(12) “Free Product” means non-aqueous phase liquid petroleum.

(13) “Gasoline” means any petroleum distillate used primarily for motor fuel of which more than 50 percent of its components have hydrocarbon numbers of C10 or less. For purposes of OAR 340-122-0205 through 340-122-0360, the concentration of gasoline in soil or groundwater is the level determined by the Northwest Total Petroleum Hydrocarbon Method NWTPH-Gx.

(14) “Groundwater” means any water, except capillary moisture, beneath the land surface or beneath the bed of any stream, lake, reservoir, or other body of surface water within the boundaries of the state, whatever may be the geological formation or structure in which such water stands, flows, percolates or otherwise moves.

(15) “Hazardous Substance” has the meaning set forth in OAR 340-122-0115(30).

(16) “Heating Oil” means petroleum that is No. 1, No. 2, No. 4-heavy, No. 5-light, No. 5-heavy, or No. 6 technical grades of fuel oil; other residual fuel oils (including Navy Special Fuel Oil and Bunker C); or other fuels when used as substitutes for one of these fuel oils.

(17) “Heating Oil Tank” means any one or combination of underground tanks and above-ground or underground pipes connected to the tank, which is used to contain heating oil used for space heating a building with human habitation, or water heating not used for commercial processing.

(18) “Institutional Control” means a remedial method such as a legal or administrative tool or action used to reduce the potential for exposure to petroleum and hazardous substances. Institutional controls may include but are not limited to use restrictions and site access and security measures.

(19) “Motor Fuel” means petroleum or a petroleum-based substance that is motor gasoline, aviation gasoline, No. 1 or 2 diesel fuel, or any grade of gasohol, typically used in the operation of a motor engine.

(20) “Native Soil” means the soil outside of the immediate boundaries of the pit that was originally excavated for the purpose of installing an underground storage tank.

(21) “Non-Gasoline Fraction” means diesel and any other petroleum distillate used for motor fuel or heating oil of which more than 50 percent of its components have hydrocarbon numbers of C11 or greater. For purposes of OAR

340-122-0205 through 340-122-0360, the concentration of non-gasoline fraction in soil or groundwater is the level determined by the Northwest Total Petroleum Hydrocarbon Method NWTPH-Dx.

(22) “Petroleum” means gasoline, crude oil, fuel oil, diesel oil, lubricating oil, oil sludge, oil refuse, and crude oil fractions and refined petroleum fractions, including gasoline, kerosene, heating oils, diesel fuels, and any other petroleum-related product or waste or fraction thereof that is liquid at a temperature of 60 degrees Fahrenheit and a pressure of 14.7 pounds per square inch absolute. “Petroleum” does not include any substance identified as a hazardous waste under 40 CFR Part 261.

(23) “*Petroleum UST System*” has the same meaning as given in OAR 340-150-0010(55).

(24) “Remediation” or “Remedial Measures” include “remedial action” as defined in ORS 465.200(22), “removal” as defined in ORS 465.200(24), and “corrective action” as defined in ORS 466.706(3).

(25) “Remediation Level” means a concentration of petroleum or petroleum constituents in environmental media such as soil and groundwater that alone, or in combination with institutional controls or engineering controls, is determined to be protective of public health, safety, and welfare and the environment in accordance with these rules.

(26) “*Residential Heating Oil Tank*” is a heating oil tank used primarily for single-family dwelling purposes.

(27) “*Responsible Person*” includes “owner” as defined in OAR 340-150-0010(51), “permittee” as defined in OAR 340-150-0010(52), “owner or operator” as defined in ORS 465.200(19), and any other person liable for or voluntarily undertaking remediation under ORS 465.200, *et seq.* or ORS 466.706, *et seq.*

(28) “Risk-Based Concentration” means a concentration of petroleum or petroleum constituents in environmental media such as soil and groundwater that is determined to be protective of public health, safety, and welfare and the environment in accordance with these rules without requiring institutional controls or engineering controls.

(29) “Soil” means any unconsolidated geologic materials including but not limited to clay, loam, loess, silt, sand, gravel, and tills or any combination of these materials.

(30) “Surface Water” means lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, wetlands, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface waters), which are wholly or partially within or bordering the state or within its jurisdiction.

(31) “Suspected Release” means evidence of a release as described in 40 CFR § 280.50.

(32) “*Underground storage tank*” or “UST” means any one or combination of tanks (including underground pipes) that is used to contain an accumulation of regulated substances and the volume of which (including the volume of connected underground pipes) is 10 percent or more beneath the surface of the ground.

[**Note:** OAR 340-150-0500 requires owners and operators of UST systems to report suspected releases to the department. Owners and permittees must refer to OAR chapter 340, division 150 for complete information on requirements for underground storage tanks.]

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.83

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 15-1991, f. & cert. ef. 8-14-91; DEQ 13-1992, f. 6-9-92, cert. ef. 10-1-92; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0215 Scope and Applicability

(1) OAR 340-122-0205 through 340-122-0360 of these rules apply to remediation of leaking petroleum UST systems required or undertaken in accordance with ORS 465.200 et seq. or ORS 466.706, et seq.

(2) Notwithstanding section (1) of this rule and OAR 340-122-0360(3), the Department may require that remediation of a release from a petroleum UST system be governed by OAR 340-122-0010 through 340-122-0115, if, based on the magnitude or complexity of the release or other considerations, the Department determines that application of OAR 340-122-0010 through 340-122-0115 is necessary to protect the public health, safety, and welfare or the environment.

(3) Remediation of releases from UST systems containing regulated substances, as defined in ORS 466.706(16), other than petroleum are governed by OAR 340-122-0010 through 340-122-0115 or as otherwise provided under applicable law.

(4) Notwithstanding section (1) of this rule, remediation of releases from residential heating oil tanks are governed by OAR 340-177-0001 through 340-177-0120.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 15-1991, f. & cert. ef. 8-14-91; DEQ 13-1992, f. 6-9-92, cert. ef. 10-1-92; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0217 Requirements and Remediation Options

(1) For a release of petroleum from an UST system, the responsible person must complete the following requirements:

(a) Perform initial response, abatement, and site characterization in accordance with OAR 340-122-0220 through 340-122-0230.

(b) Remove free product to the maximum extent practicable in accordance with OAR 340-122-0235.

(c) Where results of the initial site characterization indicate that the magnitude and extent of soil contamination have not been fully delineated, or that groundwater contamination may extend beyond the tank pit, complete additional site investigation in accordance with OAR 340-122-0240.

(d) Based on site investigations, perform one of the following remediation approaches:

(A) Remediation in accordance with OAR 340-122-0320 through 340-122-0360 for motor fuel and heating oil in soils;

(B) Closure or remediation in accordance with OAR 340-122-0243 for low-impact sites;

(C) Remediation pursuant to a corrective action plan developed in accordance with OAR 340-122-0244 and 340-122-0250;

(D) Remediation pursuant to a generic remedy developed in accordance with OAR 340-122-0252; or

(E) Any appropriate combination of subsections (A), (C), and (D) of this rule.

(e) Submit all reports, plans, laboratory data, and other documentation required in these rules or otherwise requested by the Department during the course of investigation and remedial measures.

(2) The measures described in section (1) of this rule are subject to Department review and approval as specified in these rules, and to public review and comment as specified in OAR 340-122-0260.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0218 Sampling and Analysis

(1) To streamline the investigation of petroleum UST release sites, a responsible person may use expedited site assessment methods (e.g., push probe samplers) for sample collection and analysis as long as all methods and results are documented in subsequent reports to the Department. However, samples used to demonstrate compliance with remediation levels must be collected and analyzed in accordance with this section.

(a) Sample collection, preservation, storage, and handling methods must conform with appropriate procedures in "Test Methods for Evaluating Solid Waste," SW-846, 3rd Edition, Final Updates I, II, IIA, IIB and III, Revised May 1997 (U.S. EPA).

(b) Samples must be tested for all reasonably-likely contaminants of concern relevant to the petroleum released, the age of the release, and the medium contaminated taking into account appropriate remediation levels. The following must be considered and, where appropriate, sampled:

(A) Total Petroleum Hydrocarbons (TPH) in the gasoline range and TPH in the diesel/lube oil range, as appropriate;

(B) For gasoline releases, benzene, toluene, ethylbenzene and total xylenes (BTEX); naphthalene, lead, ethylene dibromide (EDB), ethylene dichloride (EDC), and methyl t-butyl ether (MTBE);

(C) For diesel or heating oil releases, BTEX and polynuclear aromatic hydrocarbons (PAHs); and

(D) For waste oil releases, BTEX, PAHs, volatile chlorinated hydrocarbons, and leachable concentrations of cadmium, chromium, and lead.

(c) Groundwater samples collected for the purpose of testing for lead must be filtered immediately upon collection using a 0.45 micron filter and analyzed for dissolved lead.

(d) The following analytical methods must be employed.

(A) Total Petroleum Hydrocarbons must be analyzed by the Northwest Total Petroleum Hydrocarbon Methods (DEQ, December 1996) including, as appropriate:

(i) Hydrocarbon Identification by NWTPH-HCID;

(ii) Gasoline Range Hydrocarbons by Method NWTPH-Gx; and

(iii) Diesel/Lube Oil Range Hydrocarbons by Method NWTPH-Dx.

(B) Leachable concentrations of cadmium, chromium, and lead must be analyzed by EPA Method 1311 (Toxicity Characteristic Leaching Procedure).

(C) All other contaminants of concern must be analyzed by appropriate procedures described in “Test Methods for Evaluating Solid Waste,” SW-846, 3rd Edition, Final Updates I, II, IIA, IIB and III, Revised May 1997 (U.S. EPA).

(e) The Department may accept alternative sampling and analytical methods that have been shown to be appropriate for the contaminants of concern and the media of interest, and that have acceptable quality control measures, and limits of detection.

(2) The Department may request additional tests if site-specific conditions warrant additional information.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0220 Initial Response

For a suspected or confirmed release from a petroleum UST system, the responsible person must perform the following initial response actions within 24 hours:

(1) Report the following releases to the Department:

(a) All below-ground releases;

(b) All above-ground releases to the land surface in excess of 25 gallons, or releases of less than 25 gallons if the responsible person is unable to contain or clean up the release within 24 hours; and

(c) All above-ground releases to surface water that result in a sheen on the water.

(2) Take immediate action to prevent any further release of the petroleum into the environment.

(3) Identify and mitigate fire, explosion, and vapor hazards.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 15-1991, f. & cert. ef. 8-14-91; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0225 Initial Abatement Measures and Site Check

(1) Unless directed to do otherwise by the Department, a responsible person must perform the following abatement measures:

(a) Remove as much of the petroleum from the UST system as is necessary to prevent further release to the environment;

(b) Visually inspect any above-ground releases or exposed below-ground releases and prevent further migration of the released petroleum into surrounding soils and groundwater;

(c) Monitor and mitigate any fire and safety hazards posed by vapors or free product that have migrated from the UST excavation zone and entered into subsurface structures;

(d) Remediate hazards posed by contaminated soils that are excavated or exposed during confirmation, site investigation, abatement, or remedial activities. For remedial measures including treatment or disposal of soils, the responsible person must comply with applicable state and local requirements;

(e) Measure for the presence of a release where contamination is most likely to be present at the UST site. In selecting sample types, sample locations, and measurement methods, the responsible person must consider the nature of the stored petroleum, type of backfill, depth to groundwater, and other factors as appropriate for identifying the presence and source of the release; and

(f) Investigate to determine the possible presence of free product, and begin free product removal as soon as practicable in accordance with OAR 340-122-0235.

(2) Contaminated soil shall be managed in accordance with solid waste regulations.

(3) Within 20 days after release confirmation, or within a longer period of time approved by the Department, the responsible person shall submit a report to the Department summarizing the steps taken under OAR 340-122-0220 and 340-122-0225 and any resulting information or data.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 13-1992, f. 6-9-92, cert. ef. 10-1-92; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0230 Initial Site Characterization

(1) Unless directed to do otherwise by the Department, a responsible person must collect information about the site and the nature of the release, including information obtained while confirming the release or completing initial abatement measures under OAR 340-122-0225(1). This information must include the following, as appropriate:

(a) Data on the nature and estimated quantity of the release;

(b) Data from available sources and/or site investigations regarding use and approximate locations of wells potentially affected by the release, presence of a certified drinking water protection area, distance to the nearest surface water, subsurface soil conditions, locations of subsurface sewers, water lines, and other utilities, and land use for all adjacent properties and all properties potentially affected by the release;

(c) Results of the measurements required under OAR 340-122-0225(1)(e);

(d) Results of the free product investigations required under OAR 340-122-0225(1)(f), to be used by the responsible person to determine whether free product must be recovered;

(e) A site map, drawn to scale, showing the location of buildings, current and former locations of UST systems, utility lines, sample locations, and other relevant site information; and

(f) Other information necessary to characterize the site.

(2) Within 45 days of release confirmation, or within a longer period of time approved by the Department, a responsible person must submit the information collected under section (1) of this rule and required under OAR 340-122-0235(5) to the Department.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 13-1992, f. 6-9-92, cert. ef. 10-1-92; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0235 Free Product Removal

At sites where investigations under OAR 340-122-0225(1)(f) indicate the presence of free product, the responsible person must remove the free product to the maximum extent practicable while continuing, as necessary, any actions

initiated under OAR 340-122-0220 through 340-122-0230, or while preparing for actions required under OAR 340-122-0240 through 340-122-0250. In meeting the requirements of this rule, the responsible person must:

- (1) Initiate free product removal as soon as practicable.
- (2) Conduct free product removal in a manner that minimizes the spread of contamination into previously-uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site, and that properly treats, discharges, or disposes of recovery byproducts in compliance with applicable local, state, and federal regulations.
- (3) Use abatement of free product migration as a minimum objective for the design of the free product removal system.
- (4) Handle any flammable products in a safe manner to prevent fires or explosions.
- (5) Include in the report submitted under OAR 340-122-0230(2) a summary of free product removal activities, describing:
 - (a) The name of the contractor or responsible person performing the free product removal measures;
 - (b) The estimated quantity, type, and thickness of free product observed or measured in wells, boreholes, and excavations;
 - (c) The type of free product recovery system used;
 - (d) The location of any on-site or off-site wastewater discharge associated with the recovery operation;
 - (e) The type of treatment applied to, and the effluent quality from, any wastewater discharge;
 - (f) The steps that have been or are being taken to obtain necessary permits for any wastewater discharge; and
 - (g) The disposition of recovered free product; and
 - (h) Other information relevant to the recovery of free product at the site.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 13-1992, f. 6-9-92, cert. ef. 10-1-92; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0240 Investigation for Magnitude and Extent of Contamination

- (1) If data collected during the initial site characterization do not identify the full nature, magnitude, and extent of soil and groundwater contamination, the responsible person must conduct an investigation for this purpose.
 - (a) The areal and vertical extent of soil contamination must be determined.
 - (b) The areal extent of groundwater contamination must be determined, including an estimate of groundwater velocity and flow direction.
 - (c) Representative samples of all affected media must be analyzed for reasonably-likely contaminants of concern based on the nature of the release and applicable remedial options under OAR 340-122-0217.

(d) Expedited site assessment tools (*e.g.*, push-probe samplers) may be used to provide a preliminary measure of the magnitude and extent of groundwater contamination.

(e) If groundwater contamination appears to have migrated beyond the immediate vicinity of the tank pit, additional groundwater investigation must be performed in accordance with section (2) of this rule unless the responsible person can demonstrate to the Department that the contamination presents no potential threat to human health or the environment.

(2) Groundwater investigations required by section (1) of this rule, and groundwater monitoring under corrective action plans required by OAR 340-122-0250 must be carried out as follows:

(a) Groundwater monitoring systems must include a minimum of one hydraulically-upgradient and two hydraulically-downgradient groundwater monitoring wells, capable of adequately characterizing both site hydrogeology and the vertical and horizontal magnitude and extent of groundwater contamination. Additional monitoring wells may be required by the Department if necessary to adequately characterize the site or to establish compliance monitoring points. All monitoring wells must be designed, completed and, when appropriate, removed according to the Water Resources Department's administrative rules, OAR 690-240-0005 through 690-240-0180 (Construction and Maintenance of Monitoring Wells and Other Holes in Oregon).

(b) When the installation of monitoring wells is impractical due to specific site conditions, the responsible person must notify the Department and develop an alternative course of action which must be approved by the Department.

(c) Groundwater sampling events must meet the following minimum requirements:

(A) Initially, samples must be collected at quarterly intervals. After four consecutive quarters of groundwater monitoring, if site conditions warrant more or less frequent sampling, an alternative sampling schedule may be proposed;

(B) Water elevation measurements must be made in all monitoring wells during each sampling event, unless the Department has approved measurements from a reduced number of wells that provide sufficient data for the determination of the groundwater flow direction;

(C) Formal chain-of-custody records must be prepared and maintained for each sample; and

(D) All sampling events for purposes of identifying contaminants of concern, or for verifying either preliminary compliance or final compliance, must include adequate quality assurance and quality control (QA/QC) measures.

(3) The responsible person shall submit the information collected under sections (1) and (2) of this rule to the Department within 45 days of completing field work, or within a longer period of time approved by the Department. Groundwater monitoring reports must be submitted after each monitoring event unless an alternative schedule has been approved by the Department, and must contain the following information:

(a) A site map, drawn to scale, showing the location of all monitoring wells and the direction of groundwater flow;

(b) A summary of all sampling, handling, and chain-of-custody procedures followed, including, as appropriate, a discussion of any routine maintenance procedures performed during the quarter and any problems encountered (*e.g.*, failure of a pump, clogging of a well screen, an unexplained change in the quality of the water, or any other unusual event) and what actions were taken, or will be taken, in response to such occurrences;

- (c) A summary of the analytical data, including QA/QC results for the sampling event;
- (d) Water elevation measurements from each monitoring well, unless the Department approves elevation measurements from a reduced number of wells; and
- (e) A written evaluation of data, describing trends or other pertinent information derived from the sampling event, and specifying the method or methods of statistical analysis used to describe the significance of these trends.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 13-1992, f. 6-9-92, cert. ef. 10-1-92; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0243 Low-Impact Sites

Upon completion of all applicable requirements of OAR 340-122-0205 through 340-122-0240, a responsible person may propose closure of a facility as a low-impact site if information gathered during site investigations clearly demonstrates that site conditions have stabilized (*i.e.*, significant future migration of contamination is unlikely) and that the site is likely to have low current and potential future impact on the basis of risk or impairment of beneficial land and water uses. The purpose of the low-impact site designation is to provide a streamlined process for operating gas stations or other industrial or commercial properties that allows these facilities to remain in operation while the responsible person manages any potential risk from contamination remaining at the site. If the Department develops a generic remedy for low-impact sites in accordance with OAR 340-122-0252, then the low-impact site requirements specified in this rule (OAR 340-122-0243) will no longer be in effect. Until such time as a low-impact site generic remedy is in effect, the steps for low-impact closure are described below.

(1) The site must meet each of the following conditions:

- (a) The source of the release has been repaired or removed, and all tanks, lines, and associated equipment at the site have been upgraded to meet applicable technical and regulatory standards.
- (b) The facility must continue to be used as a gas station or other industrial or commercial use precluding potential routine exposure to children.
- (c) Other than minimal amounts of petroleum product in the tank pit at the time of tank removal, no measurable free product was found on the groundwater.
- (d) Concentrations of gasoline in the contaminated soil should not exceed 1000 ppm TPH, and concentrations of diesel and other non-gasoline fraction hydrocarbon in the contaminated soil should not exceed 10,000 ppm TPH.
- (e) Contaminated soil remaining at the site should not be located within 3 feet of the land surface, unless:
 - (A) Contaminant concentrations do not exceed generic risk-based concentrations for direct contact developed in accordance with OAR 340-122-0252; or
 - (B) Department-approved institutional or engineering controls have been implemented and will be maintained to prevent direct contact with soils.
- (f) Contamination is not located in utility corridors, unless:
 - (A) The contamination is shown to have been stabilized and is unlikely to result in vapor or groundwater problems;

(B) Contaminant concentrations do not exceed generic risk-based concentrations for a trench worker scenario developed in accordance with OAR 340-122-0252; and

(C) The corresponding utility has been notified of the contamination.

(g) Service station and other nonresidential buildings must not be located over or within 10 lateral feet and residences must not be located over or within 50 lateral feet of contaminated soil, unless:

(A) Contaminant concentrations do not exceed generic risk-based concentrations for volatilization from soils into buildings developed in accordance with OAR 340-122-0252; or

(B) It is demonstrated that potential exposure from volatilization into buildings from this contamination does not exceed acceptable risk levels; or

(C) Department-approved actions have been taken to mitigate potential vapor problems.

(h) If groundwater contamination is found at the site:

(A) There are no water supply wells located within one-quarter mile of the source of contamination;

(B) The groundwater plume is less than 250 feet in length as measured from the center of the source;

(C) Monitoring data are available to demonstrate that the groundwater plume has stabilized, or is diminishing in size;

(D) The groundwater plume does not leave the source property at concentrations exceeding generic risk-based concentrations developed in accordance with OAR 340-122-0252, unless owners of other affected properties consent to institutional or engineering controls necessary to prevent exposure due to the contaminated groundwater; and

(E) Service station and other nonresidential buildings must not be located over or within 10 lateral feet and residences must not be located over or within 50 lateral feet of contaminated groundwater, unless:

(i) Contaminant concentrations within the plume do not exceed generic risk-based concentrations for volatilization from groundwater into buildings developed in accordance with OAR 340-122-0252; or

(ii) It is demonstrated that potential exposure from volatilization into buildings from this contamination does not exceed acceptable risk levels; or

(iii) Department-approved actions have been taken to mitigate potential vapor problems.

(2) The responsible person must implement institutional or engineering controls, in a form acceptable to the Department, necessary to ensure that a site's designation as a low-impact site remains unchanged.

(3) The responsible person must submit a low-impact-site-closure report to the Department that includes the following:

(a) A site summary with appropriate scaled maps, a discussion of current and reasonably likely future land uses for the site and adjacent properties, including information from local government comprehensive planning plans and zoning ordinances, and information on geology, hydrogeology, topography, and other relevant factors on which the low-impact closure is based.

(b) Information about the release, including a history of all actions taken, data from all samples collected at the site, and a description of all contamination, including scaled maps showing the locations of contamination that was treated or removed from the site and contamination remaining at the site at the time of the report.

(c) Sufficient discussion and supporting data to address each of the specific low-impact site requirements listed in section (1) of this rule.

(d) If groundwater contamination is present at concentrations exceeding generic risk-based concentrations, a discussion of current and reasonably likely future water uses.

(e) If groundwater contamination is present at concentrations exceeding generic risk-based concentrations and the site is located within a certified drinking water protection area (DWPA), a description of the DWPA and what additional information has been gathered and measures taken to ensure that there are no current or potential future adverse impacts to the groundwater in the aquifer within the DWPA.

(f) A proposal, subject to Department approval, for any institutional or engineering controls necessary to maintain low-impact site conditions.

(4) Upon review of the low-impact site closure report, the Department may:

(a) Approve the report and, upon receipt of adequate documentation showing that any necessary institutional or engineering controls have been implemented and will be maintained, issue a low-impact site closure letter stipulating the site conditions that must be maintained;

(b) Request that additional information be submitted or work be performed in support of the proposed low-impact closure; or

(c) Determine that the site does not meet the conditions for low-impact closure and require that additional actions be taken under other relevant sections of OAR 340-122-0205 through 340-122-0360.

(5) The Department shall require public notice consistent with applicable requirements of OAR 340-122-0260 for sites proposed for low-impact closure.

(6) The owner of any property requiring controls under this rule must notify the Department of any future changes that might affect the facility's designation as a low-impact site.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0244 Risk-Based Concentrations

This rule describes the requirements for developing risk-based concentrations for use in establishing remediation levels in corrective action plans under OAR 340-122-0250.

(1) A conceptual model must be developed for the site describing how exposure to contaminants is reasonably likely to occur.

(a) The conceptual site model must be based on, at a minimum:

(A) The magnitude and areal and vertical extent of soil and groundwater contamination;

(B) The concentration of applicable contaminants of concern in each contaminated medium;

(C) The likelihood for exposure to occur, given the concentration, location, and mobility of the contaminants in conjunction with factors such as local climate, geology, and hydrogeology; and

(D) Information on current and reasonably likely future land and water uses in the area of potential impact.

(b) Subject to site-specific conditions, the following exposure pathways must be considered in the conceptual site model:

(A) Direct contact with contaminated soils resulting in exposure due to a combination of dermal contact, soil ingestion, vapor inhalation, and particulate inhalation;

(B) Leaching from soils to underlying groundwater with subsequent groundwater ingestion;

(C) Volatilization from soils to outdoor air and subsequent inhalation;

(D) Volatilization from soils to indoor air and subsequent inhalation;

(E) Ingestion or other exposure to contaminated groundwater;

(F) Volatilization from groundwater to outdoor air and subsequent inhalation; and

(G) Volatilization from groundwater to indoor air and subsequent inhalation.

(c) Subject to site-specific conditions, the following exposure scenarios must be considered in the conceptual site model:

(A) Exposure to adults and children as typified by single-family residential living conditions;

(B) Exposure to adults as typified by industrial or commercial working conditions; and

(C) Exposure to adults whose occupation requires increased direct contact with soil as typified by a trench worker.

(d) Depending on conditions found at the site, the Department may require the evaluation of additional exposure pathways and scenarios.

(2) Risk-based concentrations must be developed for contaminants of concern identified during the site characterization or other site investigation activities, including total petroleum hydrocarbons (TPH) when appropriate, for exposure pathways and scenarios identified in the conceptual site model.

(a) The Department shall develop and maintain, in accordance with OAR 340-122-0252, a table of generic risk-based concentrations that may be used for this purpose; or

(b) A responsible person may calculate site-specific risk-based concentrations by employing contaminant fate, transport, and exposure models.

(A) Sources of models and default exposure parameters include:

(i) Applicable Department of Environmental Quality generic remedy guidance documents developed pursuant to OAR 340-122-0252;

(ii) ASTM Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites (ASTM E 1739-95); and

(iii) US EPA Risk Assessment Guidance for Superfund.

(B) The Department may approve the use of other models if they are deemed appropriate for the proposed task.

(C) A responsible person may propose, subject to the Department's approval, the use of site-specific exposure parameters in place of default exposure parameters.

(3) Risk-based concentrations for protection of the environment must be developed if contamination poses a potential risk exceeding the acceptable risk levels for ecological receptors. Unless the Department determines that screening is required for threatened and endangered species, screening for potential ecological impact is not required if:

(a) Contaminated soils are only present at a depth greater than 3 feet below ground surface, or, if present at a shallower depth, such soils cover an area no greater than 0.125 acre;

(b) Surface water has not been affected by the release;

(c) Contaminated groundwater does not and is not reasonably likely to discharge to surface waters or otherwise reach the surface in a manner that might result in contact with ecological receptors; and

(d) Contaminated groundwater does not and is not reasonably likely to come into contact with aquatic sediments.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0250 Corrective Action Plan

(1) Subject to section (12) of this rule, a responsible person proposing to remediate a site to risk-based remediation levels must submit a corrective action plan for responding to contaminated soil and groundwater.

(2) A remediation level must be proposed for each contaminant of concern in soil and groundwater based on:

(a) Site-specific risk-based concentrations calculated according to OAR 340-122-0244, or generic risk-based concentrations developed under OAR 340-122-0252;

(b) Current or future reasonably likely significant adverse effects to beneficial uses of groundwater or surface water not addressed by risk-based concentrations under subsection (a) of this section; and

(c) Proposed institutional and engineering controls, if any.

(3) The corrective action plan must be submitted to the Department within 45 days of completing field work necessary for its development, or within a longer period of time approved by the Department, and must contain sufficient information to support the proposed remedial measures including, at a minimum:

(a) The site history and a summary of all previous actions taken in response to the release;

(b) A summary and analysis of all sampling data, including site maps, drawn to scale, showing the magnitude and extent of contamination;

(c) The conceptual site model and an explanation for each remediation level proposed under section (2) of this rule;

(d) Land and water use information necessary to support the conceptual site model, including current uses, and comprehensive plan and zoning designations for adjacent properties, and all properties potentially affected by the release; and

(e) A discussion of all remedial measures including institutional and engineering controls, addressing any contamination exceeding acceptable risk levels and non-risk impacts.

(4) A corrective action plan which contains a proposal for groundwater monitoring or remediation must include:

(a) A recommendation for which monitoring well or wells will serve as compliance points for the site based on the following minimum requirements:

(A) Compliance monitoring points must define an area surrounding the source of contamination, outside of which remediation levels must be attained and maintained.

(B) The compliance monitoring points shall establish a vertical boundary extending from the uppermost level of the saturated zone to the lowest depth which could potentially be affected by the release;

(C) Compliance monitoring points must be located close enough to the source of contamination so that they reasonably detect contamination, if present; and

(D) Compliance monitoring points may not be located beyond the source property boundary except as approved by the Department.

(b) At least one monitoring point which measures contaminant concentrations in the source area.

(c) A discussion of all actions being proposed to monitor or remediate the groundwater contamination. These actions might not require sampling from all wells or monitoring for all contaminants detected during the investigation, provided:

(A) Hydrogeological and contamination data, as well as compliance point requirements, support the wells proposed for monitoring;

(B) Appropriate indicator compounds are analyzed at regular intervals during remediation and monitoring;

(C) Analytical parameters are consistent with remediation levels; and

(D) All contaminants of concern detected during the investigation are sampled and analyzed to confirm preliminary and final compliance.

(5) The Department shall approve the corrective action plan only after ensuring that implementation of the plan, including any applicable remediation levels, will adequately protect human health, safety, and welfare and the environment, and after providing any public notice consistent with the requirements of OAR 340-122-0260.

(6) Upon approval of the corrective action plan by the Department, a responsible person must implement the plan, including any modifications to the plan made by the Department. The responsible person must monitor, evaluate, and report the results of implementing the plan in accordance with a schedule and in a format established by the Department.

(7) For remediation of groundwater contamination:

(a) Preliminary compliance is attained when the first sampling event following the installation of all required monitoring wells shows that all samples collected from all compliance monitoring points and out to the edge of the contaminant plume meet the remediation levels for all contaminants of concern. When preliminary compliance has been attained, the responsible person may suspend groundwater treatment system operation at any time. The Department may require that a suspended groundwater treatment system be reactivated if any of the water samples collected at or beyond the compliance monitoring points during the required period of monitoring are found to contain any contaminant concentrations in excess of remediation levels. If the treatment system is reactivated, treatment must be continued until preliminary compliance is again attained.

(b) Final compliance is attained when:

(A) A minimum of four consecutive quarterly groundwater monitoring events has been completed following shutdown of the treatment system, and all samples collected from all compliance monitoring points and out to the edge of the contaminant plume meet the remediation levels for all contaminants of concern. The four consecutive sampling events may include the sampling event at which preliminary compliance is achieved, provided that all contaminants of concern are included in the sampling and analysis;

(B) Site-specific hydrogeologic and contaminant level data are presented in a written report to the Department demonstrating that any remaining contaminants will not migrate beyond the compliance monitoring points at levels exceeding remediation levels; and

(C) A final report containing a summary of all groundwater data collected at the site, an analysis of the data demonstrating that the final compliance requirements have been met, and any other relevant information deemed necessary by the Department to demonstrate that all of the requirements of this rule have been met is submitted to and approved by the Department.

(c) Notwithstanding final compliance, the Department may require continued monitoring of groundwater in situations where site-specific conditions warrant such measures.

(8) The responsible person must submit additional information or develop and submit a modified corrective action plan at the Department's request if the Department determines that remedial activities must be modified or that treatment system performance (*e.g.*, rate of cleanup) is not achieving results as projected in the approved corrective action plan.

(9) When all requirements of an approved corrective action plan have been met to the Department's satisfaction, the Department shall issue a no further action letter to the responsible person.

(10) In the event that contamination exceeding risk-based concentrations remains, the Department may require the implementation of institutional or engineering controls necessary to ensure protection of public health, safety, and welfare and the environment.

(11) A responsible person may, in the interest of minimizing environmental contamination and promoting more effective remediation, begin remediation of soil and groundwater before the corrective action plan is approved provided that the responsible person:

(a) Notifies the Department of its intention to begin remediation;

(b) Complies with any conditions imposed by the Department including halting remediation or mitigating adverse consequences from remedial activities; and

(c) Incorporates the self-initiated remedial measures in the corrective action plan that is submitted to the Department for approval.

(12) The requirement that a corrective action plan be used does not apply to low-impact site closures, or to generic remedies unless specified by the Department in generic remedy guidance. However, the Department may require that a corrective action plan be developed and implemented for sites being considered for remediation under the soil matrix cleanup options (OAR 340-122-0320), as low-impact sites (OAR 340-122-0243), or under generic remedies (OAR 340-122-0252) if, upon review of available information, the Department determines that conditions at the site are not appropriate for the initial proposed remedial option or the proposal does not provide adequate protection to human health, safety, and welfare and the environment.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 13-1992, f. 6-9-92, cert. ef. 10-1-92; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0252 Generic Remedies

(1) The Department may identify or develop generic remedies for releases from petroleum UST systems.

(a) For purposes of this rule, a generic remedy may include:

(A) Generic risk-based concentrations for use in closure of low-impact sites, or remediation under a corrective action plan; and

(B) Remedial technologies or methods for use at eligible sites on a streamlined basis.

(b) A generic remedy must describe criteria making sites eligible for use of the generic remedy.

(c) Any generic remedy that allows for implementation of specified remedial measures (*e.g.*, treatment technologies, excavation and off-site disposal, engineering controls, institutional controls) must be based on a generic feasibility study evaluating a range of potential remedial measures providing protection of human health and the environment and protection or restoration of beneficial uses of waters.

(d) Any generic remedy that includes risk-based concentrations must be based on a generic risk assessment documenting the Department's conclusions with respect to how sites eligible for use of the generic remedy will achieve acceptable risk levels.

(2) In developing generic remedy guidance, the Department will provide opportunities for public participation regarding the scope and content of the guidance.

(3) The Department may approve use of a generic remedy at a site if site-specific information demonstrates that the proposed generic remedy or the completed generic remedy as implemented at the site is consistent with Department generic remedy guidance.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0260 Public Participation

(1) The Department shall maintain a list of all confirmed releases and ensure that site release and cleanup information are made available to the public for inspection upon request.

(2) For each confirmed release that requires a corrective action plan under OAR 340-122-0250, or that requires implementation of engineering or institutional controls for designation as a low-impact site under OAR 340-122-0243 or as part of a generic remedy under OAR 340-122-0252, the Department shall provide notice to affected property owners and the public. This notice may include but is not limited to public notice in local newspapers, block advertisements, public service announcements, publication in a state register, letters to individual households, or personal contacts by field staff.

(3) For each confirmed release, the Department, upon written request by ten or more persons or by a group having ten or more members, shall conduct a public meeting at or near the facility for the purpose of receiving verbal comment regarding proposed remedial activities, except for those activities conducted under OAR 340-122-0320 through 340-122-0360.

(4) The Department shall ensure that site release information and decisions concerning completed and proposed petroleum UST remedial measures are made available to the public for inspection upon request.

(5) Before approving a corrective action plan, the Department may hold a public meeting to consider comments on the proposed corrective action plan if there is sufficient public interest, or for any other good reason.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 29-1988, f. & cert. ef. 11-9-88; DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0320 Soil Matrix Cleanup Options

A responsible person may elect to clean up petroleum contaminated soils according to the procedures and standards set forth in OAR 340-122-0320 through 340-122-0360. For purposes of the soil matrix cleanup rules, “cleanup” means excavation and offsite disposal, or treatment, of contaminated soils. When using the numeric soil cleanup standards specified in these rules, the responsible person has the option of:

(1) Cleaning up the site as specified in these rules to the numeric soil cleanup standard defined as Level 1 in OAR 340-122-0335(2); or

(2) Evaluating the site as specified in OAR 340-122-0325 to determine the required Matrix cleanup level, and then cleaning up the site as specified in these rules to the numeric soil cleanup standard defined by that Matrix cleanup level.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0325 Evaluation of Matrix Cleanup Level

(1) In order to determine a specific Matrix cleanup level, the site must first be evaluated by:

(a) Assigning a numerical score to each of the five site-specific parameters in OAR 340-122-0330(1) - (5); and

(b) Totaling the parameter scores to arrive at the Matrix Score.

(2) The Matrix Score must then be used to select the appropriate numeric soil cleanup standard as specified in OAR 340-122-0335.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0330 Evaluation Parameters

The site-specific parameters are to be scored as specified in this section. If any of the parameters in sections (1) - (5) of this rule is unknown, that parameter must be given a score of ten:

(1) **Depth to Groundwater:** This is the vertical distance (rounded to the nearest foot) from the surface of the ground to the highest seasonal elevation of the saturated zone. The score for this parameter is:

- (a) > 100 feet, 1;
- (b) 51 - 100 feet, 4;
- (c) 25 - 50 feet, 7;
- (d) < 25 feet, 10.

(2) **Mean Annual Precipitation:** This measurement may be obtained from the nearest appropriate weather station. The score for this parameter is:

- (a) < 20 inches, 1;
- (b) 20 - 45 inches, 4;
- (c) > 45 inches, 10.

(3) **Native Soil or Rock Type:** The score for this parameter is:

- (a) Low permeability materials such as clays, silty clays, compact tills, shales, and unfractured metamorphic and igneous rocks, 1;
- (b) Moderate permeability materials such as fine and silty sands, sandy loams, loamy sands, and clay loams; moderately permeable limestones, dolomites and sandstones; and moderately fractured igneous and metamorphic rocks, 5;
- (c) High permeability materials such as sands and gravels, highly fractured igneous and metamorphic rocks, permeable basalts and lavas, and karst limestones and dolomites, 10.

(4) **Sensitivity of the Uppermost Aquifer:** Due to the uncertainties involved in the Matrix evaluation process, this factor is included to add an extra margin of safety in situations where critical aquifers have the potential to be affected. The score for this parameter is:

- (a) Unusable aquifer, either due to water quality conditions such as salinity, *etc.*; or due to hydrologic conditions such as extremely low yield, 1;
- (b) Potable aquifer not currently used for drinking water, but the quality is such that it could be used for drinking water, 4;
- (c) Potable aquifer currently used for drinking water; alternate unthreatened sources of water readily available, 7;

(d) Sole source aquifer currently used for drinking water; there are no alternate unthreatened sources of water readily available, 10.

(5) Potential Receptors: The score for potential receptors is based on both the distance to the nearest well and also the number of people at risk. Each of these two components is to be evaluated using the descriptors defined in this section:

(a) The distance to the nearest well is measured from the area of contamination to the nearest well that draws water from the aquifer of concern. If a closer well exists which is known to draw water from a deeper aquifer, but there is no evidence that the deeper aquifer is completely isolated from the contaminated aquifer, then the distance must be measured to the closer, deeper well. The distance descriptors are:

(A) Near, <1/2 mile;

(B) Medium, 1/2 - 2 miles;

(C) Far, < 2 miles.

(b) The number of people at risk is to include all people served by drinking water wells which are located within two miles of the contaminated area. For public wells, count the number of users listed with the Oregon Health Division, Drinking Water Systems Section. For private wells, assume three residents per well. In lieu of a door-to-door survey of private wells, it may be assumed that there is one well per residence. The number descriptors are:

(A) Many, > 3000;

(B) Medium, 100 - 3000;

(C) Few, < 100.

(c) The score for this parameter is taken from the combination of the two descriptors using the following grid:

	Many	Medium	Few
Near	10	10	5
Medium	10	5	1
Far	5	1	1

(6) The Matrix Score for a site is the sum of the five parameter scores in sections (1) - (5) of this rule.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 46-1990, f. 12-26-90, cert. ef. 3-1-91; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0335 Numeric Soil Cleanup Standards

(1) If the Matrix Score evaluated in OAR 340-122-0330 is:

(a) Greater than 40, the site must be cleaned up to at least the Level 1 standards listed in section (2) of this rule;

(b) From 25 to 40, inclusive, the site must be cleaned up to at least the Level 2 standards listed in section (2) of this rule;

(c) Less than 25, the site must be cleaned up to at least the Level 3 standards listed in section (2) of this rule.

(2) The following table contains the required numeric soil cleanup standards based on the level of Total Petroleum Hydrocarbons (TPH) as measured by the analytical methods specified in OAR 340-122-0218.

	Level 1	Level 2	Level 3
TPH (Gasoline)	40 ppm	80 ppm	130 ppm
TPH (Diesel)	100 ppm	500 ppm	1000 ppm

(3) A sample of contaminated soil must be collected from each separate release area and used to identify the petroleum product contamination present at that location. The Hydrocarbon Identification test specified in OAR 340-122-0218(1)(c) (NWTPH-HCID) must be used for that purpose. The NWTPH-HCID test is not required for petroleum product identification for releases from residential heating oil tanks. The results of the NWTPH-HCID test must be used to determine which analytical method or methods are required for verifying compliance with the Matrix cleanup levels. At locations where the soil is contaminated with both gasoline and diesel or other non-gasoline fraction hydrocarbons, the gasoline contamination must be shown to meet the appropriate gasoline cleanup standard and the diesel or other non-gasoline fraction contamination must be shown to meet the appropriate diesel cleanup standard.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 46-1990, f. 12-26-90, cert. ef. 3-1-91; DEQ 13-1992, f. 6-9-92, cert. ef. 10-1-92; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0340 Sample Number and Location

The collection and analysis of soil samples is required to verify that a site meets the requirements of these rules. These samples must represent the soils remaining at the site and must be collected after contaminated soils have been removed or remediated. Each sample must represent a single location; composite samples are not allowed. The number of soil samples required for a given site and the location at which the samples are to be collected are as follows:

(1) A minimum of two soil samples must be collected from the site:

(a) These samples must be taken from those areas where obviously stained or contaminated soils have been identified and removed or remediated;

(b) If there are two or more distinct areas of soil contamination, then a minimum of one sample must be collected from each of these areas;

(c) The samples must be taken from within the first foot of native soil directly beneath the areas where the contaminated soil has been removed, or from within the area where *in situ* remediation has taken place;

(d) A field instrument sensitive to volatile organic compounds may be used to aid in identifying areas that should be sampled, but the field data may not be substituted for laboratory analyses of the soil samples;

(e) If there are no areas of obvious contamination, then samples must be collected from the locations specified in sections (2) - (5) of this rule which are most appropriate for the situation;

(f) If it is being proposed that a pocket of contamination be left in place pursuant to OAR 340-122-0355(4), then sufficient samples must be collected from the site in order to estimate the extent, volume, and level of contamination in this pocket, and the likelihood for the remaining contamination to result in unacceptable risk levels due to volatilization into buildings.

(2) If water is not present in the tank pit:

(a) Soil samples must be collected from the native soils located no more than two feet beneath the tank pit in areas where contamination is most likely to be found;

(b) For the removal of an individual tank, samples must be collected from beneath both ends of the tank. For the removal of multiple tanks from the same pit, a minimum of one sample must be collected for each 150 square feet of area in the pit.

(3) In situations where leaks have been found in the piping, or in which released product has preferentially followed the fill around the piping, samples are to be collected from the native soils directly beneath the areas where obvious contamination has been removed. Samples should be collected at 20 foot intervals.

(4) If water is present in the tank pit, regardless of whether obvious contamination is or is not present, the Department must be notified of this fact. The responsible person shall then either continue the investigation under OAR 340-122-0240, or do the following:

(a) Purge the water from the tank pit and dispose of it in accordance with all currently applicable requirements. This might require obtaining appropriate permits from the Department or local jurisdictions;

(b) If the pit remains dry for 24 hours, testing and cleanup may proceed according to the applicable sections of these soil matrix cleanup rules. If water returns to the pit in less than 24 hours, a determination must be made as to whether contamination is likely to have affected the groundwater outside of the confines of the pit as indicated below:

(A) For the removal of an individual tank, soil samples are to be collected from the walls of the excavation next to the ends of the tank at the original soil/water interface. For the removal of multiple tanks from the same pit, a soil sample is to be collected from each of the four walls of the excavation at the original soil/water interface;

(B) At least one sample must be taken of the water in the pit regardless of whether obvious contamination is or is not present. This sample shall be collected as required by OAR 340-122-0345(4);

(C) The soil samples must be analyzed for TPH and benzene, toluene, ethylbenzene, and xylenes (BTEX). The water sample must be analyzed for BTEX at all sites, and for PAHs where releases of non-gasoline fractions have occurred. Responsible persons may use TPH analyses on groundwater samples as a preliminary screen for PAHs. The TPH method detection limit must be no greater than 0.5 ppm. Any groundwater sample for which TPH is detected must be analyzed for PAHs. These analyses must be made using the methods specified in OAR 340-122-0218. The results of these analyses must be submitted to the Department;

(D) The Department shall then determine how the cleanup shall proceed as specified in OAR 340-122-0355(3).

(5) In situations where tanks, pumps, and lines will remain in place in areas of suspected contamination, the responsible person must submit a specific soil sampling plan to the Department for its approval.

(6) In situations where TPH analysis indicates that contamination is present due to a release from a waste oil tank, at least one sample of the waste oil contaminated soils must be collected and analyzed for volatile chlorinated solvents, volatile aromatic solvents, and leachable metals (Cadmium, Chromium and Lead) using the analytical methods specified in OAR 340-122-0218(1)(c). Analysis for PCBs is also required if the contamination is from a waste oil tank other than one used exclusively for storage of automotive waste oils.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 46-1990, f. 12-26-90, cert. ef. 3-1-91; DEQ 13-1992, f. 6-9-92, cert. ef. 10-1-92; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0345 Sample Collection Methods

(1) The following information must be kept during the sampling events:

(a) A sketch of the site must be made which clearly shows all of the sample locations and identifies each location with a unique sample identification code;

(b) Each soil and water sample must be clearly labeled with its sample identification code. A written record must be maintained which includes, but is not limited to: the date, time and location of the sample collection; the name of the person collecting the sample; how the sample was collected; and any unusual or unexpected problems encountered during the sample collection which may have affected the sample integrity;

(c) Formal chain-of-custody records must be maintained for each sample.

(2) If soil samples cannot be safely collected from the excavation, a backhoe may be used to remove a bucket of native soil from each of the sample areas. The soil is to be brought rapidly to the surface where samples are to be immediately taken from the soil in the bucket.

(3) The following procedures must be used for the collection of soil samples from open pits or trenches:

(a) Just prior to collecting each soil sample, approximately three inches of soil must be rapidly scraped away from the surface of the sample location;

(b) To minimize the loss of volatile materials, it is recommended that samples be taken using a driven-tube type sampler. A clean brass or stainless steel tube of at least one inch in diameter and three inches in length may be used for this purpose. The tube should be driven into the soil with a suitable instrument such as a wooden mallet or hammer;

(c) The ends of the sample-filled tube must be immediately covered with clean aluminum foil. The foil must be held in place by plastic end caps which are then sealed onto the tube with a suitable tape;

(d) Alternatively, samples may be taken with a minimum amount of disturbance and packed immediately in a clean wide-mouth glass jar leaving as little headspace as possible. The jar must then be immediately sealed with a teflon-lined screw cap;

(e) After the samples are properly sealed, they are to be immediately placed on ice and maintained at a temperature of no greater than 4 °C (39 °F) until being prepared for analysis by the laboratory. All samples must be analyzed within 14 days of collection.

(4) The following procedures must be used for the collection of water samples from the tank pit:

(a) After the water has been purged from the pit in accordance with OAR 340-122-0340(4)(a), samples shall be collected as soon as sufficient water has returned to the pit to allow representative sampling;

(b) Samples are to be taken with a device designed to reduce the loss of volatile components. A bailer with a sampling port is suitable for this purpose;

(c) The water is to be transferred into two identical glass vials with as little agitation as possible and immediately sealed with a teflon-lined caps. The vials must be filled completely so that no air bubbles remain trapped inside;

(d) After the samples are properly sealed, they are to be immediately placed on ice and maintained at a temperature of no greater than 4° C (39° F) until being prepared for analysis by the laboratory. All samples must be analyzed within 14 days of collection.

(5) The Department may approve alternative sampling methods which have been clearly shown to be at least as effective with respect to minimizing the loss of volatile materials during sampling and storage as the methods listed in sections (1) - (4) of this rule.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 46-1990, f. 12-26-90, cert. ef. 3-1-91; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0355 Evaluation of Analytical Results

(1) The results of the soil analyses shall be interpreted as follows:

(a) If a sample has a concentration less than or equal to the required matrix level, the area represented by that sample meets the requirements of these rules;

(b) If a sample has a concentration exceeding the required matrix level by more than ten percent, the area represented by that sample does not meet the requirements of these rules. Further remediation, sampling, and testing is necessary until the required level is attained;

(c) If a sample has a concentration exceeding the required matrix level by less than ten percent, the responsible person has the option of collecting and analyzing two more samples from the same area and using the average of all three to determine if the standard has been met; or further remediating the area and then collecting and analyzing one new sample and using the concentration of the new sample to determine if the standard has been met. Alternatively, the Department has the options of approving the cleanup with no further action, requiring that more samples be taken, or requiring further cleanup and subsequent sampling. Such a decision shall be made based upon the analytical results of other samples from the site, best professional judgment made from a visit to the site, the apparent extent of contamination, and other site specific factors deemed appropriate.

(2) A site shall be considered sufficiently clean when all of the sampled areas have concentrations less than or equal to the required matrix cleanup level, and when the possibility of any human contact with the residual soil contamination remaining on the site has been precluded.

(3) If water is present in the tank pit, the Department shall decide if cleanup may proceed under these rules or if further action must be taken pursuant to OAR 340-122-0240. This decision shall be based on, but is not limited to:

(a) The apparent extent of the contamination;

(b) The likelihood that groundwater contamination exists beyond the boundaries of the tank pit;

(c) The likelihood that the BTEX concentrations in the water and the BTEX and TPH concentrations in the soil indicate a situation which poses a threat to public health, safety, and welfare or the environment; and

(d) Any other site-specific factors deemed appropriate by the Department.

(4) If a pocket of contamination exceeding the required Matrix cleanup level is located under a building or other structure where further removal would endanger the structure or be prohibitively expensive, the Department must be notified of this situation. The Department shall then decide whether such contamination can remain without threatening public health, safety, and welfare or the environment. If not, the Department shall require further remediation.

(5) For waste oil contaminated sites, all detectable levels of volatile chlorinated solvents, volatile aromatic hydrocarbons, PCBs, or leachable metals shall be reported to the Department as soon as these results are known. The Department shall then decide whether the cleanup shall continue under these rules or whether further investigation is warranted under OAR 340-122-0205 through 340-122-0260 or 340-122-0010 through 340-122-0115.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 46-1990, f. 12-26-90, cert. ef. 3-1-91; DEQ 23-1998, f. & cert. ef. 11-2-98

340-122-0360 Reporting Requirements

(1) Within 60 days of completing work at a soil matrix site cleaned up pursuant to OAR 340-122-0320 through 340-122-0360, or within a longer period of time approved by the Department, the responsible person must submit to the Department a final report which must contain:

(a) A narrative section describing how the release was discovered, what initial measures were taken to control the spread of contamination, what was observed when the tank was removed from the pit (*e.g.*, odor, sheen, stained soils, holes in tank or lines), what information was used to score the site, how the cleanup was done, how much contaminated soil was removed, what was done with the contaminated soil and the decommissioned tank and piping, who collected the samples, how the samples were collected, stored, and shipped to the lab, and any problems encountered during the cleanup or sample collection process;

(b) A site map drawn to scale showing relevant information such as the location of tanks, lines, utilities, buildings, and other structures, excavated soils, samples, and any pockets of contamination left pursuant to OAR 340-122-0355(4);

(c) Properly filled out copies of the Department's Matrix Checklist and Matrix Score Sheet;

(d) All of the sampling documentation required in OAR 340-122-0345;

(e) Copies of the laboratory reports and chain of custody forms for all soil and water samples collected at the site;

(f) Copies of all receipts or permits related to the disposal of free product, contaminated soil, contaminated water, and decommissioned tanks and piping;

(g) A brief explanation of what was done in the case of any samples that initially exceeded the required cleanup levels;

(h) A summary of the concentrations measured in the final round of samples from each sampling location;

(i) In cases where groundwater was present in the pit, a summary of the data collected and the decision made by the Department under OAR 340-122-0355(3);

(j) In cases where pockets of excess contamination remain on site in accordance with OAR 340-122-0355(4), a description of this contamination including location, approximate volume and concentration; and

(k) In cases where waste oil contamination required extra sampling and analyses as specified in OAR 340-122-0340(6), a summary of the data collected and, if appropriate, the decision made by the Department under OAR 340-122-0355(5).

(2) The responsible person shall retain a copy of the report submitted to the Department under this section until the time of first transfer of the property, plus ten years.

(3) Upon review of the report, the Department shall:

(a) Provide the responsible person a written statement that, based upon information contained in the report, the soil present at the site has been cleaned up in accordance with OAR 340-122-0320 through 340-122-0360; or

(b) Request the responsible person to submit additional information or perform additional investigation; or

(c) Request the responsible person to conduct additional remedial action in accordance with OAR 340-122-0250 or 340-122-0252.

Stat. Auth.: ORS 465.400 & ORS 466.746

Stats. Implemented: ORS 465.200 - ORS 465.455 & ORS 466.706 - ORS 466.835

Hist.: DEQ 15-1989, f. & cert. ef. 7-28-89 (and corrected 8-3-89); DEQ 46-1990, f. 12-26-90, cert. ef. 3-1-91; DEQ 23-1998, f. & cert. ef. 11-2-98

SECTION 2.5: SUMMARY OF EACH RULE

This section summarizes each of the UST cleanup rules. Additional information is provided to clarify how to apply the rule. Although this information is provided to assist you, you should remember that it is the actual rules that you are required to follow (Section 2.4), not this summary. You may wish to consult with an attorney for additional interpretation or explanation.

340-122-0205 Purpose

This simply describes the purpose of the rules — which is to set standards and a process to investigate, monitor and clean up releases from a petroleum Underground Storage Tank (UST) system — and cites the Oregon Statutes (law) giving DEQ the authority to adopt these rules.

340-122-0210 Definitions

The definitions of common terms used throughout these rules are all listed here. We recommend that you read this section closely, as the specific wording of a definition can sometimes make a significant difference in how to interpret certain rules.

340-122-0215 Scope and Applicability

This describes the types of releases that are covered by OAR 340-122-0205 through 340-122-0360. Note that some petroleum releases normally covered under this portion of the regulations may, in certain cases, be covered under a different set of rules:

- Releases from UST systems containing hazardous substances other than petroleum are covered under OAR 340-122-0010 through 340-122-0115.
- Releases from heating oil tanks are covered under OAR 340-177-0001 through 340-177-0095.

340-122-0217 Requirements and Remediation Options

This is an important rule to review and understand because it summarizes the overall requirements for the entire set of UST cleanup rules and describes the options that you have for completing a petroleum cleanup. It basically tells you:

- All sites must be taken through certain initial phases of work such as initial response and abatement measures, free product removal, site characterization, and finding the extent of soil and groundwater contamination.
- After the initial phases are complete, then a number of options are available for finishing the cleanup of the site — low-impact site cleanup (OAR 340-122-0243), risk-based remediation carried out under a corrective action plan (OAR 340-122-0244 and 340-122-0250), generic remedies (OAR 340-122-0252), or soil matrix cleanup (OAR 340-122-0320 through 0360).
- You may achieve the final remediation of your site by using a combination of the options listed above except for the low-impact site option, which must be applied separately.

If you follow and understand the diagram given in Section 2.2: Rules Flowchart, then you will have a very good idea of what this rule covers.

It is important to keep in mind that all measures that you take to comply with the UST cleanup rules are subject to Department review and approval. This is to ensure that the measures taken are appropriate for the site conditions and circumstances of the petroleum release. Before using non-standard investigation or remediation methods, it would be in your best interest to first get approval from the Department. If you do not get prior approval, DEQ may later reject your work. Also, depending upon what cleanup options are used, your actions may be subject to public review and comment in addition to Departmental review.

340-122-0218 Sampling and Analysis

This rule lists the requirements and options you have for sampling and analyzing soil and groundwater samples when you are investigating a petroleum release. Note that when you are first trying to determine the extent of contamination you may choose the most efficient and cost-effective techniques to investigate your site. However, when soil and water samples are collected and tested to determine if your site meets the relevant cleanup requirements, then you must use the methods laid out in this rule. This is to ensure that you have employed adequate methods and to provide the Department with data sets from consistent methods for better comparison of data. You may propose alternative sampling and analytical methods to DEQ to demonstrate compliance. However, you should get prior approval from DEQ or your work may be rejected.

What you decide to test for will depend in part on what method you decide to use to clean up your site. For example, if you have a fairly minor release limited to soil and decide that the soil matrix is the best option for your site, you may be able to investigate and clean up the site using only tests for TPH. In many cases — especially when groundwater is contaminated or when you are considering risk-based decision making — you will have to test for specific components of petroleum such as benzene, toluene, ethylbenzene and xylenes (BTEX), or polynuclear aromatic hydrocarbons (PAHs). These individual petroleum constituents are often referred to as “contaminants of concern” (COCs). For more information about COCs, we recommend that you refer to the document entitled *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003).

Besides the typical petroleum hydrocarbon constituents like BTEX and PAHs, products like gasoline usually contain additives such as methyl tertiary-butyl ether (MTBE). This is further complicated by the fact that gasoline formulations have changed over time. For example, tetraethyl lead (TEL), ethylene dibromide (EDB) and ethylene dichloride (EDC) were used for decades in leaded gasolines, but have been phased out since 1986. The end result is that the types of COCs that you test for will depend not only on the product type (*e.g.*, gasoline or diesel), but also on the age of the release. It is up to you to consider the history of the site and what products have been handled in the past as well as the present when considering what tests to run.

Rules 0205 through 0218 specify the circumstances under which they are to be used, define terms, and provide general overall direction with respect to remedial options and testing requirements. Starting with the next section — 0220 — specific requirements are laid out for you to implement the rules.

340-122-0220 Initial Response

For every suspected or confirmed release, you must do certain things right away, including:

- Stop the release;
- Remove the potential for fire or explosion; and
- Report the release to DEQ within twenty-four hours.

Service Providers must report the release within 72 hours if you do not.

For information on reporting a release, please refer to Section 1.1: How to Report an Underground Storage Tank Petroleum Release.

340-122-0225 Initial Abatement Measures and Site Check

After you have stopped the release, taken all emergency measures, and reported the release to DEQ, you must:

- Remove product from the tank and piping as needed;
- Keep product from spreading;
- Take initial soil and/or water samples;
- Sample for vapors or fumes if necessary;
- Prevent any hazards that may result from the removal of product, contaminated soils and backfill; and
- Check whether free product is present. If free product is found, you must remove as much of it as possible, following OAR 340-122-0235.

After taking the above measures, submit a report summarizing these actions to the appropriate DEQ regional office. This report is due within twenty (20) days after the release has been confirmed, or within another reasonable period of time approved by DEQ.

Note: If your site has been assigned an UST Cleanup project manager, check with this person to determine the appropriate reporting time for your site. For a more detailed discussion of how to prepare reports and what type of information to include, please refer to Section 3.1: Writing Cleanup Reports and Corrective Action Plans.

340-122-0230 Initial Site Characterization

The next phase of the investigation requires gathering information about your site and the nature of the contamination. The goals of this phase are to estimate how contaminated the soil and groundwater are as well as to gather enough information about the site and its surroundings to assess the potential impact of the release. Therefore, you will usually collect and analyze additional soil and/or groundwater samples⁷, search for nearby wells, locate buried utilities, identify critical habitats or wetlands, *etc.*

Within forty-five (45) days after confirming the release, or within another reasonable period of time approved by DEQ, you must submit a report summarizing the site characterization. Include a description of the nature and quantity of the release as well as how much product was recovered. Also include a detailed site plan drawn to scale identifying adjacent properties, buildings, tanks and excavations, and all groundwater wells. Data from all soil and groundwater samples collected during the initial site check and the site characterization should also be included in this report.

Note: If your site has been assigned an UST Cleanup project manager, check with this person to determine the appropriate reporting time for your site. In some cases, it may be appropriate to submit only one combined report in place of the 20-day and 45-day reports.

340-122-0235 Free Product Removal

Remove all free product (*i.e.*, unconfined petroleum products on the ground or in water) discovered during the initial abatement measures as soon as possible from all tank excavations, pits, ditches, wells, and any other locations. Remove not only the free product that you can readily pump, but also any product that you can remove using absorbent materials. For recent releases, you may significantly reduce the spread of contamination if you take quick action at the outset and take out as much free product as you are able to remove. This may make later cleanup efforts easier and less costly. Include in your

⁷ Soil samples are typically tested for TPH and, if risk is being considered, also for likely contaminants. Groundwater samples are usually tested for constituents. See Section 3.3: Analytical Requirements.

45-day site characterization report information about the type and thickness of product found, how much product was recovered, and what you did with it.

After completing the initial site characterization, you should review all available data about your site and consider the following:

If you still do not know the full extent or depth of the soil contamination, or if groundwater may have been contaminated and you need to determine the extent of the contaminant plume, then you must continue with an investigation for the magnitude and extent of contamination as directed by OAR 340-122-0240.

If you have enough information about the location and composition of all of the petroleum contamination on your site, then you are ready to think about what cleanup option to choose:

- Soil matrix cleanup (OAR 340-122-0320 through 0360);
- Risk-based decision making proposed under a corrective action plan (OAR 340-122-0244 and OAR 340-122-0250);
- Generic remedy (OAR 340-122-0252);
- Any combination of the above three options; or
- Low-impact site cleanup (OAR 340-122-0243).

340-122-0240 Investigation for Magnitude and Extent of Contamination

As mentioned in the text box above, you must apply this rule if the information gathered during the initial site characterization (OAR 340-122-0230) is not sufficient to describe the full extent of the petroleum contamination at your site. The goal, obviously, is to complete your investigation for the full magnitude and extent of both soil and groundwater contamination. This may require test pits, soil borings, push probes and/or installing monitoring wells to collect soil and groundwater samples. Soil gas analysis or grab samples from well-points may also be helpful in surveying the extent of the contaminant plume. At a fairly complex site, you may need to perform this phase of the investigation in a number of steps. The contaminants that you must test for depend on the type of petroleum product or products released at your site. Please refer to the discussion under OAR 340-122-0218 for more information about the types of samples and analyses that may be required.

Note: Groundwater samples must be collected and analyzed for the appropriate contaminants at sites where soil contamination extends down to, or is in close proximity of, the seasonally high water table. Because most petroleum products are less dense than water, the water table acts as a confining layer that restricts the downward migration of the petroleum. Depending on the location of your site, the water table may fluctuate up to 10 feet seasonally. As the water table drops, it can effectively leave the contamination hanging within the vadose zone. When assessing the vertical extent of soil contamination, a rapid decline in TPH levels can indicate that you are within the zone of groundwater fluctuation. Therefore, some knowledge of local hydrogeologic conditions is necessary before you can determine that groundwater has not been impacted by the release.

During your investigation, be aware that many petroleum cleanup sites also contain contamination from leaking waste oil tanks. Used crank-case oil often contains high concentrations of heavy metals and aromatic hydrocarbons such as benzene. Waste oil tanks have often also been used to dispose of chlorinated solvents and other non-petroleum products. If you find that your site also includes waste oil contamination, you must do other tests in addition to the usual HCID and TPH tests, namely, you must collect at least one sample of heavily contaminated soil and test it using approved EPA SW-846 methods for:

- BTEX;
- PAHs;
- Volatile chlorinated solvents; and
- Toxicity Characteristic Leaching Procedure (TCLP) for cadmium, chromium and lead.

If the waste oil tank has been used for purposes other than storing automotive waste oils, you must also test for Polychlorinated Biphenyls (PCBs). If any of these contaminants are detected in a sample from your site, please discuss this situation with the appropriate regional UST Cleanup project manager to decide how to proceed. If none of the above contaminants is detected, analysis for Total Petroleum Hydrocarbons (Method NWTPH-Dx) will usually be sufficient for any subsequent soil samples from the waste oil area.

For your investigation to be complete, it must reveal the full horizontal and vertical extent of the soil and groundwater contamination, both on-site and off-site.

Furthermore, relevant numerical data from the site must clearly support the reported magnitude and extent. This is critical to the success of your project. If the investigation report is incomplete, DEQ will request further investigation. An incomplete site investigation is probably the most common mistake made at UST cleanup sites.

After the investigation is complete, then you must decide what method or methods you want to use to remediate your site. Your options are discussed in the following rules.

340-122-0243 Low-Impact Sites

The purpose of the low-impact site (LIS) option is to provide a streamlined process for use at operating gas stations or other industrial or commercial properties. This option allows these facilities to remain in operation while you manage any potential risk from contamination remaining at the site.

The LIS option is designed to be used only at sites that meet certain requirements. The site requirements are listed in OAR 340-122-0243(1). Note that some of the requirements are not cleanup requirements, but pertain to property use and how severe the release is. If these requirements are not met, then the site cannot taken through the LIS option. For example, if the property is being sold or developed for residential use, then the LIS cleanup option cannot be used. This option is only for commercial or industrial facilities that plan to remain in business. This could include certain government facilities where children are not routinely present such as highway or forest service facilities and prisons.

Most of the remaining requirements in OAR 340-122-0243(1) are cleanup requirements. In other words, if they are not met, this does not rule out the use of the LIS option. It simply means that you must take the necessary remedial actions to meet these requirements before you can close the site under the LIS option. For example, if you have gasoline-contaminated soil at your site that exceeds 1000 ppm TPH, then this soil must be treated or removed so that what remains does meet this requirement.

In some cases you may decide to use institutional or engineering site controls (*i.e.*, risk management) instead of actually cleaning up the soils or groundwater to the acceptable cleanup levels.

If you decide to propose using site controls, you should talk to the appropriate UST Cleanup project manager about their application and possible consequences. DEQ requires deed restrictions on your property to ensure that the controls remain in force. If you use site controls on your property, you must notify DEQ of any future changes to the property that might affect these controls. Also, public notice will be required if institutional or engineering controls site are needed to meet the cleanup requirements. See Section 3.4: Site Controls for more information on this topic.

As with any of the cleanup options, you are required to submit a report to DEQ documenting the work carried out at the site. Carefully review and follow the LIS reporting requirements listed in OAR 340-122-0243(3). For more detailed information about the LIS cleanup option, including a checklist and description of what to include in a LIS Report, please refer to *Guidance for Applying the Low-Impact Site Rule to UST Cleanup Sites* (DEQ, January 2008).

340-122-0244 Risk-Based Concentrations

This section of the rules defines the basic requirements for developing and applying risk-based concentrations (RBCs) to set cleanup levels for your site. If you intend to apply RBCs at your site, you may either use generic numbers from tables prepared by DEQ, or calculate site-specific RBCs. The tables of generic RBCs are not included in the rules, but can be found in Appendix A of *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003).

Before you can apply any RBCs, either generic or site-specific, you must develop a conceptual site model, which includes:

- A description of all known or suspected sources of contamination;
- An evaluation of how and where the contaminants are likely to move (“pathways”); and
- An assessment of who or what is likely to be affected by the contaminants (“receptors”).

Developing a CSM requires not only a thorough investigation of the contamination (what kind, how much, and where), but also information about climate, geology and hydrogeology as well as local land and water uses. The goal of the CSM is to use everything you know about your site to show the contamination sources, extent and magnitude of contamination, concentration trends, and a summary of pathway-specific risks at the site. Risk pathways might be summarized in a table or flow chart and should be accompanied with supporting documentation. An example of a risk pathway is “The benzene in this soil may pose a risk to downgradient residents by leaching into the groundwater and contaminating the drinking water.” The specific requirements for the CSM, including the pathways and exposure scenarios that you should consider, are given in OAR 340-122-0244(1). The contaminants that you should include are covered in OAR 340-122-0218.⁸ These are sometimes referred to as the contaminants of potential concern (COPCs). For more detail on how to develop a CSM, see *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003).

After you have completed the CSM, you need to determine an appropriate RBC for each contaminant by each of your risk pathways. Using the example in the previous paragraph, you would need to determine a soil concentration for benzene that would be low enough so that you are not likely to create an unacceptable risk to downgradient residents who use the groundwater for drinking water. Although you may use either generic or site-specific RBCs, DEQ recommends that you always start by screening the list of contaminants found at your site using the table of generic RBCs mentioned above.

Continuing with the example of benzene leaching to groundwater, the DEQ Table of RBCs lists 0.044 mg/kg (44 ppb) as the RBC for this combination of contaminant, pathway and receptor. If benzene in the soil at your site does not exceed this concentration, then no remediation would be necessary for the benzene-contaminated soil for this pathway (i.e., leaching to groundwater and being consumed as drinking water). If it does exceed this concentration, then the benzene would be referred to as a contaminant of concern (COC) and you have the option of:

- Calculating a site-specific RBC to determine if a less stringent standard can be applied at this site; or

⁸ OAR 340-122-218(2) allows the Department to request testing for additional contaminants not listed in the rule if conditions warrant. For a list of contaminants that may be required at your site please refer to the Table of RBCs in Appendix A of *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003).

- Cleaning up the benzene contamination in the soil so that no remaining contamination exceeds the 44 ppb generic standard; or
- Using institutional and engineering controls to reduce risk in those areas where the soil concentration exceeds the risk-based concentration.

Note: If you propose using institutional controls, you must include enough discussion to show how risks are avoided over time and under all likely circumstances. You might do this through modeling or testing. This could require analysis of such things as the characteristics of the shallow aquifer and how likely it is to become contaminated; or, if groundwater were to become contaminated, how likely it would be to travel off-site. See Section 3.4: Site Controls for more information on institutional and engineering controls.

Each relevant combinations of contaminants, pathways and receptors at your site must be evaluated in this fashion. If the concentrations detected at your site are low enough that they do not exceed any of the generic RBCs, the easiest way to close the site may be to use the Department's *Generic Remedy for Simple Risk-Based Cleanups*. Information, applicability and reporting requirements about this generic remedy can be found in Section 4.0 of the document *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003).

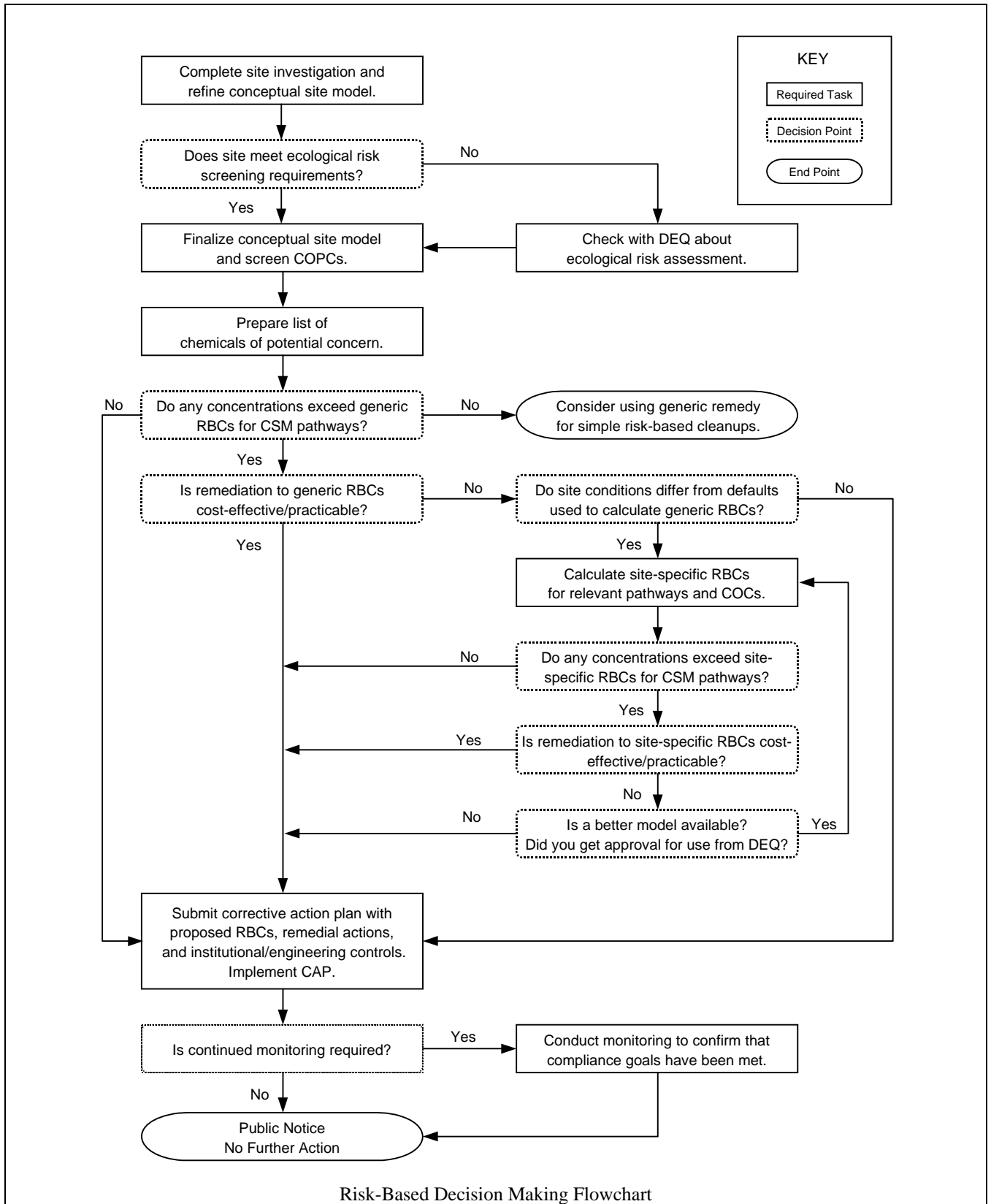
If you decide to calculate site-specific RBCs, DEQ recommends that you start by following the process used for the generic RBCs. This is explained in detail in Appendix B of *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003). Suggestions for site-specific calculations are also provided in that document. After you have calculated site-specific RBCs, compare your sample data to these RBCs. If concentrations at your site do not exceed the site-specific RBCs, then you may want to propose that the site be closed. If contaminant levels exceed the site-specific RBCs, your options are to perform additional cleanup, or to consider using institutional and engineering controls to reduce risk at the site.

The RBCs mentioned above are used to evaluate potential risk to human health. Before your site can be closed under the risk-based option you must also show that there are no unacceptable risks to ecological receptors (e.g., wetlands). For most typical gas station sites this will only require that you screen your site with the four conditions listed in OAR 340-122-0244(3). If your site does not meet all of these screening requirements you may be asked to carry out a basic ecological risk assessment. More information about this type of assessment can be found in *Guidance for Ecological Risk Assessment - Level I: Scoping* (DEQ, 1998). (See Section 5.2 for the web address of this document.)

All risk-based cleanups, except for those that are closed under the generic remedy mentioned above, are required to:

- Be submitted to the Department in a corrective action plan (OAR 340-122-0250); and
- Receive public notice before final approval (OAR 340-122-0260).

For more information about conceptual site models and risk-based concentrations, including tables of generic RBCs, and guidance for calculating site-specific RBCs, please refer to *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003). A flowchart which shows the steps and options in the risk-based decision making process is provided on the next page for your reference. Also see Section 5.2: Additional Guidance Documents for more information on institutional controls, land use and beneficial water use.



340-122-0250 Corrective Action Plan

The UST Program has received many questions and comments about what to include in corrective action plans (CAPs). People often assume that CAPs must be long, complex reports. Although such a document would be appropriate for a complex site, we would like to make it clear that a CAP should be no more complex than the site. It should tell us what happened, what you did, what your goals (cleanup levels) are, and how you propose to reach your goals. It should include sufficient information to describe and support your proposal as well as demonstrate to us that what you plan to do will likely work. A small site may only need a 5-10 page CAP whereas a large site may need a 50-100 page CAP. Don't skimp, but don't overdo it.

This rule lists the information that you must include in a corrective action plan (CAP). You will have to submit a CAP when you are proposing to use:

- Site-specific RBCs as your cleanup levels; and/or
- Institutional or engineering controls to reduce exposure to contaminants at your site.

We may also require you to prepare a CAP in certain other cases depending on site conditions.⁹

In your CAP you should tell us how you will respond to each COC in contaminated soil and groundwater. The main thing to keep in mind is that the CAP must adequately describe the site and what was found there, and include sufficient information to support the proposal that you are making. Relatively complex sites may require a detailed CAP. However, CAPs for relatively simple sites may be quite short and not significantly different than what you would submit for a soil matrix or low-impact site. The main difference is likely to be that the CAP will need to include information about why you eliminated certain pathways, how you calculated site-specific RBCs and may also include a discussion of the proposed engineering or institutional controls.

Many CAPs submitted in the past have been considered incomplete. DEQ returns these with requests for more information. To avoid this difficulty and delays in cleaning up your site, keep in mind the three following important points:

- 1. You shouldn't submit a CAP until you have determined the full magnitude and extent of all contamination (soil, groundwater, surface water, and vapors both on- and off-site).**

Make sure that the numerical data and figures from your site clearly support any statements made about the extent of contamination. Any CAP submitted without first determining the magnitude and extent of soil and groundwater contamination will be considered incomplete.

In some cases you may be asked to begin developing a CAP while you complete the delineation of soil and groundwater contamination. This request is generally made if the initial site characterization indicates some form of corrective action is necessary although the full scope of the remediation project is still unknown.

- 2. It is not necessary to wait until a CAP is approved in order to perform corrective actions, unless implementation of the corrective action carries additional human health risks that must be evaluated.**

Because environmental cleanups are complex, it may take a long time to move your site through the necessary regulatory steps. It is not unusual for delays to occur while you are preparing a report or while we are reviewing it. During this time, however, the contamination at your site may continue to move, making it more difficult and expensive to clean up. Therefore, throughout the cleanup process, you are not only allowed (OAR 340-122-0250(11))

⁹ CAPs are not required for soil matrix or low-impact site cleanup projects. They may also not be required in certain generic remedies, but you should refer to the specific generic remedy guidance to see what type of reporting is required.

but also encouraged to take steps to limit the environmental impact of the contaminants. Note, however, that you must notify DEQ about such activities, comply with any conditions DEQ may impose, and incorporate any steps you take into your CAP. For example, vapor extraction systems and recovery wells may be operating before submitting the CAP. These actions should be described in your CAP.

3. A CAP must include enough design and test data to show that the plan is adequate for its purpose.

The CAP should demonstrate, using test data, that actions being taken are likely to be effective. For example, recovery wells or vapor extraction systems should have enough field data to show that they cover the entire contaminated area and operate effectively.

Specific requirements for submitting progress reports during implementation of the CAP are not listed in the rules. You should discuss progress report requirements with the appropriate regional UST Cleanup project manager. For more information on writing CAPs and other reports, please refer to Section 3.1: Writing Cleanup Reports and Corrective Action Plans.

Note: Since investigations and cleanups tend to be conducted in phases, it is important to submit reports to DEQ at appropriate intervals.

340-122-0252 Generic Remedies

This rule authorizes the DEQ to develop “generic remedies” for petroleum cleanups. A generic remedy is a cleanup option designed to apply to a specific group of cleanup projects with similar properties or characteristics. In developing a generic remedy, the Department must seek public input and review before publishing the final document. However, developing a generic remedy is not a rulemaking action, and generic remedies can be more easily modified (after public review) if information changes over time.

Unlike the other rules discussed above, there is nothing in this particular rule that applies to you when cleaning up your site. What you do get out of this rule, after we develop them, are streamlined approaches to cleanup that can be applied to certain categories of sites.

So far we have developed two generic remedies that apply to petroleum-contaminated sites:

- *Generic Remedy for Simple Risk-Based Cleanups*, which can be found in Section 4.0 of the document *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003); and
- *Heating Oil Tank Generic Remedy Guidance Document* (DEQ, Updated August 2007).

Please refer to those documents for the specific details of each generic remedy.

340-122-0260 Public Participation

Public participation is an important part of the UST Cleanup program. This rule implements the statutory requirement for DEQ to maintain a list of all confirmed UST releases. You may request a copy of this list from DEQ, or find it on our web site.

If a release requires a Corrective Action Plan (OAR 340-122-0250) or implementation of engineering or institutional controls, we must notify potentially affected property owners and the general public. Notice may be given in various ways, but usually includes publishing a press release or requiring the responsible person to notify adjacent property owners. In addition, DEQ may hold public meetings to inform interested persons of the actions proposed or to hear comments from the public about a specific cleanup project.

340-122-0320 Soil Matrix Cleanup Options

The soil matrix cleanup option is covered by rules OAR 340-122-0320 through 340-122-0360. As implied by its name, this option is designed only for soils. However, if your site has both soil and groundwater contamination, you may choose to use the soil matrix option for the soils and another option, such as the risk-based concentrations, for the groundwater.

Under this option you must first decide whether to:

- Choose the most stringent soil matrix cleanup level, in which case you don't have to do a site-specific evaluation; or
- Evaluate your site as outlined in the rules and use the resulting soil matrix cleanup level.

You might decide to immediately choose the most stringent cleanup level to avoid having to determine site-specific evaluation factors such as depth to groundwater or native soil type. Another reason to choose the most stringent cleanup level might be to try to minimize any potential future liability at the site. In most cases, however, you will probably want to determine a site-specific cleanup level to potentially reduce your cleanup costs.

340-122-0325 Evaluation of Matrix Cleanup Level

This part of the matrix rules tells you how to determine the required soil cleanup level for your site. First, you must assign scores to the five site-specific factors listed in OAR 340-122-0330. Then compare your total score to the table given in OAR 340-122-0335.

340-122-0330 Evaluation Parameters

The five site-specific parameters that you must evaluate to calculate your soil matrix score are depth to groundwater, mean annual precipitation, native soil type, sensitivity of the uppermost aquifer, and potential receptors. Many people may think it best to hire a licensed Soil Matrix Service Provider to do the work for them. However, it should not be necessary to perform any specific scientific tests to evaluate these site-specific parameters. In most cases, the desired information is readily available.

For example:

- Depth to groundwater: Talk to the owner of a nearby shallow well or call the local Water Master or a local well driller.
- Mean annual precipitation: Call the National Weather Service. (Note: You should NOT reduce the rainfall amount for your site just because your property is paved.)
- Native soil types: Examine these materials when you dig up the tank.
- Sensitivity of the uppermost aquifer: Talk to the local Water Master, the Health Department or the Water Resources Department.
- Potential receptors: Estimate by obtaining information about wells in the area from the local Water Master, the Water Resources Department, or by asking people in the neighborhood if they have private wells.

340-122-0335 Numeric Soil Cleanup Standards

This rule tells you what your soil cleanup level is based on your site's matrix score and on the type of petroleum product that was released. After you have evaluated the five parameters for your site, assign the proper score to each one. Then total the scores and use them to determine whether the site is Level 1, 2 or 3 as explained in section (1) of the rule. To determine the required cleanup level, you must also know and prove, by means of specified analytical methods, the nature of the petroleum contamination. To accomplish this, you must collect a sample of obviously

contaminated soil and have it analyzed using the Department-approved Hydrocarbon Identification Test (Method NWTPH-HCID). After you know the product type, you can use the table in section (2) of this rule to set your soil matrix TPH cleanup level.

If the contamination being cleaned up on your property is from:

- Gasoline spills or releases, you must use the gasoline cleanup levels listed in the table.
- Diesel, heating oil, or some other non-gasoline petroleum product covered by the rules, you may use the diesel cleanup levels.
- A mixture of gasoline and a non-gasoline product such as diesel, then the gasoline component must meet the gasoline cleanup levels and the non-gasoline component must meet the diesel cleanup levels.
- Waste oil, you must first do some additional testing before you can use a matrix cleanup option at your site. See OAR 340-122-0340(6) for the additional tests required for contamination from waste oil tanks.

Note: DEQ does not recommend nor require the use of specific cleanup methods. For minor releases, the quickest and least expensive cleanup method may simply be removal and proper disposal of the contaminated soil. However, as landfills close and tipping fees increase, other options may need to be considered.

340-122-0340 Sample Number and Location

The soil matrix option was designed as a streamlined process for closure when dealing with a simple, soil-only site. As previously stated, however, it may be used in combination with other options at more complex sites. Most simple soil matrix cleanups receive little or no DEQ oversight. Therefore, it is important that you collect enough samples from the proper locations so that when we review your report we have enough information to decide if the work has been completed correctly. Otherwise you may have to take equipment and personnel back on site to collect the sample data you need. This rule lays out the sampling requirements for the soil matrix option.

The simplest sites will typically require only two soil samples, collected in native soil just beneath each end of the tank. But this will be sufficient only if there is little or no obvious contamination. If you find contamination that exceeds the soil matrix cleanup level for your site, you must remove or clean up the most obviously stained or contaminated soils, and then collect additional samples from those areas. Most sites will probably require more than two samples. For example, if you have cleaned up several distinct areas of contamination on your site, you must take at least one discrete sample from each area. Also, if piping has not been removed during excavation, you must sample below the piping at 20-linear-foot intervals and under dispenser islands.

If the tank pit contains water, you must follow special requirements. First, pump the water from the pit. Then, if water returns to the pit within twenty-four hours, you must collect a water sample. You should collect the sample as soon as enough water has returned to the pit to allow you to use the sampling device. In this situation, you must also collect soil samples from the walls of the pit, at the level where the water was first found before you pumped it out (*i.e.*, at the soil-water interface).

The required tests in these cases are:

- Soil samples must be tested for total petroleum hydrocarbons (TPH), using the analytical method for the type of contamination at the site (*e.g.*, gasoline, diesel, waste oil, *etc.*); and for benzene, toluene, ethylbenzene and total xylenes (BTEX).

- Water samples must be tested for BTEX at a minimum. Because of concerns about fuel additives, we have also been asking for MTBE testing in water samples at most sites.¹⁰ At sites where diesel or other non-gasoline products have been released, you should also test for polynuclear aromatic hydrocarbons (PAHs).

Note: The soil matrix option allows you to use TPH analyses on groundwater samples as a preliminary screen for PAHs. The TPH method detection limit must be no greater than 0.5 ppm. Any groundwater sample for which TPH is detected must be analyzed for PAHs by the methods specified in OAR 340-122-0218. Although this may be a useful screen for very simple sites, at more complex sites where risk questions may arise you will be better off having the actual PAH results. For this reason, we normally recommend that you skip the screen and test directly for PAHs.

If you encounter contamination from a waste oil tank, you must follow special requirements. When there is a release from a waste oil tank, you must collect a sample of the contaminated soil and test it for the presence of non-petroleum contaminants such as volatile chlorinated solvents, leachable metals (cadmium, chromium, and lead), and, in some cases, PCBs. Note that this must be an obviously contaminated sample. You should try to obtain a sample from the most contaminated area (“worst case” sample). The purpose of this sample is to identify constituents in the waste oil contamination, not to confirm that you have reached a particular cleanup level. You must prove to the Department that there are no non-petroleum contaminants in the release of waste oil in order to get approval to use soil matrix cleanup levels for waste oil contamination.

340-122-0345 Sample Collection Methods

You must collect soil and water samples in ways that will not cause volatile compounds to be released to the air. Therefore, as you collect the samples, disturb the soil as little as possible. Collect and store all samples individually in proper containers, and store them immediately on ice. **Composite samples¹¹ are not acceptable.** You must also carefully label each sample, mark its location on a site diagram, record the name of the sample collector, note any unusual conditions that you encounter during sample collection, and use proper chain-of-custody procedures.

If you intend to collect your own samples, you should contact the laboratory that will analyze your samples and get the proper sampling equipment. The laboratory will usually also be able to give you tips on collecting samples as well as on logging, handling, storing, filtering, and transporting the samples. Make sure that you fill out chain-of-custody forms for all of your samples. Proper handling and documentation are critical. If there are doubts about the sample collection methods used at your site, you may be required to collect and analyze another set of samples.

340-122-0355 Evaluation of Analytical Results

When the results of your sample analyses come back from the laboratory, you should examine the data to determine if your site meets the required soil matrix cleanup standards. This will usually require only a simple comparison of the lab results to the site-specific soil matrix cleanup level. However, you should contact the appropriate regional UST Cleanup project manager to discuss how best to proceed if:

- Water samples analyzed are found to contain detectable levels of BTEX and/or MTBE; or
- Waste oil contaminated soil samples are found to contain detectable levels of BTEX, volatile chlorinated hydrocarbons, PCBs or leachable metals.

If contamination remains at a concentration greater than the calculated numeric soil cleanup level, you will usually have to perform additional cleanup. When you think the contamination has been adequately cleaned up, another round

¹⁰ If you have a question about MTBE testing, check with a UST project manager at the appropriate regional office.

¹¹ Composite samples are made up by mixing several samples from different locations into one final sample. Such mixing of samples is not allowed.

of samples will be required to confirm that the final levels are within acceptable limits. Confirmation samples must be analyzed using the appropriate TPH test method.

Sometimes pockets of contamination exceeding the soil matrix cleanup levels are located under buildings or in other locations where further cleanup would be expensive relative to the risk posed by the contamination. In such cases, you may be able to get permission from DEQ to leave this contamination in place, as specified in OAR 340-122-0355(4). To do this you will usually have to collect additional samples to determine where the remaining contamination is located, and estimate both the volume and average concentration of contamination in the “pocket” that you would like to leave on site. Remaining contaminant concentrations in the pocket must not exceed the generic risk-based concentrations listed in Appendix A of *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003). If the concentrations exceed the RBCs, you may no longer be able to use the soil matrix option for that portion of the site. You should refer to OAR 340-122-0217 Requirements and Remediation Options or contact the appropriate regional UST Cleanup project manager to discuss how to proceed.

340-122-0360 Reporting Requirements

When soil matrix work at the site has been completed, you must submit a report to DEQ as described in this rule. The report must include a written description of all activities that took place at the site, and other necessary items such as a site map, copies of laboratory data sheets, and completed matrix score sheet and checklist. You must submit this report to us within 60 days of completing the work at your site.

Because soil matrix sites are typically cleaned up with little or no oversight by DEQ, UST Cleanup project managers depend heavily on information in the matrix report to determine if work has been done properly. If you submit incomplete reports, it will cause delays in completing work at your site and may require you to take more soil samples or collect other missing data. Please carefully review the requirements of OAR 340-122-0360 and refer to other sections of this cleanup manual for the matrix checklist and scoresheet and additional information on writing reports.

After a regional UST Cleanup project manager has been assigned to your project (refer to Section 1.7: Cost Recovery for Departmental Oversight Work for information on how projects are assigned), the final report will be reviewed and you will be notified whether:

- No further action is necessary at your site;
- More information must be submitted before a decision can be made; or
- Contamination remains that is outside the scope of the soil matrix option and you must select another cleanup option for part or all of your site (see OAR 340-122-0217).

SECTION 3: UST CLEANUP GUIDANCE

SECTION 3.1: WRITING CLEANUP REPORTS AND CORRECTIVE ACTION PLANS

The UST cleanup rules require you to submit reports to DEQ at key points during the investigation and cleanup of petroleum releases. These reports range in complexity from the straight-forward summary of initial response and abatement measures (the “20-day” report), to the detailed presentation of a corrective action plan (CAP). Please remember that some documents, such as quarterly reports, can be streamlined as long as they contain all the required elements. This section of the UST Cleanup Manual provides suggestions to help you prepare reports and CAPs. If you follow these suggestions your UST Cleanup project manager should be able to review your report more quickly.

Note: This is not the only guidance document that contains information on writing reports. Other sources of information are:

- A summary of reporting requirements for low-impact sites can be found in Section 3.4.2 of *Guidance for Applying the Low-Impact Site Rule to UST Cleanup Sites* (DEQ, January 2008). A checklist is also included in Appendix C of that document to provide you with additional assistance.
- Information on developing a CAP for risk-based sites can be found in Section 3.2.3.2 of *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003).
- The reporting requirements for the generic remedy for simple risk-based cleanups are given in Section 4.4 of *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003).

3.1.1: General Information

When preparing a report, keep in mind that your report must:

- Provide up-to-date status about conditions at the site so that we can decide if the work being done is acceptable and if actions being proposed are both reasonable and appropriate; and
- Stand as a permanent record that will remain in the Department’s files and can be reviewed by interested parties who want to know what cleanup activities took place at your site.

For these reasons, it is important that each report be independent. In other words, when a series of reports are submitted over time for a given site, it should not be necessary to read all previous reports to obtain an overview of what has been done at the site since the release occurred. This does not mean that you will have to repeat everything contained in previous reports, but it does mean that past activities discussed in detail in earlier reports should be summarized in subsequent reports. You may need to repeat certain items from past reports if they are essential to the discussion in the current report. For example, to describe trends, you will always need to include a complete listing of both old and new data. In general, however, much information from earlier reports can be summarized and specific references provided to those reports in case the reader wants to look up the details on a certain item.

3.1.2: Generic Report Outline

You should consider the outline below to be an example of what would be needed in a report for a risk-based site. Most reports will not require all of the information listed below. The table in the next section has been developed to help you decide what types of information to include in the different reports that are due at various stages of the cleanup process.

Generic Report Outline

- i. Table of Contents
- ii. List of Figures
- iii. List of Tables
- I. Introduction
 - A. Progress Summary
 - B. Site Description
 - C. Background
 - D. Site Maps
 1. General Location Map
 2. Detailed Site Plan
- II. Regional and Local Geology and Hydrogeology
- III. Technical Information
 - A. Soil and Groundwater Sampling
 - B. Subsurface Investigation
 - C. Field Tests
- IV. Results
 - A. Presentation of Data
 - B. Discussion and Analysis of the Results
- V. Conceptual Site Model
 - A. Sources
 - B. Exposure Pathways
 - C. Receptors
- VI. Corrective Action Measures
 - A. Cleanup Options
 - B. Contaminants of Concern and Risk-Based Concentrations
 - C. Cleanup Actions Already Taken
 - D. Future Cleanup Activities
- VII. Conclusions
- VIII. Supporting Documentation (Appendices)
- IX. References

3.1.3: Minimum Reporting Requirements

As mentioned in the previous section, these guidelines are meant to apply to a wide variety of UST Cleanup reports as well as corrective action plans. Therefore, not every topic listed on the generic report outline on the previous page will be appropriate for every report. However, unless otherwise directed by the UST Cleanup project manager assigned to your site, you must cover the following topics when preparing reports associated with the stages of the UST cleanup rules listed below:

For reports on:	Include the following sections from the main outline in Section 3.1.2:
Initial Response and Abatement Measures (20-day report)	i-iii I.A, I.B and I.D IV VII-IX
Initial Site Characterization (45-day report)	i-iii I III.A, and III.B IV and V VII-IX
Investigation for Magnitude and Extent of Contamination	i-iii I-V VII-IX
Quarterly Reports (e.g., groundwater monitoring reports)	i-iii I III and IV VII-IX
Corrective Action Plan	i-iii I-IX
Soil Matrix Cleanup Reports	i-iii I.A, I.B and I.D III.A VII and VIII Matrix score sheet & checklist

The specific information that you must include for each of the required topics is discussed in the next section. Please refer to that section for guidance when preparing your reports and CAPs. If any of the required information cannot be obtained, you must include a statement to that effect in your report. If you omit required information because it seems irrelevant to your site, you must include a rationale for this omission in your report. Remember: *the complexity of the site and the stage of the investigation determines the complexity of the report.*

Note: If you have any questions about what items must be included in your report or what level of detail is necessary, please contact the appropriate regional UST Cleanup project manager.

3.1.4: Material to Include in Reports and Corrective Action Plans

The guidance presented below lists the specific items to include in various sections of your reports, and discusses how some of the material should be presented. Explanatory material is presented in regular type. Subjects you should consider including, depending on the conditions at your site, are listed in *italics*.

For easy reference, the opening pages of all reports and CAPs should include:

Table of Contents
List of Figures
List of Tables
Signature Page (include licensing information, professional stamps, and other relevant information about the authors of this document.)

I. INTRODUCTION

The introductory sections of a report should provide a summary of pertinent historical information as well as a description of the site. The site description should be complete enough so that a person who has never visited the location can follow arguments made in the report as well as anticipate the potential impact of the release on the local health, safety, welfare and the environment.

A. Progress Summary

You must include a narrative section summarizing the work done at the site since the release was detected. This section should generally be written for a non-technical audience. The technical details should be discussed later in a separate technical section. For portions of the project that have been previously reported, a brief overview should suffice. Where needed, be sure to include references to previous reports. The narrative should provide a more detailed discussion of work completed since the last report.

The stage of the project and the contents of previous reports will determine which items are summarized briefly and which are discussed in detail in the summary section. However, you should typically include:

- *How the current release was detected (routine decommissioning, etc.);*
- *What product was released;*
- *Results of an UST inventory reconciliation or other estimate of the volume of the release;*
- *Summary of any previous work done at the site related to the current release before your involvement (such as decommissioning work or initial cleanup work by another contractor);*
- *Initial abatement measures that were taken;*
- *Observations made when the tanks were removed such as color of soil, odor, product age, holes in tank, etc.;*
- *Locations of observed contamination;*
- *Quantity of free product recovered;*
- *What you have done to determine if there is any potential vapor impact from the source as well as from any contaminated materials (soil, water, free product) removed from the ground;*
- *Approximate volume of all contaminated soil, free product or groundwater removed from the site, and what was done with them;*
- *What was done with the decommissioned tanks and associated piping (if unused piping was not removed, explain why not);*
- *Description of activities to monitor contaminants (test pits, soil borings, well installations, soil gas, etc.);*
- *Description of how you did the cleanup, e.g. all activities to remove contaminants (excavation, pumping, vapor extraction, etc.);*
- *Description of any unusual conditions or problems encountered; and*
- *Description of who collected the samples, how they were collected, stored, and shipped to the laboratory.*

If appropriate, you should also include a discussion of any legal or public relations/informational activities relevant to the site.

B. Site Description

Your report should describe your site, the immediately adjacent properties and the general surrounding area. Include:

- *The address and location of the property;*
- *The size and dimensions of the property;*
- *The legal description of the property;*
- *Natural and man-made features on the property;*
- *Uses of the adjacent properties;*
- *The water supplies for area residents and facilities; and*
- *Any important natural or man-made features near the property, such as streams, wetlands, wells, sewer lines, buried or overhead utility lines (include approximate distances from the site to these features).*

C. Background

Background information should provide relevant history about the site before the discovery of the release. Include:

- *Important past uses of the property (paint shop, body shop, etc.) that may have caused some of the contamination, including the years, if known, during which the property was used for such purposes;*
- *A summary of all past complaints (vapors, water in tank, etc.) about this property including any Notices of Noncompliance or Notices of Violation issued by the Department;*
- *A summary of past releases (what happened and what was done);*
- *Current use of property; and*
- *Current owners and operators of the property/facility.*

D. Site Maps

To complete the description of the site, include at least two maps in your report.

1. General Location Map

This map should show where the site is located within the city or general surrounding area, and include:

- *Names of major streets;*
- *Location of the site;*
- *Location of wells potentially affected by the release including wells listed with the Oregon Water Resources Department and wells identified during field surveys;*
- *Location of nearby surface waters, wetlands, and other environmentally sensitive areas; and*
- *Location of any other important features discussed in the report such as possible off-site sources of contamination or receptors.*
- *A north-direction arrow (with north at the top of page, if possible)*

These items should be highlighted or clearly marked in some way on the map.

2. Detailed Site Plan

This map should have a detailed view of the site and be drawn to scale. Measuring distances to the nearest foot should be sufficient. Surveying will usually not be necessary, except you will need to survey for wellhead elevations at groundwater sites. This map must include:

- *Property boundaries;*
- *Names of surrounding streets and properties (including use of adjacent properties);*
- *Buildings and other man-made features, such as canopies, walls, wells and all buried utilities;*
- *Important natural features, such as hills, drainage ditches, surface water;*
- *Current and former tanks, both above and below ground, as well as piping and dispensers;*
- *Areas of known or suspected releases or existing contamination;*
- *Sample collection sites including samples taken during decommissioning or during previous stages of the investigation;*
- *Monitoring wells and push probe holes (shown in precise locations);*
- *Excavations, any stockpiled soil, all remaining soil contamination; and*
- *Other relevant details mentioned in the text of your report.*

All detailed maps must include a scale, a key to symbols used, a north-direction arrow (with north at the top of page, if possible), and, when known, the direction of groundwater flow.

II. REGIONAL AND LOCAL GEOLOGY AND HYDROGEOLOGY

Include information discussing relevant features of the regional and local geology and hydrogeology. Initial site reports may include mostly general information obtained from published reports. By the time you submit a CAP, you should have done enough studies to include detailed site-specific information. Include:

- *The climate;*
- *The regional and local geology;*
- *The local topography and other features that may control surface and subsurface flow;*
- *Discussion of major surface drainages in the vicinity;*
- *Local soil type and characteristics;*
- *Regional groundwater flow direction;*
- *Depth to first groundwater and seasonal fluctuations;*
- *General description of deeper aquifers including potential or known connection to other aquifers;*
- *Groundwater quality and use of local aquifers;*
- *Nature of aquifer materials including permeability, transmissivity, and porosity of potentially affected aquifers;*
- *The magnitude and direction of vertical and horizontal gradients as well as the mean velocity of contaminated or potentially contaminated groundwater;*
- *Seasonal variations in groundwater flow directions; and*
- *Appropriate maps.*

Maps should be included showing water table elevations, groundwater contours, and groundwater flow directions for aquifers of interest in the vicinity of the site. **Well locations should be clearly shown to scale on these maps.**

III. TECHNICAL INFORMATION

You should discuss all aspects of the work at a cleanup site in the Progress Summary section of a report; however the technical details not immediately relevant to that discussion are best covered separately in a “Technical Information” section. Some topics best handled in this way are:

A. Soil and Groundwater Sampling

Whenever samples of any kind are collected, you must discuss the complete sampling program. Sampling may be the most critical part of the work done at your site and should be very carefully planned BEFORE any samples are taken.

To avoid common problems that occur in investigating petroleum-contaminated sites, make sure that you:

- Are aware that composite samples are NOT acceptable for volatile materials, nor are composite samples acceptable for any confirmation samples;
- Sample and analyze for non-petroleum contamination if that is warranted (such as in cases of waste oil contamination - see OAR 340-122-0218 in Section 2.5: Summary of Each Rule);
- Determine the specific analytical methods needed for your samples and check that the laboratory that you are planning to use is capable of performing these methods;
- Check with the laboratory to find out if they can generally attain a detection limit low enough for your purposes; and
- Always measure the depth to groundwater and purge well(s) before every groundwater sampling event.

Discussion of your sampling results should include:

- *Where samples were collected (include the depth of soil samples) and why you chose these locations ;*
- *The relationship between sample locations and known areas of contamination;*
- *Well purging rates, volumes, methods, and water disposal;*
- *How the samples were collected, preserved and stored (give details);*
- *Soil sample description including lithology, odor, color, staining and whether the soil was removed or left in place;*
- *Who collected the samples;*
- *What quality assurance measures were taken (how the sampling equipment was cleaned);*
- *What quality control measures were taken (field blanks, travel blanks);*
- *How the samples were packed and transported to lab;*
- *Use of proper chain of custody procedures;*
- *What was the length of time between sampling and analysis;*
- *To what lab were the samples shipped; and*
- *What analytical methods you requested (give the specific EPA method numbers) and why.*

B. Subsurface Investigation

Include pertinent technical design and installation information and why you used those methods and equipment. Discuss:

- *Choice of well and push probe location(s);*
- *Well design as related to proposed use;*
- *Well installation methods, data, as-built diagrams and logs (include names of the well driller and person who logged the wells);*
- *Soil samples collected during drilling and field vapor screening;*
- *Reason for choice of materials used, depth of installation, length and location of screened interval, slot size and filter pack grain size;*
- *Well development methods;*
- *Well development or production rate and water disposal;*
- *Parameters used to determine when development was complete; and*
- *Any problems or unusual circumstances encountered during the installation and development of the wells.*

Remember that all groundwater monitoring wells must be installed by a licensed Monitoring Well Constructor and registered with the Oregon Water Resources Department (WRD) in accordance with OAR 690-240-0005 through 690-240-0180 (*Construction and Maintenance of Monitoring Wells and Other Holes in Oregon* (WRD, 1995)). For information on these rules, contact the Water Resources Department at 503-378-8455. For additional guidance please refer to *Groundwater Monitoring Well Drilling, Construction, and Decommissioning* (DEQ, 1992).

C. Field Tests

Include technical details for all field tests in your reports. Such tests include aquifer characterization tests as well as preliminary design/operational tests on pump-and-treat, vapor extraction, air stripper, bioremediation or other remediation systems. Include:

- *Details of test method procedures;*
- *Reference to published articles describing chosen tests;*
- *Reasons for choosing test methods used;*
- *Methods used for analysis of data;*
- *Numerical results of tests; and*
- *Site maps showing location of equipment, resulting cones of depression, groundwater or soil vapor capture/extraction zones, and any other relevant details.*

If equations or graphs were used to arrive at the final results, be sure to include those equations or graphs (and their references) in the report. If computer software packages were used to obtain the results, provide appropriate references and rationale for chosen algorithms.

IV. RESULTS

Data gathering at UST cleanup sites is generally done for one or more of the following reasons:

- To prove or disprove the presence of contamination;
- To identify the nature of the contaminants;
- To determine the magnitude and extent of the contamination; and
- To show changes/trends in contaminant levels over time.

When preparing the part of your report that discusses the results of the sample analyses, you should keep in mind the purpose(s) of your data so that you can focus your discussion.

A. Presentation of Data

The easiest way to present your data is to display it in tables. It is recommended that you present your data in a table or series of tables even when part or all of it is also displayed in some other form such as on maps or graphs. You should include historical data for each sampling point in tables. Tables are easy to use for a quick review of what was found at the site and any data trends over time. In addition to data tables, you should display key data elements visually (*i.e.*, on maps). Always include one or several maps showing:

- *Current sample results posted on site maps at the sample locations;*
- *Plume outline, and if data permits, water table elevation contours;*
- *Dissolved contaminant concentration contours;*
- *Approximate boundaries of contaminated area(s), including off-site contamination;*
- *Groundwater flow direction arrows;*
- *Lithologic cross-sections derived from well logs or borings;*
- *Graphs of concentrations versus time; and*
- *A graph of concentration versus distance from the source area, along the plume centerline.*

When appropriate, include old and new data on the same maps or diagrams. Be sure to identify which values are from which sampling event. In some cases, a series of maps or charts showing changes over time may be the best way to make your point. The maps and graphs mentioned above will be invaluable in showing that groundwater plumes have stabilized.

If you intend to use commercial computer software packages to produce concentration or elevation contours, be aware that they must be used with caution. You should examine such diagrams carefully to make sure that they are consistent with the available data. You may need to experiment with the algorithm, smoothing, grid spacing and other factors to show your data in a way that most reflects your interpretation of the sample data. The most common problem with such diagrams is extrapolating the data, that is, displaying estimated concentrations or elevations outside the area where data have been collected.

B. Discussion and Analysis of the Results

Although this may be the most important component of reports, it is by far the most neglected component. It is not enough to simply present the data collected at your site, you must also carefully analyze and discuss the meaning of the data.

In the discussion and analysis section, you should:

- *Relate the soil and groundwater contamination to the known sources of contamination as well as to each other;*
- *Specifically address the types of petroleum products released and the contaminants of concern which were tested for and found in the groundwater;*
- *Relate groundwater contaminant plumes to direction and velocity of groundwater flow;*
- *Show changes in water table elevation and discuss how those changes may have affected contaminant concentrations;*
- *Discuss the currently known vertical and horizontal extent of the soil and groundwater contamination; and*
- *Examine the data to determine if the known extent of contamination also appears to be the full extent of contamination.*

If there has been more than one sampling event at your site, you should also:

- *Provide a summary of ALL of the data that have been collected;*
- *Discuss any trends in the data;*
- *Relate measured trends to possible natural causes such as dilution by recharge or movement of the plume; and*
- *If appropriate, relate measured trends to corrective actions taken.*

When you have completed this section of the report, review what you have written and make sure that the data support your position. For example, don't make comments about "typical background levels" without providing either measurements of background values or properly-referenced data from an outside source. Also, don't state that biodegradation will eliminate the remaining contamination without specific evidence from your site. Finally, when you discuss trends in your data, make sure that you can support your statements with graphs or statistics.

V. CONCEPTUAL SITE MODEL

You should begin work on the conceptual site model early in the investigation so that you can identify data gaps and collect information needed for risk-based decision making. After determining the current locations and levels of contamination at your site, you **MUST** evaluate the migration pathways and potential effects of this contamination. For this you must consider:

A. Sources

Discuss the type of product(s) released including:

- *When and where the release occurred;*
- *Media (e.g., soil, water) contaminated and contaminants of concern in each medium;*
- *Distribution and concentration of contaminants in each medium;*

- *Chemical and physical properties;*
- *Relevant components of the petroleum products that are likely to present a risk (e.g., benzene in gasoline);*
- *Persistence (i.e., is it likely to evaporate or degrade right away or will it remain); and*
- *Potential for migration.*

B. Exposure Pathways

Humans can be exposed to toxic substances if they breathe them in, eat or drink them, or through contact with the skin. These exposure pathways are discussed in the document *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, 1999). You should provide site-specific information to support whether you included or excluded all standard pathways. Summarize existing data showing how far the contaminants have migrated both on- and off-site and use these in a discussion of:

- *How close they are to both surface and groundwater;*
- *Groundwater and surface water discharge points;*
- *Current and future uses of groundwater including results for well surveys or beneficial use studies;*
- *The potential for the contaminants to continue migrating;*
- *The potential exposure pathways and estimated concentrations; and*
- *Whether an ecological risk assessment is needed for animals or plants.*

C. Receptors

Having covered the nature and extent of contamination, discuss the populations that may be at risk from the contaminants at your site. Cover reasonably likely future uses and include:

- *Information about the current uses of your site and adjacent properties;*
- *Identification of wells within one mile of your site and their uses including not only wells listed with the Oregon Water Resources Department, but also wells found in field surveys, including such information as:*
 - *Well owner, address and map location;*
 - *Driller and date drilled;*
 - *Total depth of the well;*
 - *Reported or measured depth to water;*
 - *Casing and screen materials;*
 - *Screened interval;*
 - *Seal types, depths and intervals;*
 - *Static pumping levels;*
 - *Approximate land surface elevation; and*
 - *Reported water quality and use of well.*
- *The potential or actual adverse impacts on human receptors, ecosystems, natural resources, and the environment.*

VI. CORRECTIVE ACTION MEASURES

You must include this section of the report in all corrective action plans prepared under OAR 340-122-0250. In it you must identify actions to protect public health, safety, welfare and the environment from the release of contaminants at your site. Although CAPs must also include the other sections listed in this outline, in most cases the detailed information required for those sections will already have been covered in previous reports and you will only need to summarize it as appropriate for the CAP. However, if you have carried out further investigations since the last report, discuss these in detail in the appropriate sections of the CAP. In this section, be sure to cover each of the following topics:

A. Cleanup Options

Discuss the cleanup options you considered for this site. Such options may include:

- *Soil excavation and treatment or disposal;*
- *In-place soil treatment, either active or passive (e.g., natural degradation with monitoring);*
- *Free product recovery;*
- *Groundwater removal and treatment;*
- *Groundwater gradient control;*
- *Vapor control measures;*
- *Replacing the drinking water supply; and*
- *Relocating the resident(s).*

B. Contaminants of Concern and Risk-Based Concentrations

You should include risk-based concentrations for all applicable pathways at the site and a thorough justification, including modeling or calculation results, for any site-specific risk-based concentrations. If you have carried out site-specific modeling, you should include either in this section or in an appendix at the end of the report:

- *The name and description of all models used for your calculations;*
- *A brief discussion of why the models are appropriate for your site-specific calculation;*
- *A table listing all of the input values that you used when running the models;*
- *A brief explanation as to where you obtained the input values and why you chose each one — these will typically fall into one of three categories:
 (1.) *site-specific data,*
 (2.) *laboratory data, or*
 (3.) *estimates from scientific literature;**
- *A discussion of the sensitivity of the model to the input values and what ranges of data you may have tried before settling on your final set; and*
- *A discussion of the uncertainty in the model input values.*

It is usually much better to show the range of options you tried when experimenting with the modeling than to just present one final result. This makes it easier to follow your modeling logic.

For groundwater contaminants, include specific information about:

- *Each of the detected contaminants of concern; and*
- *The compliance points where the risk-based concentrations will be attained.*

C. Cleanup Actions Already Taken

It is important to remember that you are not only allowed, but also encouraged to perform cleanup activities to reduce the spread of contaminants even before the CAP has been submitted or approved. This may be done as long as you notify DEQ about such activities, comply with any conditions that DEQ may impose, and incorporate the cleanup measures taken into your CAP. Therefore, the corrective actions discussed in your CAP should not simply be brief theoretical summaries of what might be done. Your report should cover what you have already done in addition to any future actions that you are proposing for the site (see next section). Include information related to:

- *Design, specifications and installation of the equipment being used;*
- *Operational parameters such as pumping rates, flow rates, and discharge rates;*
- *Location of recovery wells, vapor extraction systems; and*
- *Reasons for choosing the items listed above (include discussion of preliminary data confirming the effectiveness of the remedial actions).*

D. Future Cleanup Activities

Based on the current information about the system, discuss:

- *The possible need for expanding the system to completely capture the contaminant plume;*
- *Operational and maintenance needs of the system and how you will address them;*
- *Planned monitoring activities to evaluate the effectiveness of the system;*
- *How you plan to analyze the data to prove that the cleanup levels appear to have been met and the system can be shut down; and*
- *What monitoring you will do after the system has been shut down to confirm that final cleanup levels have been met at the site.*

Be sure to include necessary site maps, equipment diagrams and specifications, and relevant equations and calculations that confirm that your system has been designed and is operating correctly.

VII. CONCLUSIONS

You should always include in your report a section summarizing key findings and conclusions about the investigation/corrective action activities. When preparing this section, answer any of the following questions appropriate to your stage of investigation:

- *Have you located and removed or remediated known sources of the contamination both on-site and off-site?*
- *Are there any remaining problems with vapors?*
- *Have you defined the full magnitude and extent of both soil and groundwater contamination?*
- *Are any of the contaminants still moving, and, if so, where to, and what are the potential impacts?*
- *Are the corrective actions producing the desired results?*
- *Will you use any institutional or engineering controls to achieve closure?*
- *What is the compliance monitoring schedule?*
- *Will further work be needed?*

Note: A recommendation for “no further action” must be justified. If you cannot support your recommendation, it will likely be rejected.

If more work is needed, include:

- *Your plans for further action;*
- *A schedule of estimated dates for these activities; and*
- *A proposed date for submitting the next report to the Department.*

VIII. SUPPORTING DOCUMENTATION

Be sure to attach appendices to your report with relevant supporting documentation. Include such items as copies of:

- *Laboratory data sheets;*
- *Chain of custody forms;*
- *Well start-cards;*
- *Water Resource Department well logs for existing wells in the vicinity of the site;*
- *Push probe/soil boring, monitoring well and test pit logs;*
- *Receipts for disposal of contaminated soil and/or water;*
- *Receipts for disposal of tanks and piping;*
- *Discharge permits or agreements with local waste-water treatment plants for disposal of contaminated water;*
- *Photographs; and*

- *Information on any fate and transport model used in the risk-based analysis of indoor/outdoor air, groundwater and surface water.*

IX. REFERENCES

If your report refers to any previous reports, technical or scientific papers, Environmental Protection Agency guidance documents, or other outside documentation, you must include a separate section with complete bibliographic information including the names of the authors, publishers and publications as well as dates published and pages cited.

These guidelines are intended to be a summary of the topics most often covered when reporting typical activities at UST Cleanup sites. Specific topics not discussed will usually still fall into one of the categories covered above; you should treat them with a similar level of detail. It bears repeating that since this information is meant to apply to a wide variety of reports, not every comment will be appropriate for all reports. You will need to use your best professional judgment in deciding what applies to a report on your specific site. If you have questions, you should discuss them with the appropriate regional UST Cleanup project manager.

SECTION 3.2: EXAMPLE REPORTS AND OUTLINES

As mentioned before, the report must fit the site and more complex sites will have more complex reports. Therefore, in a guidance document like this it is difficult to tell you exactly what you need to put in any specific report. Some reports, however, such as the 20-day report and the soil matrix report, are more straight forward and generally include the same information from site to site. To assist you with these reports, we have included in this section:

- A four page “fill-in-the-blanks” 20-day report that you can photocopy from this manual, fill in, and submit to fulfill that reporting requirement; and
- An outline including a description of the type of information that must be included in a soil matrix report.

These reports can be found on the following pages.

NOTE: The most current versions of UST and UST cleanup forms, including interactive forms that can be filled out right on the screen and then printed, can be found on DEQ’s Website at: <http://www.deq.state.or.us/pubs/forms.htm>. DEQ recommends you either use the interactive forms or download the most current versions to use.

Section 3.2.1: Initial (Twenty Day) Report Form for UST Cleanup Projects

This report is due twenty (20) days from the date of the release.

DEQ USTC File No. _____

DEQ Facility ID No. _____

Site Name: _____

Site Address: _____

INITIAL CLEANUP INFORMATION

(1) Type of contamination (check all that apply):

Gasoline Diesel Waste Oil Heating Oil

Other (specify) _____

(2) Estimate quantity of release (based on information known to date):

<100 gal. 100-499 gal. 500-999 gal. 1,000-5,000 gal. >5,000 gal.

SITE INFORMATION (Circle N for "no" or Y for "yes")

(3) **N Y** Did any water enter the excavation? If yes, please describe and identify the depth to groundwater in feet below ground surface: _____

(4) **N Y** Was a sheen or odor observed on any water in the excavation?

Note: If groundwater is encountered, soil samples from the soil/water interface must be collected and analyzed for BTEX and by the appropriate TPH method.

At sites where diesel or other non-gasoline products have been released, the water may also have to be screened or tested for polynuclear aromatic hydrocarbons (PAHs). Refer to OAR 340-122-0218.

(5) **N Y** Was water pumped from the excavation?

N Y If yes, did groundwater recharge within 24 hours after pumping?

Please describe the pumping procedure and disposal option selected for the purged excavation water:

(6) **N Y** Were there any water samples collected from the excavation?

If yes, please describe:

(7) **N Y** Have any soil and/or water sample results been received at this time?

If so, please attach any lab reports.

IF GROUNDWATER HAS BEEN ENCOUNTERED, PLEASE ANSWER QUESTIONS #8-13, BELOW.
IF NO WATER HAS BEEN ENCOUNTERED, PLEASE SKIP TO QUESTION #14

- (8) What are the known uses of groundwater within a 500-foot radius of the release site?
 non-use industrial agricultural drinking supply
- (9) If groundwater in this area is being used as a drinking water supply, please check the type and size of population served by the supply:
 Community (community well used for drinking water year round)
size: <1,000 people 1,000 - 5,000 people >5,000 people
 Intermittent use (public water used for drinking water only on a part-time basis)
size: <50 people 50 - 300 people > 300 people
 Private wells (individual private well or wells used for drinking water)
size: <10 people 10 - 25 people >25 people
- (10) **N Y** Is there any evidence this water supply has been or is likely to be impacted from the petroleum product release? If yes, estimate how difficult it would be to replace the existing supply:
 bottled water is the only alternative
 on-site water treatment; bulk water delivery; new wells are available
 able to connect to existing water supply
 do not know what alternatives would be available
- (11) **N Y** Are/were there any vapors present in on-site or nearby buildings? If yes:
A. Are you monitoring and/or mitigating any potential fire and safety hazards posed by vapors and free product? Explain: _____

B. Estimate the number of people potentially affected by vapors:
 1-2 people 3-10 people >10 people
- (12) **N Y** Are vapors or is petroleum contamination present in the utility corridors?
If yes, please explain:

- (13) **N Y** Are there natural areas within 1/4 mile of the site? If so, please describe types (parks, rivers, wetlands, sensitive habitats, etc.) and proximity: _____

- (14) **N Y** If groundwater was not encountered in the excavation, do you believe that this cleanup project can be conducted under the requirements for an UST Cleanup Matrix site? If yes, then refer to OAR 340-122-0305 through 0360.

AREA/SITE CONDITIONS:

- (15) Mean annual rainfall: ___ <20 inches ___ 20-45 inches ___ >45 inches
- (16) Soil type(s) of the naturally occurring soils, not the backfill around the tank:
- ___ clays, compact tills, shales, and unfractured metamorphic and igneous rocks
 - ___ sandy loams, loamy sands, silty clays, clay loams, moderately permeable limestone, dolomite, sandstones, moderately fractured igneous and metamorphic rock
 - ___ fine and silty sands, sands and gravels, highly fractured igneous and metamorphic rock, permeable basalts and lavas, karst limestones and dolomites

SOIL MANAGEMENT

- (17) If soil sample results have been received:
- N Y** Will the level of contamination detected require removal of contaminated soil for treatment or disposal?
- (18) All contaminated soil temporarily stockpiled on-site prior to treatment or disposal must be contained within a bermed area, kept covered, and the entire area secured to prevent unauthorized access by the public. If you haven't done this, please explain why:

Note: It is a violation to stockpile petroleum contaminated soil (PCS) on-site for greater than 30 days without a DEQ Solid Waste Letter Authorization (SWLA) Permit. See Section 1.4: Permit Requirements for UST Cleanup Sites.

- (19) If contaminated soil is currently stockpiled on-site, please indicate when disposal will occur or when treatment will begin: _____
- (20) Estimated volume of contaminated soil (specify tons or cubic yards): _____
- (21) Intended disposition of soils (please check one):
- ___ On-site/off-site treatment, Solid Waste Letter Authorization Permit Application attached.
 - ___ Thermal treatment off-site at an authorized facility.
Facility name: _____
 - ___ Landfill disposal.
Name of Landfill: _____

Note: Please attach additional information as necessary to explain any unusual circumstances associated with this project.

This initial report is intended to provide the Department with the basic initial information about activities associated with the release. Future reports should provide a more detailed and complete picture of the cleanup project.

Please be aware that a DEQ permit/authorization is required for the following activities:

- 1) Soil aeration, bioremediation (on-site or off-site), or on-site thermal treatment.
- 2) Water discharges to a stream/storm drain from the excavation or treatment tank.

If these activities will be included in your cleanup project, contact the regional DEQ office for the appropriate application forms, information on permit fees and guidance documents.

THIS REPORT WAS PREPARED BY:

Individual: _____ Phone: (____) _____
Company: _____
Address: _____
City: _____ State _____ Zip _____

**Please return this form to the regional office in which the site is located.
Addresses and phone numbers for these offices can be found in Section 1.2: UST Program Offices.
If you have questions, call the contact person in your regional office.**

**REMINDER: For non-heating oil tanks, you must submit a UST Decommissioning/
Change-in-Service Report form and a UST Decommissioning Checklist to the appropriate
regional office within 30 days of the UST decommissioning.
See SECTION 4: FORMS USED FOR UST CLEANUP PROJECTS, for copies.**

**Failure to do so can result in delays to your project and
may result in continued billing for the tank permit fees.**

KEEP A COPY OF THIS REPORT FOR YOUR FACILITY RECORDS

Section 3.2.2: Soil Matrix Report Guidance

In general, matrix reports will not require the level of detail that must be included in many of the other reports submitted in compliance with the UST cleanup rules. However, the rules require that certain information be included in all matrix reports. Since a soil matrix cleanup will not be considered complete until a report has been submitted and approved, it is important that such reports be properly prepared. This will help reduce the time that it takes for the Department to review and respond to your report.

It is recommended that soil matrix reports be prepared as outlined below.

- I. All Matrix reports should begin with a narrative section describing:
 - A. How the release was discovered, what initial measures were taken to control the spread of contamination, what was observed when the tank was removed from the pit (odor, sheen, stained soils, holes in tank or lines, *etc.*);
 - B. How the cleanup was done and what was done with the contaminated soils and the decommissioned tank and piping (copies of receipts and other records related to this step should be included);
 - C. Who collected the samples, how they were collected, stored and shipped to the laboratory; and
 - D. Any unusual conditions or problems that were encountered.
- II. If there is any soil remaining at your site which contains contaminant levels in excess of matrix cleanup levels (“pocket of contamination”), you must describe where it is located, why you left it, provide an estimate of the approximate volume and level of contamination, and list the concentrations of any contaminants that may contribute to volatilization to indoor or outdoor air.

Remember that you must have the Department’s approval to leave such contamination at a matrix site. Therefore, this should be discussed while cleanup is in progress, not after the report has been submitted.
- III. If you encountered any water in the tank excavation(s), you must describe what you did with the water. If water returned to the pit within 24 hours after pumping, you must sample the water and report the results to the Department. You should discuss the results of the tests in your report. Include a summary of any discussions that you had with the Department on this subject.
- IV. If your site contained any contamination associated with a release from a waste-oil tank, you must provide the results of the special analytical tests required for such contamination, and discuss measures taken for removing and handling this contamination, or any decisions made by the Department regarding this contamination. The location and magnitude of any remaining waste oil contamination must be specifically discussed.
- V. Include a detailed sketch of your site which is neatly drawn and clearly labeled to show:
 - A. The location of buildings and other key features, both man-made and natural;
 - B. The names of adjacent streets and properties;
 - C. The location of excavations including those that were for the removal of tanks and associated piping as well as those that were strictly for the removal of contaminated soils;
 - D. The location of product storage tanks, lines and dispensers, including those that were decommissioned as well as those that remain on the site;

- E. The locations from which soil and water samples were collected. These locations should be marked with identifying sample numbers that correspond to the numbers used in tables and laboratory data reports. Be sure to clearly identify the locations associated with waste oil contamination.; and
 - F. The location of any contaminated soil which exceeds matrix cleanup levels but which has been left with approval of the Department.
- VI. Include copies of the completed matrix score sheet and checklist. These documents can be found in Section 4.4: Soil Matrix Checklist and Score Sheet.
- VII. Include copies of all laboratory data sheets for samples collected at the site plus copies of the chain-of-custody forms. Also include copies of all receipts for the disposal of free product and/or sludges, contaminated soil and water, and decommissioned tanks and piping.

<p>A copy of the matrix report must be submitted to the appropriate regional office of the Department of Environmental Quality <u>within 60 days</u> of completing work at any matrix site.</p>

SECTION 3.3: ANALYTICAL REQUIREMENTS

The analytical requirements for UST cleanup sites have become more complex as the program has evolved from TPH-based soil matrix cleanups to constituent-based risk-based decision making. Also, the current rules provide you with a range of cleanup options, not all of which will have exactly the same requirements. Please refer to the overall sampling and analysis rule (OAR 340-122-0218) for the general requirements as well as to any specific information listed under your chosen cleanup option. This section provides some additional discussion and guidance on the analytical requirements.

3.3.1: General Comments

Except for fairly small and simple cases, most UST cleanups will be carried out in phases. Different phases may have different purposes and, therefore, may require the use of different analytical methods. The methods will also depend upon the cleanup goals for your site. For example, during the initial site characterization it is helpful to collect a number of soil samples and test them for TPH to give you a quick and less expensive picture of how widespread the contamination is at your site and to identify the type(s) of product released. The TPH results may also be useful to direct a soil matrix cleanup on all or part of your site. However, site conditions may require you to go back and collect additional samples to test for constituents like BTEX, PAHs, lead, and MTBE. This information can help you construct a conceptual site model so you can base your cleanup levels and site closure on risk. You may choose to collect both kinds of samples at once to save the costs of a second sampling trip. That's up to you. In most cases, however, several sets of samples collected at different stages in the overall cleanup process will be required.

3.3.2: Required Analytical Methods versus Simplified Field Tests

When you collect a sample, there is one very important question to keep in mind: What is the purpose of the sample? Are you collecting it just to get an idea of where the contamination is located, or are you trying to get some data to show that your site meets the required cleanup levels for the cleanup option you have chosen? If it is the first case, then you may use any sample collection and analytical procedures you choose that will help you determine the extent of contamination (e.g., visual observations of staining, sheen, noticeable petroleum odors). You may also use less expensive field methods that will give approximate results quickly and efficiently. It is only when you collect the data that you plan to use to demonstrate that your site meets the cleanup levels that you must use the methods specified in OAR 340-122-0218 (see rule citation below). Note, however, that the results of all tests must be documented in reports submitted to the Department.

OAR 340-122-218(1): "To streamline the investigation of petroleum UST release sites, a responsible person may use expedited site assessment methods (e.g., push probe samplers) for sample collection and analysis as long as all methods and results are documented in subsequent reports to the Department. However, samples used to demonstrate compliance with remediation levels must be collected and analyzed in accordance with this section."

3.3.3: The Role of TPH Methods

Although tests for total petroleum hydrocarbons (TPH) are older and less specific than many of the analytical methods used for risk-based decision making, the results of these tests still serve two important purposes at UST cleanup sites:

- They are used for determining the nature, magnitude, and extent of petroleum product contamination, and should be used to help characterize your site even if you intend to propose a risk-based, low-impact site, or generic remedy closure; and
- They are used for compliance purposes for any part of your site (soil only) that you decide to close under the soil matrix option (OAR 340-122-0320 through 340-122-0360).

The rest of this section will discuss the use of TPH methods as applied to soil matrix closures.

When TPH tests are going to be used for compliance, then you must use the TPH methods specified by the Department. There are three TPH methods developed for your use under specific circumstances:

- The Northwest Total Petroleum Hydrocarbon Identification test (Method NWTPH-HCID) identifies *the type* of petroleum contamination in the soil (*i.e.*, is it gasoline, diesel, or heavier hydrocarbon products).

After you use NWTPH-HCID to figure out what kind of product or products are present, then you apply one or both of the other two TPH tests (Methods NWTPH-Gx and NWTPH-Dx) to measure *how much* contamination is present.

- NWTPH-Gx is used for volatile petroleum products such as aviation and automotive gasolines, mineral spirits, Stoddard solvent and naphtha.
- NWTPH-Dx is used for semi-volatile petroleum products such as jet fuels, kerosene, diesel oils, hydraulic fluids, mineral oils, lubricating oils, and fuel oils.

This section describes when the NWTPH-HCID test must be used, and explains how to interpret the results of that test to make sure that the proper TPH tests are used at your site. A flow chart (see page 81) and several examples are also provided. Note that these TPH test methods are used not only at sites where there has been a reported release, but also at sites where tanks are being decommissioned and no release has been found. Therefore, you may have to collect different types of samples for the NWTPH-HCID test.

If you are working on the cleanup of a reported release, the NWTPH-HCID test must be performed on an obviously contaminated sample - the more contaminated, the better. The purpose of this sample is to identify the type of contamination on the site. This sample will not be used to determine if cleanup levels have been met. If there is more than one separate area of contamination on the property, then at least one contaminated sample must be taken from each area and analyzed by Method NWTPH-HCID.

If you are working on a routine tank decommissioning and there are no signs of a release, then you should run the NWTPH-HCID test on samples collected from the native soils below both ends of the tank to prove that the site is clean (“confirmatory samples”).

Based on the results of the NWTPH-HCID tests, do one of the following:

- If no release has been reported, the site appears clean, and Method NWTPH-HCID shows that there is no gasoline, no diesel or heating oil and related products, no Bunker C and related products and no waste oil, then it is not necessary to follow up with one of the other TPH methods. This is the only case where a “non-detect” by Method NWTPH-HCID may be used to confirm that your site is clean. In all other cases you will be required to use one of the other TPH tests on the samples taken to show that cleanup levels have been met.
- If Method NWTPH-HCID shows that gasoline is present, but that diesel, heating oil, Bunker C, waste oil or other non-gasoline hydrocarbons are not present, then you must use the test Method NWTPH-Gx on samples taken to show that cleanup levels have been met.
- If Method NWTPH-HCID shows that diesel or heating oil is present, but that gasoline is not present, then you must use the test Method NWTPH-Dx on samples taken to show that cleanup levels have been met. If heavier fractions such as Bunker C or waste oil are present, or if a mixture of diesel or heating oil and heavier fractions are present, then you must also use Method NWTPH-Dx .
- If Method NWTPH-HCID shows that both gasoline and diesel or heating oil or other non-gasoline hydrocarbons are present, then you must run TPH tests for both types of product. That is, NWTPH-Gx must be run for gasoline and NWTPH-Dx must be run for the non-gasoline components.

For sites where the measured TPH levels exceed the required soil matrix cleanup levels, you may either clean up under the soil matrix option, or select one of the other remedial action options allowed under the UST cleanup rules. If you choose an alternative option (*i.e.*, low-impact, risk-based, or a generic remedy), you may be able to close the site without meeting the TPH cleanup levels in the matrix score. Refer to OAR 340-122-0217 for more information about the other cleanup options.

You may use a combination of cleanup options at your site, so you may be able to clean part of your site using the soil matrix option and the remaining part of your site under another of the allowable options. Refer to Section 3.5: How to Handle Sites With Multiple Cleanup Options for more information.

Example 2:

You are working at a site where a release has occurred and has been reported to DEQ. Several tanks have been removed from the pit and the soils are obviously contaminated. You collect one or more obviously contaminated samples from the pit to characterize the types of contaminants by having the lab test them by method NWTPH-HCID.

Case A - The test result shows both gasoline and diesel.

After the cleanup, you must collect at least two confirmatory samples (one per each 150 square feet) from the area that was contaminated. Each sample must be analyzed by both NWTPH-Gx and NWTPH-Dx. To comply with the rules, the results of the NWTPH-Gx tests must not exceed the appropriate gasoline cleanup level and the results of the NWTPH-Dx tests must not exceed the appropriate diesel cleanup level.

Case B - The test result shows both diesel and heavy oil.

After performing the cleanup, you must collect at least two confirmatory samples from the area that was contaminated. Each sample must be analyzed by NWTPH-Dx. The result must not exceed the diesel cleanup level.

Example 3:

You are cleaning up a site where several tanks have been removed. There are two distinct areas of contamination, one in the pit where the waste oil tank was removed and one in the pit where the product tanks were removed. You collect an obviously contaminated soil sample from each of these two locations. In addition to NWTPH-HCID for both samples, the sample from the waste oil pit must be analyzed for polynuclear aromatic hydrocarbons (PAHs), volatile chlorinated organic hydrocarbons (VOCs), and TCLP-metals (cadmium, chromium and lead).

Case A - Tank pit NWTPH-HCID indicates only gasoline.
Waste oil NWTPH-HCID indicates only “heavy” hydrocarbons (*i.e.*, heavier than diesel).
PAH, VOC and TCLP-metals tests are all negative.

Cleanup of contamination should proceed in the usual fashion. After cleanup is complete, confirmatory samples from the waste oil location must be analyzed by Method NWTPH-Dx. The result must not exceed the diesel cleanup level. Confirmatory samples from the gasoline tank pit must be analyzed by Method NWTPH-Gx. The results must not exceed the gasoline cleanup level.

Case B - Tank pit NWTPH-HCID indicates only gasoline.
Waste oil NWTPH-HCID indicates only heavy hydrocarbons.
One of the other waste oil tests detects non-petroleum contaminants.

If any of the additional waste oil tests (PAHs, VOCs, or TCLP-metals) show detectable levels of contaminants, you must report these results to DEQ. We suggest you discuss these results with the appropriate regional UST Cleanup project manager before you submit your matrix report. Depending on the levels found, this site may require cleanup under another set of rules. You should, however, be able to proceed with the cleanup of the gasoline contamination since, in this example, it is not mixed with the other contaminants. After the gasoline contamination is cleaned up, take confirmatory samples and analyze them by Method NWTPH-Gx.

Example 4:

You are working at a contaminated site where water has been found in the tank pit. You pump all the water from the pit into a holding tank. Whether or not water returns to the pit, you will have to collect a contaminated soil sample and run an NWTPH-HCID test to identify the type of contaminants at the site.

Case A - No water returns to the pit and after 24 hours the pit remains dry.

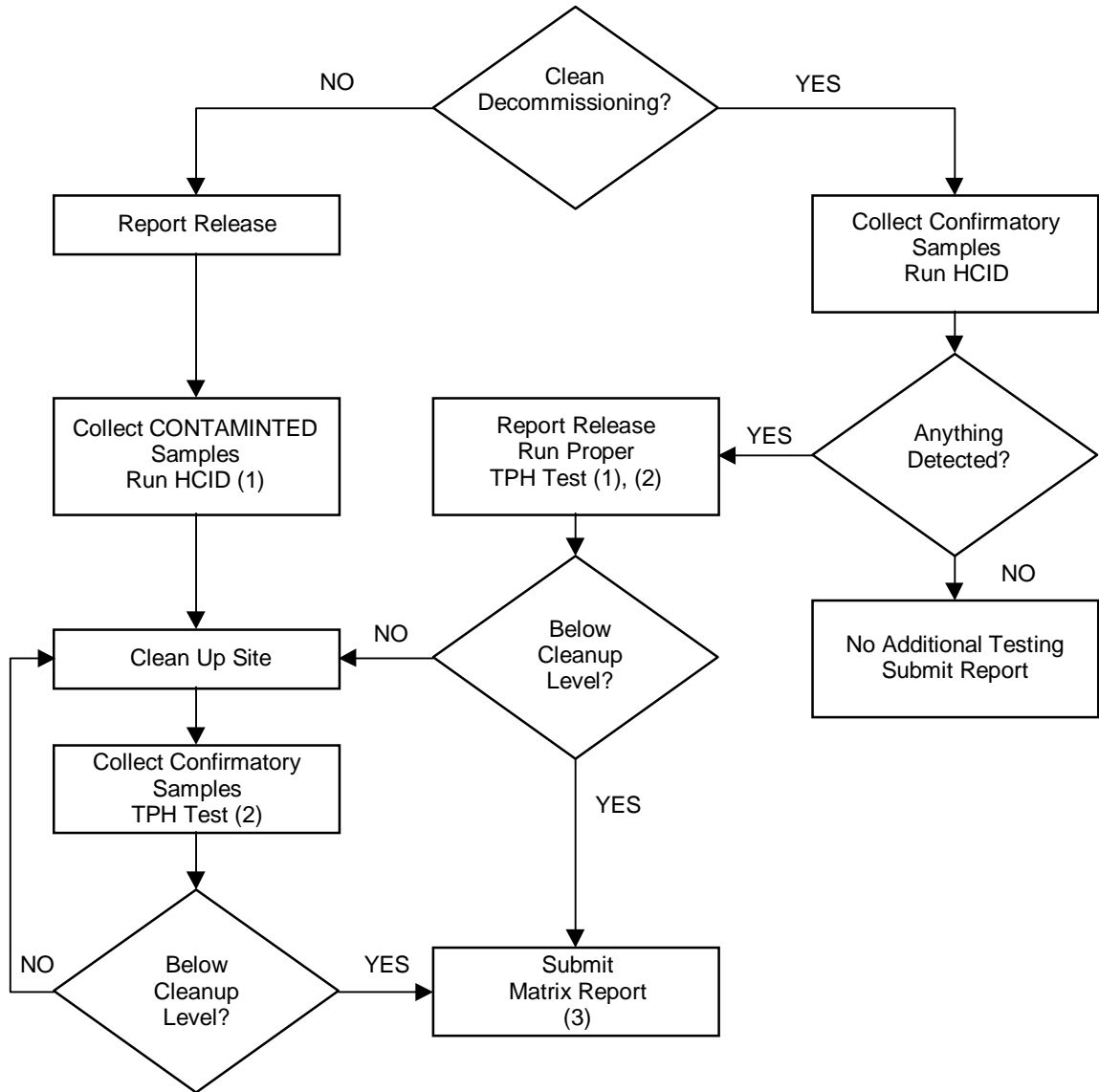
Since water did not return to the pit, you don't have to collect a water sample to comply with the Matrix rules. You should proceed with the Matrix cleanup and sampling as discussed in previous examples. The results of the NWTPH-HCID test will determine what tests to use for the confirmatory samples.

Case B - You see water immediately returning to the tank pit. In only about four hours there is enough water for you to easily collect a water sample.

Since water is obviously returning to the pit, you must collect a fresh water sample as soon as possible rather than waiting for 24 hours. You must analyze this sample for BTEX, MTBE and, if the release is from diesel or heavier products, also PAHs. You must also collect soil samples from the walls of the tank pit at the original soil/water interface and analyze these for BTEX as well as for TPH using the methods determined by the NWTPH-HCID test. You must report results of these tests and the DEQ will decide whether this site can continue under the soil matrix option, or whether investigation for groundwater contamination will be required. Even if groundwater contamination is detected, you may still choose to complete cleanup of the soil contamination using the matrix option. You would, however, also have to select another option for dealing with the groundwater contamination.

<p>Note: In all cases where water has been pumped from an excavation, you will still have to test the water to arrange for appropriate disposal. If you improperly dispose of contaminated water you may be assessed significant civil penalties.</p>

Soil Matrix Sampling Decision Flowchart



NOTES:

- (1) If water in pit or waste oil release, extra tests are required.
- (2) Proper test depends on results of HCID.
- (3) In some cases, DEQ may request more information or more work.

3.3.4: Constituent Analysis

With the possible exception of the soil matrix option, you will not be basing most final cleanup decisions on TPH results alone. Rather, you will need to collect data on a large number of individual petroleum constituents such as BTEX, trimethylbenzenes, PAHs, MTBE, and other constituents. Therefore, we recommend that even in the early stages of your investigation where you may be focusing on TPH, you should consider having some of the worst TPH samples sent off for additional constituent analysis. Not every sample will need this so you should talk to your laboratory about how many samples should be given additional tests.

The additional tests that you run on these samples — both soil and water — will depend on a number of factors including the type(s) of product released as well as the age of the release. At newer stations that have never sold leaded products, it will not be necessary to test for lead, ethylene dibromide (EDB) or ethylene dichloride (EDC). If only diesel has been released, it may not be necessary to test for MTBE. The NWTPH-HCID test along with some knowledge of the station history can help you decide what type of product you are dealing with and what types of tests are the most appropriate. If contamination is from both gasoline and diesel, you will probably need to test for the full suite of BTEX, trimethylbenzenes, PAHs, and MTBE. If there is any evidence of a release from a waste oil tank, you may also have to test for chlorinated solvents, leachable metals, and, in some cases, PCBs.

The rules do not require you to test all of these constituents at all sites, but put the burden on you to test “for all reasonably-likely contaminants of concern relevant to the petroleum released, the age of the release, and the medium contaminated taking into account appropriate remediation levels” (OAR 340-122-0218(1)(b)). We recommend that you refer to Table 2.1 in *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003) for some suggestions on what to test for based on the type of product released. Table 2.2 in that same document lists the appropriate analytical methods that you can use to test for the various groups of constituents.

Note: There are two important points to keep in mind regarding analytical methods. Both are covered in OAR 340-122-0218 and relate to the fact that as time passes, both analytical methods and petroleum products change.

(1) We may accept alternative sampling and analytical methods that have been shown to be appropriate for the contaminants of concern and the media of interest, and that have acceptable quality control measures, and limits of detection. As new methods come along — especially if they are faster and less expensive — you may propose to use them as long as they are of acceptable quality. You should always consult with us before applying any new method that is not listed in the rules.

(2) We may request additional tests if site-specific conditions warrant additional information. As new additives come along or new toxicological information is available, we may decide that we need information on a few additional compounds before a decision can be made. Likewise, some compounds or tests may be dropped from the list.

The main idea is to try to keep in mind what compounds are likely to be there and what subset of those compounds are likely to be the ones that could produce unacceptable risk.

3.3.5: Contaminants of Concern

This topic is discussed in much more detail in *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, September 22, 2003). However, it is worth reminding you here that any petroleum-contaminated site will have hundreds to thousands of different chemical constituents dispersed in the soil and groundwater. It is not your job to try to analyze all of them. Your goal is to try to determine the concentration of a relatively small group of compounds in petroleum that are currently known to be toxic and to decide if they may produce unacceptable risk at your site. The group of compounds that create an unacceptable risk is often called the

contaminants of concern (COCs). These are the compounds that you need to focus on when planning a remedy for your site.

3.3.6: Detection Limits versus RBCs

When you get data back from a laboratory you should do more than just look at the sample results. It is always a good idea to examine the detection limits and the quality assurance and quality control samples that the lab has run (such as sample blanks and standards). If you have questions about these factors you should contact your laboratory.

There are some cases where the risk-based concentration for a particular constituent is lower than can be detected by typical analytical methods. In that case, a “non-detect” will be considered acceptable proof that the contaminant is not present even though the detection limit is above the RBC. In other words, you are not required to try to find special methods to lower the detection limit below commonly achievable limits. In some cases, however, the detection limit of a sample may be unusually high. This often occurs when the sample is highly contaminated. You should check with your lab about methods that they could use to clean up the sample in order to reduce the detection limit to within an acceptable range.

3.3.7: Analytical Method Questions and Answers

The following questions and answers are included to help explain some specific matters related to analytical methods that cannot be covered under the types of general discussions covered in the previous sections. For additional general questions and answers about the UST cleanup rules please refer to Section 3.8: Answers to Common UST Cleanup Questions on page 93.

I'm planning to use risk-based concentrations for the cleanup levels at my site. Is there any reason to also test some of the samples for TPH?

Yes. TPH tests are needed to determine the nature, magnitude, and extent of petroleum contamination at your site. You should use NWTPH-HCID to identify the product, and NWTPH-G and/or NWTPH-D to determine where it is located and measure how much is present. This must be documented even in cases where risk-based decision making is used to set appropriate cleanup levels for your site.

I have noticed that the Department's Table of RBCs lists screening values for several compounds, such as 1,2,4-trimethylbenzene, that we have not been asked to test for in the past. Why have these compounds been added?

As mentioned earlier, the rules allow us to request additional tests if site-specific conditions warrant additional information. During the development of the Table of RBCs and the implementation of risk-based decision making, Department staff identified additional contaminants that have frequently been encountered at UST cleanup sites and have sufficient toxicity to warrant evaluation. To provide for these situations, we developed RBCs for four additional petroleum constituents: 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; n-propylbenzene; and iso-propylbenzene. These compounds are included on a full Method 8260 report along with many of the other potential contaminants of concern that we are seeking.

If MTBE is not detected in groundwater, is it necessary to analyze for it in soil? Conversely, I would not be comfortable in simply analyzing for MTBE in soil (lets say it was ND in soil) at a groundwater impact site.

Depending on the site, it may be sufficient to screen out MTBE by only testing for it in groundwater. If present, however, we may need soil samples to complete the evaluation of certain risk pathways. Since MTBE is included in a Method 8260 analysis, which is often used at UST sites to cover a wide range of other petroleum and non-petroleum contaminants, using this method would give you the data you need.

If lead is not detected in soil samples at a site with groundwater contamination, should groundwater samples be analyzed for lead?

The answer depends on the type of product and age of the release. At newer sites that have never handled leaded gasoline products you would not be required to test for lead at all. At older sites where leaded products may have been released, we do ask for a filtered water sample to be tested for lead.

The trend has been that DEQ asks the consultant to analyze the “hottest” soil (*i.e.*, the soil likely to have the highest concentrations). The problem is that with high BTEX concentrations come higher detection limits, and as a result, it is difficult to determine if concentrations of EDB and EDC really meet screening values. Would it be better to use groundwater as a screen for these constituents, at least at groundwater impact sites?

There will be sites where what you are proposing is probably the best solution to the problem. However, the UST cleanup rules state that “samples of all affected media must be analyzed for reasonably-likely contaminants of concern...” (OAR 340-122-0240(1)(c)). Therefore, you have to make the best choice for the conditions at your site. We do recognize that some contaminants are more likely to be found in groundwater than in soil and would take that into account when reviewing the data. The proximity of the contaminated soil to the groundwater would also be taken into account.

Would DEQ please clarify the dates they believe that additives (EDB, EDC, and MTBE) were introduced/removed from Oregon’s petroleum market to assist in the selection of constituent analyses.

MTBE and other alcohols were first introduced as gasoline additives in the mid to late 70’s. According to EPA, their use significantly increased in 1979. Though not formalized in policy, the UST program considers 1975 as the cutoff year for MTBE. Gasoline releases after that date should be tested for MTBE. EDB and EDC were used as lead scavengers in leaded gasolines. They should be tested at sites where releases of leaded gasoline are suspected.

With the methods that you reference for EDB and EDC (8021 and 8260) the reporting limits, especially in the case where there are high levels of hydrocarbons, are quite different. How should the consultant determine the method to use? Many times, 8260 is used, but the reporting limits are several orders of magnitude over the risk-based concentration.

When there is a choice of analytical methods, the RBC must be taken into account when deciding which method to apply. If no method is able to meet the risk criteria, then the method with the lowest detection limit should be used. The consultant should be working with an experienced laboratory for guidance. When possible, sufficiently low detection limits should be applied to determine the occurrence and magnitude of contaminants at a UST site.

Method 8270 for PAHs has reporting levels at 100-160 ppb for soil, and 5-10 ppb for water. These levels are significantly higher than useful when compared to the Table of RBCs. My concern is that consultants may select on the basis of price and not consider detection limits.

As the comment indicates, the reporting levels for Method 8270 are often not low enough to determine if PAH concentrations are below the RBCs. In that case, labs can apply 8270 SIM modified or 8310 using HPLC to get better detection levels. You should work closely with your laboratory when dealing with matters of detection limits.

With respect to many of the organic compounds in 8260 or 8021, reaching the reporting limit required for cleanup can be difficult, especially on highly contaminated samples. In some cases, especially where 8260 is used, with interferences commonly found in petroleum sites, the reporting limits are not reached for RBCs. What should be done in this case?

There are numerous cleanup techniques available to help, but even they are not always adequate. There will be cases where the best analytical method and cleanup combination will still have reporting limits that are higher than the RBCs. In those cases, non-detects will usually have to suffice. These situations should be explained in the report that you submit to the Department that includes the relevant data.

SECTION 3.4: SITE CONTROLS

The option of using site controls as a remedy at UST cleanup sites was made possible through legislative and rule changes in 1995 and 1998, respectively. These changes allow you to “manage risks” from contamination as an alternative to cleaning up the site to appropriate risk-based concentrations.

There are two kinds of site controls — institutional controls and engineering controls. Both are meant to eliminate risks to human health and the environment.

- An **institutional control** is a legal mechanism that restricts activities on or around a contaminated site. An example of an institutional control is a deed restriction prohibiting well construction and use of groundwater at a site where contaminant levels in groundwater exceed health-based cleanup levels.
- An **engineering control** eliminates risks by using a mechanical system to trap, treat, isolate, dilute, or vent off contamination. An example of an engineering control is pavement used as a cap over contaminated soil as a means of isolating the soil from human contact.

If you want to use site controls at an UST cleanup site, you must make that proposal in a CAP.¹² To substitute site controls for cleanup, you must demonstrate that the controls you propose will reduce human health risks from individual cancer-causing contaminants to below a 1×10^{-6} excess cancer risk or, for non-cancer causing contaminants, to below a hazard quotient (HQ) of 1. You must include enough discussion to show how all risks are avoided over time and under all typical circumstances. You might do this through modeling or testing. For DEQ to approve the use of site controls, they must be sufficiently protective, adequately maintained, and legally enforceable. In addition, your proposal to use site controls is subject to public notice requirements as part of the CAP document.

Every site *control* must have a corresponding site *restriction* to ensure that the control is properly maintained. In many cases this is handled with an “equitable easement and servitude” (ESE, more commonly referred to as a “deed restriction”). The ESE is attached to the property deed and recorded by the appropriate county. Recording the deed restriction with the county ensures that all future owners of the property are aware of contamination issues, potential restrictions on property use, and the need to maintain the controls. In some cases the restriction is written into the no further action (NFA) letter in lieu of using an ESE.

Note: Institutional and engineering controls may not permanently encumber a property. If future sampling at the site were to show that contaminant levels had subsided to below risk-based concentrations, this would allow unrestricted use of the property, and the deed restriction could be removed.

For more information, please refer to *Guidance for Use of Institutional Controls* (DEQ, 1998).

¹² Provisions are made for site controls under the low-impact site rule (OAR 340-122-0243) as well, but they are more restrictive. Refer to *Guidance for Applying the Low-Impact Site Rule to UST Cleanup Sites*, DEQ (January 2008).

SECTION 3.5: HOW TO HANDLE SITES WITH MULTIPLE CLEANUP OPTIONS

In addition to providing a number of options for cleaning up petroleum-contaminated sites, the latest version of the UST cleanup rules (effective November 2, 1998) also specifically allows you to use any combination of the following three options on a single site (see OAR 340-122-0217(1)(d)(E)):

- The soil matrix option (OAR 340-122-0320 through 340-122-0360)
- Risk-based cleanup levels proposed under a corrective action plan (OAR 340-122-0244 and OAR 340-122-0250); and/or
- Any relevant generic remedy (OAR 340-122-0252).

For example, you may have a site that has both soil and groundwater contamination. The level of contamination in the soil may be such that it could be cleaned up to the appropriate TPH level in the soil matrix option. Even though your site has groundwater contamination, you could still choose to clean up the vadose zone soils using the soil matrix option.

Obviously, you would also have to deal with the groundwater contamination since the soil matrix option does not cover groundwater. You may find that with limited groundwater treatment or with only groundwater monitoring subsequent to the soil removal, that the groundwater at your site eventually meets either the generic or site-specific risk-based concentrations. At that point you would be able to close your site under a combination of the soil matrix option and the risk-based option.

3.5.1: Reporting Requirements

If there is a project manager assigned to your project, you may want to ask if they have any preferences for how to combine the reports when two options are used. Generally, the final report will need to include the minimum reporting requirements for each section. Using the example mentioned above, that means that the section that discusses the soil cleanup must include all of the reporting requirements of a soil matrix report, and the section that discusses groundwater remediation must include all of reporting requirements of a risk based proposal under a corrective action plan.

3.5.2: Public Participation

If any of the options employed at your site require public participation, then such participation will be required for the project. So, for example, if you decide to use site-specific risk-based concentrations for the groundwater contamination, then the public participation requirements of OAR 340-122-0260 would apply to the site.

3.5.3: What about Low-Impact Sites?

The low-impact site option (OAR 340-122-0243) was designed to be implemented in its entirety at a site and therefore cannot be used with the other options. That does not mean, however, that if you decide to try the LIS option that you are trapped in that option. You always have the choice to move your project completely out of the LIS option and apply another option or set of options to it. For example, maybe you thought that you could close your site under the LIS option, but later found that it was going to be too difficult or expensive to meet the requirements. It may be that examination of the data would show that with a different level of effort you would be able to have your site meet the requirements of a risk-based closure. In that case you would simply abandon the LIS closure and proceed under the risk-based closure.

3.5.4: Analytical Requirements

Since not all of the options have exactly the same analytical requirements, moving from one option to another on part or all of your site might require you to go back and collect additional samples. That's just one of the factors that you will have to keep in mind when deciding on the best option or set of options to use for closing your site. In most cases, however, we feel that this additional flexibility will be beneficial in the long run.

SECTION 3.6: HANDLING AND TREATING PETROLEUM-CONTAMINATED SOIL

This guidance is designed to give an overview of options available for treating petroleum-contaminated soils (PCS).

3.6.1: General Information

Before removing an underground storage tank (UST), you should look at the many factors involved in deciding what cleanup option to use. Planning will save you both time and money.

When you find contamination, you must make some difficult decisions. Should cleanup begin immediately or is further investigation required? Should the contamination be removed or is it possible to treat it in-place? Will your business be unduly interrupted if soil treatment occurs on-site? Are there potential business implications, such as long-term liability, insurance requirements, and future salability of the property, *etc.* that should be considered when selecting the cleanup method? Because cleanups are complex and many options are available, the services of a qualified consultant are often useful when developing cleanup strategies other than simple removal of the contaminated soils.

You should be aware that the Department will not be able to complete final review and closure on your cleanup project until treatment and reuse or disposal of all contaminated soils has taken place. Since some options take longer to complete than others, this may also be a factor in your decision of how to handle the contaminated soil.

This guidance gives several options for handling petroleum-contaminated soils, but some are more desirable than others are. From an environmental perspective, the Department strongly encourages you to select a treatment method that actually destroys contamination rather than transferring it from one medium to another (*e.g.*, from soil to air). In addition, effective treatment of soils will let you reuse the soil for other purposes (with some restrictions). The Department will look for careful justification if you propose to use an option which is environmentally less desirable.

3.6.2: In-Place Soil Treatment

Many methods for cleaning up soil contamination in place, or “*in situ*,” have been used successfully. With *in situ* treatment, contaminated soils are not removed and such techniques as vapor extraction and biological treatment may be used. Typically, *in situ* treatment can be expensive but becomes more cost effective when large amounts of contamination are present or would be difficult to remove.

In situ treatment methods are primarily used with complex cleanup projects and often require that you submit a CAP. To properly prepare a CAP, you usually have to do extensive subsurface investigation to define the extent of the contamination. See Section 2.5: Summary of Each Rule and Section 3.1: Writing Cleanup Reports and Corrective Action Plans for more information on developing CAPs. Once you have determined the full extent of the contamination, you can develop reasonable cleanup options. If you choose to pursue *in situ* soil treatment through a CAP, you should contact the DEQ regional office that has jurisdiction for your cleanup project to discuss the details of what will be required.

3.6.3: Soil Removal

If soil removal appears to be the best method for soil cleanup, you must decide how to manage the soils. Once the soils are removed from the pit, they can be taken to an authorized facility for treatment or disposal or independently treated (by you or your consultant). If the soils are to be independently treated, you must take precautions to prevent adverse environmental impacts or nuisance conditions.

You can stockpile contaminated soils only on a temporary basis while making arrangements for disposal or treatment. During this time, soils must be placed within a secure (*e.g.* fenced), lined, and bermed area and kept covered at all times. You have thirty (30) days to either dispose of the soils at an authorized facility or to obtain a solid waste

treatment permit from the Department (see Section 1.4: Permit Requirements for UST Cleanup Sites). Local jurisdictions may have different requirements for how – or if – soil treatment or stockpiling may occur. Check with local land use authorities before beginning any treatment to ensure that this is allowed at your site.

3.6.3.1: Landfill Disposal - Ideally, no contaminated soils would be disposed of in a landfill since this results in the problem being moved from one location to another. Also, should there be problems with the landfill in the future, or if cleanup of the landfill should be required, persons who disposed of contaminated soil in the landfill may be held partially responsible for cleanup costs. However, until other disposal and treatment methods become readily available, landfill disposal may be the most cost-effective option for some cleanup projects.

Individual landfills may have specific requirements you must meet before disposal is allowed. If landfill disposal is the option you choose, contact the landfill operator in advance - you may be able to coordinate sampling efforts to meet both landfill and Department requirements at the same time.

3.6.3.2: Thermal Treatment (“Soil Cooker”) - Thermal treatment is a better environmental solution than aeration or landfill disposal. It destroys the contaminants rather than transferring them to air or possibly to landfill leachate. This treatment method may reduce your future liability for the contaminated soils (the “cradle-to-grave” philosophy). Contaminated soil can be treated on site using a mobile unit or can be transported to a stationary facility.

3.6.3.2.1: Mobile Unit - A mobile unit is especially useful for sites that are far from a permanent thermal treatment facility or a landfill. It may save or reduce costs of hauling the contaminated soil. However, you must ensure that your treatment site is suitable for the treatment equipment. You will need to contact local land use authorities to make sure this activity is allowed on your site. You must give specific information about the use of the mobile unit to the Department. A solid waste permit from the Department is required (see Section 1.4: Permit Requirements for UST Cleanup Sites). There are some restrictions on how the treated soil can be reused. Contact your regional DEQ office for more information.

3.6.3.2.2: Permanent Facility - A permanent facility operates similarly to a landfill from a “user” perspective. You must tell the facility where the contaminated soils came from and provide contamination levels. Once your application has been approved, you take the contaminated soils to the facility for processing. Your involvement is then over, unless you make arrangements to reuse the treated soil. Contact the specific facilities for more information on their requirements.

3.6.3.3: Above-Ground Biological Treatment (“Bioremediation”) - This treatment method is excellent for gasoline contamination and works relatively well for diesel, waste oil, and other heavy hydrocarbon contamination which does not aerate readily. Since this treatment actually destroys the contaminants, this method reduces long-term liability and is a better environmental solution than soil aeration or landfill disposal. However, unless you are treating a large amount of soil, bioremediation can be a relatively costly way to deal with contamination. The services of a qualified consultant are usually necessary to design an appropriate treatment system. A solid waste permit from the Department is required (see Section 1.4: Permit Requirements for UST Cleanup Sites). There are some restrictions on how the treated soil can be reused. Contact your regional DEQ office for more information.

3.6.3.4: Soil Aeration - In this method hydrocarbons evaporate into the atmosphere. For that reason it is not preferred environmentally. This type of treatment releases hydrocarbons into the air, contributing to the formation of photochemical smog (ozone). Also, gasoline contains benzene, a carcinogen, which is also released into the air during aeration. Aeration works best for gasoline-contaminated soils. It has limited success with diesel or heavier hydrocarbons because of their low volatility; for them, soil aeration is very slow or requires frequent maintenance (tilling, *etc.*) and **often does not work at all**. Aeration of gasoline-contaminated soils works best on sandy or silty soils with low clay content, and is most effective in warm, dry weather.

While soil aeration may sometimes be a lower cost treatment option, it is by no means a “no cost” procedure. It involves more than just spreading or piling the soil and letting it sit. The process requires the use of specific controls to prevent other problems. Considerable work is needed to ensure that treatment is effective in reducing contaminant concentrations to an acceptable level. Soil aeration should include active treatment measures such as tilling or using piping and pumps to push/pull air through the soil. The Department may not approve projects that involve the use of “passive aeration”. A solid waste permit from the Department is required (see Section 1.4: Permit Requirements for UST Cleanup Sites). There are some restrictions on how the treated soil can be reused. Contact your regional DEQ office for more information. More details on how to conduct soil aeration are in the guidance document *Treatment of Petroleum-Contaminated Soils* (DEQ, June 2007).

3.6.4: Summary

Because treatment conditions for each site are unique, the specific requirements listed in this document may be more or less stringent than what is actually needed for your site. Careful coordination and prior approval from your local DEQ regional office at specific points in the treatment process is extremely important. You must coordinate soil treatment activities with the Department throughout the project and receive approval before moving any contaminated or treated soils off-site. Regardless of the treatment methods, there are some restrictions on how you can reuse the treated soil. Contact your regional DEQ office for more information.

Note: The Department will not make a final determination that “no further action is required” for the entire cleanup project until you have adequately addressed and documented all details regarding the treated soils.

Direct all questions about specific treatment projects, permit requirements and/or forms to the regional office that has jurisdiction for the cleanup project associated with your soil treatment plan. See Section 1.2: UST Program Offices for office locations and phone numbers.

SECTION 3.7: SAMPLE CALCULATIONS FOR AIR EMISSIONS

As discussed in Section 1.4: Permit Requirements for UST Cleanup Sites, you must give us prior notice if your proposed method of cleanup will produce emissions to air (such as air strippers or vapor extraction systems). You must also calculate the system's emission rate to determine if you will be required to obtain an Air Quality Permit. Although most UST remediation systems will not exceed the limits necessary for a permit, many of these systems do have the potential of causing nuisance conditions or impacting the health and safety of individuals working or residing in the vicinity of the site. Therefore, we also ask that you evaluate potential human health risks resulting from exposure to hazardous air pollutants discharged from your remediation system. This section provides you with an example of how you can use your air sample data to make these calculations.

3.7.1 Conversion Factors

Analytical Result Conversions

To convert air sample results reported in parts per million by volume (ppmv) to milligrams per cubic meter (mg/m^3) for any of the compounds listed in the table below, simply multiply the ppmv result by the given factor¹³.

Compound	To obtain an air concentration in mg/m^3 , multiply the air concentration in ppmv by the following number.
Benzene	3.25 (mg/m^3)/ppmv
Toluene	3.83
Ethylbenzene	4.40
Xylenes	4.40
Trimethylbenzenes	4.99
TPH-G ¹⁴	4.16

Example: If an air sample is reported to contain 2.5 ppmv of benzene, the concentration in mg/m^3 will be

$$2.5 \text{ ppmv benzene} \times 3.25 (\text{mg}/\text{m}^3)/\text{ppmv} = 8.1 \text{ mg}/\text{m}^3 \text{ benzene}$$

Volume and Mass Conversions

$$\begin{aligned} 1 \text{ cubic meter (m}^3) &= 0.0283 \text{ cubic feet (ft}^3) \\ 1 \text{ m}^3 &= 1000 \text{ liters (L)} \\ 1 \text{ gram (g)} &= 1000 \text{ milligrams (mg)} \\ 1 \text{ mg} &= 1000 \text{ micrograms (}\mu\text{g)} \\ 1 \text{ pound (lb)} &= 454 \text{ g} \end{aligned}$$

¹³ The full conversion equation is: $\text{Concentration (mg}/\text{m}^3) = (\text{ppmv} \times \text{compound molecular weight in g/mol}) / 24.055$, where 24.055 is the product of the ideal gas law constant (0.0821 L-atm/K-mol) and an assumed temperature of 20 degrees C (293 K). Therefore, the factors listed in the table are derived by dividing the compound molecular weight by 24.055.

¹⁴ Heptane (MW = 100 g/mol) is used as a surrogate for gasoline in the calculation for TPH-G.

3.7.2: Example Calculation

Problem: You have installed a soil vapor extraction system on your site that uses a 200 cubic feet per minute (cfm) blower to discharge the vapors. A sample of air from your system is found to contain a benzene concentration of 15.5 ppmv and a TPH-G concentration of 5048 ppmv. Calculate the pounds of benzene and TPH-G¹⁵ discharged daily. Does the concentration of benzene being emitted from your system exceed the acceptable risk-based air concentration for benzene of 0.30 µg/m³?

Solution

First use the conversion factors in the table to convert the concentration to mg/m³.

$$\text{Benzene concentration} = 15.5 \text{ ppmv} \times 3.25 \text{ (mg/m}^3\text{)/ppmv} = 50.4 \text{ mg/m}^3$$

$$\text{TPH-G concentration} = 5,048 \text{ ppmv} \times 4.16 \text{ (mg/m}^3\text{)/ppmv} = 21,000 \text{ mg/m}^3$$

Next, determine the total volume of air discharged in one day.

$$\text{Volume of air discharged} = 200 \text{ ft}^3\text{/min} \times 0.0283 \text{ m}^3\text{/ft}^3 \times 1440 \text{ min/day} = 8150 \text{ m}^3\text{/day}$$

Finally, multiply the above answers and convert from grams to pounds to obtain the desired emission rates.

$$\begin{aligned} \text{Mass of Benzene Discharged} &= 8150 \text{ m}^3\text{/day} \times 50.4 \text{ mg/m}^3 \times 1 \text{ g/1,000 mg} \times 1 \text{ lb/454 g} \\ &= 0.9 \text{ lb/day} \end{aligned}$$

$$\begin{aligned} \text{Mass of TPH Discharged} &= 8150 \text{ m}^3\text{/day} \times 21,000 \text{ mg/m}^3 \times 1 \text{ g/1,000 mg} \times 1 \text{ lb/454 g} \\ &= 376 \text{ lb/day} \end{aligned}$$

Note that in the first step you calculated a benzene concentration of 50.4 mg/m³. If you convert this to µg/m³ you can compare the result to the risk-based standard of 0.30 µg/m³.

$$50.4 \text{ mg/m}^3 \times 1000 \text{ µg/mg} = 50,400 \text{ µg/m}^3$$

It should not be too surprising to see that discharge concentrations from a treatment system are often well in excess of risk-based standards. What we have not taken into account in this example is mixing of the emissions with ambient air, which causes the concentrations to drop. You may need to estimate the on-site or off-site air concentrations by using an air discharge model, or by collecting ambient air samples. When designing your system it is also very important to consider the location and height of emission stacks. This can have a significant impact on the potential for such emissions to create nuisance or health risk conditions and should be discussed with the regional project manager assigned to your site.

¹⁵ The TPH-G measurement is used to represent the total volatile organic carbons (VOCs) being emitted.

SECTION 3.8: ANSWERS TO COMMON UST CLEANUP QUESTIONS

For additional questions and answers please refer to Section 3.3.7: Analytical Method Questions and Answers on page 83.

I started my project before the Department made the latest changes to the cleanup rules. Do I have to follow the old set of rules or the new set?

That depends on where you are in your project. In general, if you are still in the early stages of a project you should switch to the new rules. However, if you are already working under an approved cleanup plan, you may continue under the old rules. See Section 1.3: Transition Policy for Ongoing UST Cleanup Projects for additional details.

Many UST sites have been assessed and are currently on long-term groundwater monitoring programs. Many of the analytical data collected from soil samples at these sites are TPH quantifications and are not constituent specific. Will these sites be considered for risk-based closures (such as low impact) without the extra cost of going out to collect additional soil samples for constituent-specific analysis?

A blanket statement cannot be made about how to handle these sites. In some cases additional soils samples will probably be required to assess certain soil-related risk pathways. Other sites may not have any soil pathways that need to be addressed. The decision regarding additional samples will depend on the conceptual model for the site.

Note also that under the UST Program's *Transition Policy for Ongoing UST Cleanup Projects*, sites "which were operating under a Department-approved cleanup plan prior to 11/2/98 may continue under the approved plan including eventual closure based on cleanup levels and requirements in effect at that time the plan was approved." Therefore, the past regulatory history of the site may also affect what is required.

The way the new rules are written, it sounds like I can use a combination of cleanup options to complete my cleanup. Is that true?

Yes. To summarize what is stated in OAR 340-122-0217(1)(d)(E), you may use any combination of three options — the soil matrix option, the risk-based option, and/or a generic remedy — to remediate any given site. The only option that cannot be used along with the others is the low-impact site option. That particular option has a special application and must be used in an "all or none" fashion. For more information see Section 3.5: How to Handle Sites With Multiple Cleanup Options.

Who decides what cleanup option is best for my site?

You should make this decision along with your consultant or contractor. Note that the decision may be made at several points in the cleanup process and you may change your approach as more information is gathered. If the release is obviously very minor and restricted to the soils, such as in a tank decommissioning, you may decide right away to go with the soil matrix option. In some cases, the decision on what cleanup approach to take may not be reached until initial response and abatement measures have been taken and investigative work shows the full extent of contamination.

Can I use any analytical methods other than those listed in the rules?

Yes. During the site investigation you may use any method (*e.g.*, visual, combustible gas indicators or other field instruments, *etc.*) to track and determine the extent of soil contamination. When you collect data to show that your site is in compliance with a given set of cleanup levels, then you must use the methods specified in OAR 340-122-0218.

Can I use the soil matrix option for waste oil contaminated soil?

Maybe, but you must first analyze soils contaminated by releases of waste oil from USTs for polynuclear aromatic hydrocarbons, volatile aromatic solvents, and leachable metals (cadmium, chromium and lead) in addition to the usual tests for total petroleum hydrocarbons. If the waste oil tank was used for purposes other than exclusively storing automotive waste oils, then you must also analyze for polychlorinated biphenyls (PCBs). You should use a highly contaminated sample for these analyses. If it can be clearly shown that the only compounds present are petroleum products, then DEQ will usually allow the matrix option for this soil. If chlorinated hydrocarbons or other non-petroleum hazardous substances are present, it may be necessary to refer the project to another program in the Department's Environmental Cleanup Division to complete the cleanup. In most cases, you can still complete the cleanup of the petroleum contamination under the UST Cleanup rules.

I removed contaminated soil from the tank pit. Can I just aerate it on my property and then put this soil back into the pit?

First of all, you must obtain a Solid Waste Letter Authorization (SWLA) for on-site soil treatment. Refer to Section 1.4: Permit Requirements for UST Cleanup Sites for more information. If your property is an appropriate location¹⁶, you may be allowed to treat it there under certain conditions. You will usually be allowed to treat such soils on-site for six months to one year. Stockpiling soils on-site for long periods of time without treatment is not allowed. After treatment, if proper sampling and testing show that TPH levels in the soil don't exceed the cleanup standard for that site, you may return the soils to the pit. However, you may return these soils only if you place them above the seasonal high water table mark, and also if you can still cover them with enough clean soil to prevent future human contact. Department policy does not allow such soils to be reused in a 100-year flood plain. See also Section 3.6: Handling and Treating Petroleum-Contaminated Soil and Section 1.5: Policy for Reuse of Petroleum Contaminated Soil.

I am doing a tank decommissioning and everything looks completely clean. Do I still have to take samples? If so, what kind and how many?

Yes, you are required to collect samples. The tank decommissioning rules (OAR 340-150-0130) require you to collect and analyze samples as specified in the soil matrix option to demonstrate that the site was not contaminated with petroleum products at the time of the decommissioning.

What if my soil samples are found to contain some contamination but the levels are already below the required cleanup levels for the cleanup option that I have chosen?

If Method NWTPH-HCID can detect your soil contaminants, you must report the release to DEQ. This is because OAR 340-122-0220(1)(a) requires you to report to DEQ all below-ground releases in any amount from a petroleum UST within 24 hours after you discover them or confirm their presence through testing. However, if your investigation is complete and the data show that contaminant levels are already below the cleanup levels for your site, no cleanup will usually be necessary.

¹⁶ By "appropriate" we mean that it is a location where the aeration of the petroleum-contaminated soil can be carried out without creating nuisance conditions or unacceptable risks to human health, and can be monitored and tested as required in the SWLA permit.

When the DEQ first came out with risk-based guidance in 1996, the generic standards for the indoor air pathway were so low that they stopped many projects in their tracks. The numbers in the newer guidance document are much better, but there is still a lot of confusion about what to do for fieldwork to prove that the indoor air pathway is not really a threat? What do you suggest?

Unfortunately, we are still trying to figure out the best approach for this situation. We have suggested and allowed soil gas monitoring and indoor air monitoring to help us figure out what is happening on a site-specific basis. We have also used modeling to estimate exposures. (Please refer to *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ September 22, 2003) for more information on modeling.) As of yet, however, we do not have a policy or guidance document on this topic. We are, however, working with Region 10 EPA on some training and hope to provide more information on this topic in the future. In the meantime we will have to work with you on this matter on a case-by-case basis.

What if I have a heating oil tank on my site?

As of March 2000 heating oil tanks are covered by a different set of rules (OAR 340-177-0001 through 340-177-0095) than those used for regulated UST cleanups. Licensed heating oil tank service providers now certify cleanups and decommissionings of heating oil tanks. The DEQ only audits the program to ensure that the work meets appropriate standards. If you have a question about heating oil tanks, you should leave a message along with your name and phone number on the Department's UST Helpline (1-800-742-7878, toll free in Oregon) and your call will be returned.

What if my site contains both heating oil and gasoline or other USTs and the contamination is intermingled? Will I have to report two separate releases and hire two different contractors?

The Department prefers to treat such a mixed situation as a single site. Therefore, you will only need to report the release once and will only be issued a single project log number (see Section 1.1: How to Report an Underground Storage Tank Petroleum Release). How the cleanup will be handled will usually depend on the conditions at your site. If gasoline or other non-heating oil contamination is the dominant problem, the entire site will probably be handled under the UST Cleanup Rules — the rules discussed in this guidance document. If the heating oil tank release is the dominant problem, then the site will probably be handled under the heating oil tank rules. You should discuss the preferred approach with the Department.

SECTION 4: FORMS USED FOR UST CLEANUP PROJECTS

This section contains several forms that you may wish to copy and use as needed on your UST cleanup projects.

NOTE: The most current versions of UST and UST cleanup forms, including interactive forms that can be filled out right on the screen and then printed, can be found on DEQ's Website at: <http://www.deq.state.or.us/pubs/forms.htm>. DEQ recommends you either use the interactive forms or download the most current versions to use.

1. The three-page *Petroleum Release Form* is provided for your use on pages 97 through 99. You should feel free to photocopy these two pages, fill out the form, and fax it to the appropriate regional office as described in Section 1.1: How to Report an Underground Storage Tank Petroleum Release. Please refer to that section for more information.
2. An example of a typical *Cost Recovery Agreement* is included for your reference on pages 100 and 101. The regions usually send out copies of such an agreement in their original packet of information that gets mailed to all responsible parties reporting a release. To read more about our cost recovery program please see Section 1.7: Cost Recovery for Departmental Oversight Work.
3. For non-heating oil tanks, you must submit a UST Decommissioning Checklist and Site Assessment Report form to the appropriate regional office. For your convenience a copy of this form is included on pages 102 through 109.
4. The soil matrix checklist (page 110) and score sheet (page 111) are provided to help you determine if the requirements of the soil matrix rules have been met. Although this checklist is a good summary of the matrix rule requirements, you should always refer to the rules themselves for the complete requirements of each step. To help you find the specific rule that applies to a particular item on this list, the rule number is given in parentheses. For example, if a particular item on this list is required by OAR 340-122-0320, then that item will include the reference number (0320).

Please make sure that you can check off ALL of the items on this list BEFORE submitting your final report to DEQ. If an item on the list does not apply to your site, mark "N/A" on the line. For example, if you are not requesting permission to leave a small inaccessible pocket of soil contamination that exceeds the cleanup standards, then item 5 would be marked "N/A". Omitting items that apply to your site will cause delays and may result in your having to return to the site to do more work to complete the report.

You are required by OAR 340-122-0360 to include a completed copy of the matrix checklist and the matrix score sheet as part of your soil matrix report. The soil matrix report must be submitted to DEQ within 60 days of completing a cleanup.

SECTION 4.1: PETROLEUM RELEASE FORM

Page 1 of 3



UST PETROLEUM RELEASE FORM

(This Section for DEQ Use Only)	
LOG NUMBER:	_____ - _____ - _____
RECEIVED BY:	_____

-----**INCIDENT INFORMATION**-----

DATE REPORTED: (today's date) _____ DATE DISCOVERED: _____

SITE NAME: _____

SITE ADDRESS: _____ REGULATED UST & FAC NBR: _____

SITE CITY: _____ ZIP: _____ NON-REGULATED UST

SITE COUNTY: _____ PHONE: _____

-----**MAIL CONTACTS**-----

REPORTED BY (required, person reporting this release to DEQ)

RESPONSIBLE PARTY (required, person responsible for remedial action)

NAME: _____

NAME: _____

COMPANY: _____

COMPANY: _____

ADDRESS: _____

ADDRESS: _____

CITY: _____ ZIP: _____

CITY: _____ ZIP: _____

STATE: _____ PHONE: _____

STATE: _____ PHONE: _____

EMAIL: _____

EMAIL: _____

INVOICE CONTACT (required, may be same as responsible party)

OTHER CONTACT(S) (Optional Information)

NAME: _____

NAME: _____

COMPANY: _____

COMPANY: _____

ADDRESS: _____

ADDRESS: _____

CITY: _____ ZIP: _____

CITY: _____ ZIP: _____

STATE: _____ PHONE: _____

STATE: _____ PHONE: _____

CONTINUE ON NEXT PAGE

PETROLEUM RELEASE FORM

Page 2 of 3

-----**SITE ASSESSMENT (For Cause and Source Descriptions – See Next Page)**-----

- | | | | |
|---|---|---|-------------------------------------|
| DISCOVERY: (check one) | CAUSE: (check one) | SOURCE: (check one) | CONFIRMATION: (check one) |
| <input type="checkbox"/> DECOMMISSIONING | <input type="checkbox"/> OVERFILL | <input type="checkbox"/> TANK | <input type="checkbox"/> CONTRACTOR |
| <input type="checkbox"/> ROUTINE MONITORING | <input type="checkbox"/> SPILL | <input type="checkbox"/> PIPING | <input type="checkbox"/> RP REPORT |
| <input type="checkbox"/> COMPLAINT | <input type="checkbox"/> CORROSION | <input type="checkbox"/> DISPENSER | <input type="checkbox"/> STAFF DEQ |
| <input type="checkbox"/> LEAK DETECTION | <input type="checkbox"/> INSTALL PROBLEM | <input type="checkbox"/> TURBINE PUMP | <input type="checkbox"/> LAB DEQ |
| <input type="checkbox"/> SITE ASSESSMENT | <input type="checkbox"/> PHYSICAL/MECHANICAL DAMAGE | <input type="checkbox"/> DELIVERY PROBLEM | <input type="checkbox"/> LAB RP |
| <input type="checkbox"/> TIGHTNESS TEST | <input type="checkbox"/> OTHER | <input type="checkbox"/> OTHER | <input type="checkbox"/> LAB OTHER |
| <input type="checkbox"/> OTHER | <input type="checkbox"/> UNKNOWN | | <input type="checkbox"/> OTHER |

-----**CONTAMINANTS (Select one or more)**-----

- | | | | |
|--|--|--|---|
| <input type="checkbox"/> HEATING OIL | <input type="checkbox"/> UNLEADED GASOLINE | <input type="checkbox"/> LEADED GASOLINE | <input type="checkbox"/> MISCELLANEOUS GASOLINE |
| <input type="checkbox"/> DIESEL MOTOR FUEL | <input type="checkbox"/> WASTE OIL | <input type="checkbox"/> LUBRICANT | <input type="checkbox"/> SOLVENT |
| <input type="checkbox"/> OTHER PET. DIST. | <input type="checkbox"/> CHEMICAL | <input type="checkbox"/> MTBE | <input type="checkbox"/> UNKNOWN |

-----**IMPACTED MEDIA (Select one or more)**-----

- | | | | | | |
|---|--------------------------------------|--|-------------------------------|---------------------------------|---------------------------------------|
| <input type="checkbox"/> DRINKING WATER | <input type="checkbox"/> GROUNDWATER | <input type="checkbox"/> SURFACE WATER | <input type="checkbox"/> SOIL | <input type="checkbox"/> VAPORS | <input type="checkbox"/> FREE PRODUCT |
|---|--------------------------------------|--|-------------------------------|---------------------------------|---------------------------------------|

-----**SITE-MANAGEMENT (This Section Department Use Only)**-----

RELEASE STOPPED: _____ FINAL REQUEST INVOICE DATE: _____

CLEANUP STARTED: _____ NO FURTHER ACTION: _____

NOTES/COMMENTS:

Petroleum Release Form
Page 3 of 3

CAUSE OF RELEASE DESCRIPTIONS

Overfill – Use this cause when an overfill occurs. For example, overfills may occur from the fill pipe at the tank or when the nozzle fails to shut off at the dispenser.

Spill – Use this cause when a spill occurs. For example, spills may occur when the delivery hose is disconnected from the fill pipe of the tank or when the nozzle is removed from the vehicle at the dispenser.

Corrosion – Use this cause when a metal tank, piping or other component has a release due to corrosion (for steel, corrosion takes the form of rust). This is a specific type of physical or mechanical damage.

Installation Problem – Use this cause when the problem is determined to have occurred specifically because the underground storage tank system was not installed properly. Note that these problems may be difficult to determine.

Physical or Mechanical Damage – Use this cause for all types of physical or mechanical damage except corrosion as described above. Some examples of physical or mechanical damage include a puncture of the tank or piping, loose fittings, broken components and components that have changed dimension (for example, elongation or swelling).

Other – Use this option when the cause is known but does not fit into one of the above categories. For example, releases from vent lines, vapor recovery lines and fill lines would be included in this category.

Unknown – Use this option only when the cause is not known.

SOURCE OF RELEASE DESCRIPTIONS

Tank – This term means the tank that stores the product and is part of the underground storage tank system.

Piping – This term means the piping and connectors running from the tank or submersible turbine pump to the dispenser or other end-use equipment. It does not include vent, vapor recovery or fill lines.

Dispenser – This term includes the dispenser and equipment used to connect the dispenser to the piping. For example, a release from a suction pump or components above the shear valve would be considered a release from the dispenser.

Turbine Pump (STP) – This term includes the submersible turbine pump head (typically located in the tank sump), the line leak detector, and the piping that connects the submersible turbine pump to the tank.

Delivery Problem – This term identifies releases that occur during product delivery to the tank. Typical causes associated with this source are spills and overfills.

Other – Use this option when the release source does not fit into one of the above categories. For example, releases from vent lines, vapor recovery lines and fill lines would be included in this category.

SECTION 4.2: COST RECOVERY AGREEMENT



OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
UNDERGROUND STORAGE TANK PROGRAM

Cost Recovery Agreement

This document serves as an agreement between the undersigned (hereinafter “you”) and the Department of Environmental Quality (DEQ) regarding DEQ review and oversight of the investigation and/or cleanup of petroleum (hazardous substances) at the property located at:

Facility Name: _____

Address: _____

USTC No.: _____

DEQ agrees to review environmental documents submitted by you or on your behalf regarding the investigation and/or cleanup of the above-referenced site. Additional details regarding DEQ oversight will be established upon review of the initial site data.

DEQ requires that persons requesting DEQ review and oversight of investigation and cleanup activities agree to the terms of this cost recovery agreement and pay project oversight costs.

DEQ project oversight costs will include direct costs and indirect costs. Direct costs include site-specific expenses and legal costs. Indirect costs are those general management and support costs of the DEQ, including the Land Quality Division (LQ), allocable to DEQ oversight of this agreement and not charged as direct, site-specific costs. Indirect charges are based on a percentage of direct personal services costs. Review and oversight costs shall not include any unreasonable costs or costs not otherwise recoverable by DEQ under ORS 465.255.

DEQ costs are due within thirty (30) days of issuance of the monthly statement, by a check made payable to the “Department of Environmental Quality”. Nine percent interest shall be charged on past due accounts.

Electing not to enter into this agreement does not release you from any responsibility that you might have for any reporting requirements, investigation and/or cleanup of petroleum (hazardous substances) at the above referenced facility. This does not preclude the DEQ from conducting audits or inspections of all or portions of the investigation and cleanup activities associated with this facility. Enforcement action may be initiated if any violation of Oregon Administrative Rules (OARs) or Oregon Revised Statutes (ORSs) is found.

Cost Recovery Agreement
Page Two

Either DEQ or you may terminate this agreement by giving 15 days advance written notice to the other. Only those costs incurred or obligated by DEQ prior to the effective date of any termination of the agreement shall be recoverable under this agreement. Termination of this agreement will not affect any other right DEQ may have for recovery of costs under any applicable law.

You will hold DEQ harmless for any claims (including but not limited to claims of property damage or personal injury) arising from DEQ review and/or oversight activities under this agreement.

This agreement is not and shall not be construed to be an admission by you of any liability under ORS 465.255 or any other law or as a waiver by you of any defense to such liability. This agreement is not and shall not be construed to be a waiver, release, or settlement of claims that DEQ may have against you or any other responsible person nor is this agreement a waiver of any enforcement authority that DEQ may have.

The DEQ Tanks Program will be responsible for the review and oversight of the investigation and cleanup activities associated with the property. Please refer all site-specific inquiries to the UST Regional Offices in Northwest Region – Portland, Western Region – Salem and Eugene and Eastern Region – The Dalles. For locations and phone numbers of the regional offices, please see the UST Regional Office list at <http://www.deq.state.or.us/about/locations.htm>

All inquiries regarding cost recovery and/or invoices should be directed to Dawn Ismerio at 503-229-5812.

If the terms of this agreement are acceptable, please have it executed by an authorized officer in the space provided below. In order to more effectively schedule your project, please return this agreement within 30 days of receipt to the regional office responsible for your site.

Accepted and agreed to this _____ day of _____, 20_____

By: _____

Title: _____

Please provide the following information as to where the invoices should be sent.

Individual Name: _____

Title: _____

Company Name: _____

Mail Address: _____

City, State, Zip: _____

Phone Number: _____

SECTION 4.3: UST DECOMMISSIONING CHECKLIST AND SITE ASSESSMENT REPORT



OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
UNDERGROUND STORAGE TANK PROGRAM

**UNDERGROUND STORAGE TANK DECOMMISSIONING
CHECKLIST AND SITE ASSESSMENT REPORT**

A. FACILITY INFORMATION:

This report **MUST** be submitted by the underground storage tank permittee or tank owner, or the licensed DEQ Service Provider on their behalf, **within 30 days following completion of the tank decommissioning or change-in-service regardless of ongoing cleanup work.**

DEQ FACILITY NUMBER: _____

FACILITY NAME: _____

FACILITY ADDRESS: _____

PERMITTEE PHONE: _____ DATE: _____

B. WORK PERFORMED BY:

The checklist and site assessment report should be completed and signed by the DEQ licensed supervisor and signed by an executive officer of the DEQ licensed Service Provider on page 6. The tank owner or permittee must review and sign the report on page 6. **NOTE: AN OWNER OR PERMITTEE MAY PERFORM UST SERVICES ONLY IF THEY HAVE TAKEN AND PASSED THE APPROPRIATE UST SUPERVISOR EXAMINATION OFFERED BY A NATIONAL TESTING SERVICE (SEE OAR 340-150-0156 for requirements).**

DEQ Service Provider's License #: _____ Construction Contractors Board License #: _____

Name: _____

Telephone: _____

DEQ Decommissioning Supervisor's License #: _____

Name: _____

Telephone: _____

DEQ Soil Matrix Service Provider's License #: _____ (If applicable)

Name: _____

Telephone: _____

DEQ Soil Matrix Supervisor's License #: _____ (If applicable)

Name: _____

Telephone: _____

C. DATES:

Decommissioning/Change-in-Service Notice - Date Submitted: _____ (30 days before work starts).

Work Start Telephone Notice - Date Submitted: _____ (3 working days before work starts).

DEQ Person Notified: _____

Date Work Started: _____ Date Work Completed: _____

Note: Provide the following information if any soil or water contamination is found during the decommissioning or change-in- service. Contamination must be reported by the UST permittee within 24 hours. The licensed service provider must report contamination within 72 hours after discovery unless previously reported.

Date Contamination Reported: _____ By: _____

DEQ Person Notified: _____

D. OTHER DEQ PERMITS MAY BE NEEDED WHERE SOIL OR WATER CLEANUP IS REQUIRED.

DEQ Water Discharge Permit #: _____ Date: _____

Water Disposed to (Location): _____

DEQ Solid Waste Disposal Permit #: _____ Date: _____

Soil Disposal or Treatment Location: _____

E. TANK INFORMATION:

TANK ID #	DEQ-UST PERMIT #	TANK SIZE IN GALLONS	PRODUCT: GASOLINE, DIESEL, USED OIL, OTHER?		CLOSURE OR CHANGE-IN- SERVICE?			TANK TO BE REPLACED?	
			PRESENT	NEW	TANK REMOVAL	CLOSURE IN PLACE ♦	CHANGE IN SERVICE ♦	YES	NO

NOTE 1: Where decommissioned tank(s) are replaced by new underground storage tanks the UST permittee must submit a *General Permit Registration Form to Install and Operate USTs* containing information on the new tanks 30 days before installing them.

NOTE 2: Submit a soil sampling plan to the DEQ regional office and receive plan approval prior to starting work if 1) tank is to be decommissioned in-place, 2) tank contents are changed to a non-regulated substance, 3) tank contains a regulated substance other than petroleum, or 4) tank changed to non-regulated use.

F. DISPOSAL INFORMATION:

TANK ID #	TANK AND PIPING DISPOSAL METHOD				DISPOSAL LOCATION OF TANK CONTENTS	
	SCRAP	LAND-FILL	OTHER	IDENTIFY LOCATION & PROPERTY OWNER	LIQUIDS	SLUDGES

NOTE 1: The tank contents, the tank and the piping may be subject to the requirements of Hazardous Waste regulations. If you have questions, contact the DEQ regional office for your area.

NOTE 2: Attach copies of the disposal receipts for the tanks and piping. If the tanks are shipped off-site for reuse provide the name, address and phone number of the person or business receiving the tanks for reuse.

NOTE 3: Attach copies of the disposal receipts for the disposal or treatment of liquid or sludge removed from the tanks

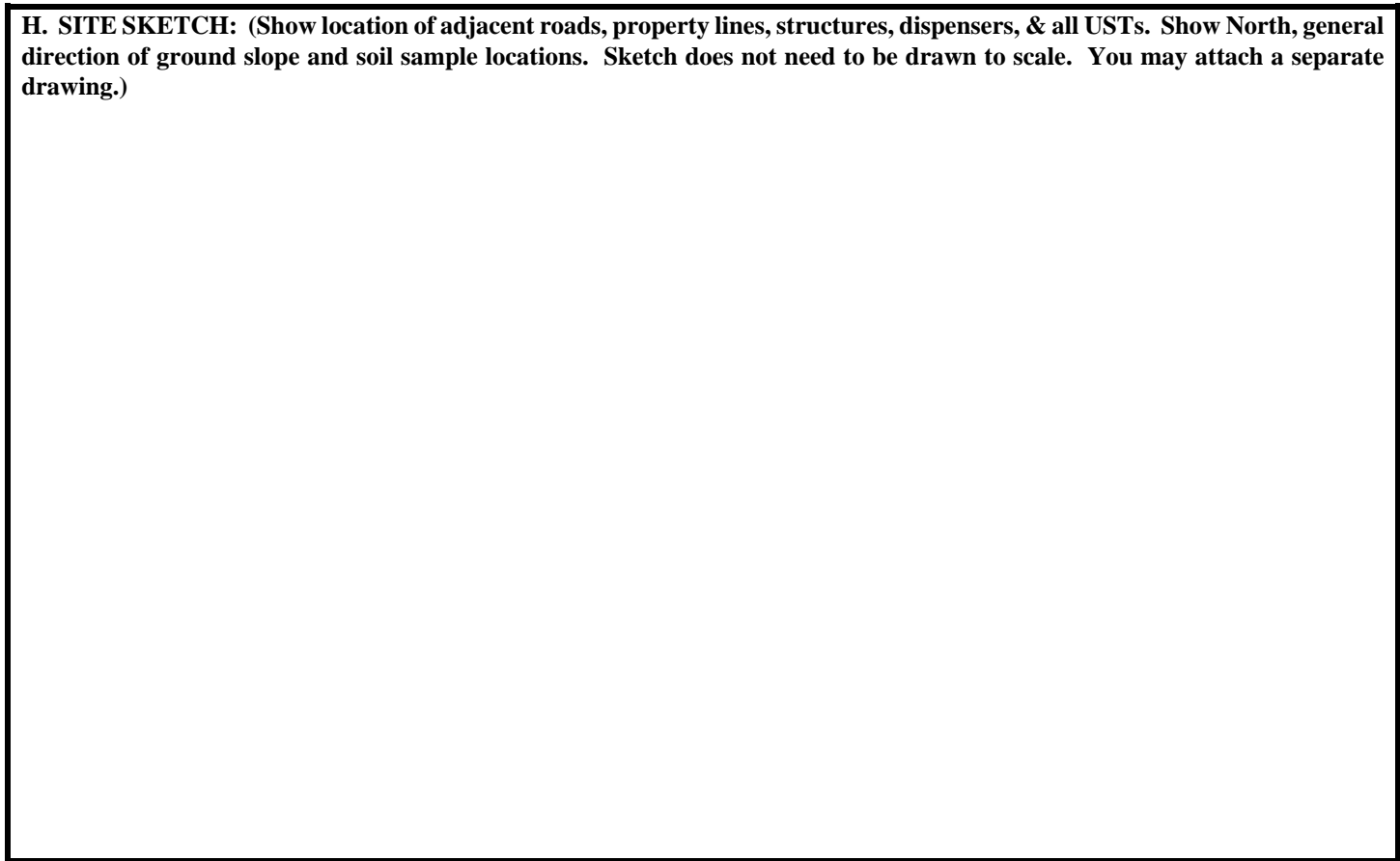
G. CONTAMINATION INFORMATION:

TANK ID #	GROUND WATER IN PIT ?	PRODUCT ODOR IN SOIL ?	PRODUCT STAINS IN SOIL ?	NUMBER OF SAMPLES	LABORATORY (NAME, CITY, STATE, PHONE)

NOTE 1: Attach a copy of the laboratory report showing the results of all tests on all soil and water samples. The laboratory report must identify sample collection methods, sample location, sample depth, sample type (soil or water), type of sample container, sample temperature during transportation, types of tests, and copies of analytical laboratory reports, including QA/QC information. Include laboratory name, address and copies of chain-of-custody forms.

NOTE 2: If contamination is detected and a Level 2 or Level 3 soil matrix cleanup standard is applied to the site, attach a copy of the soil matrix analysis including methods of determining soil type, depth to groundwater, and sensitivity of uppermost aquifer.

H. SITE SKETCH: (Show location of adjacent roads, property lines, structures, dispensers, & all USTs. Show North, general direction of ground slope and soil sample locations. Sketch does not need to be drawn to scale. You may attach a separate drawing.)



I. SAFETY EQUIPMENT ON JOB SITE:

Fire Extinguisher:	Type/Size: _____	Recharge Date: _____
Combustible Gas Detector:	Model: _____	Calibration Date: _____
Oxygen Analyzer:	Model: _____	Calibration Date: _____

J. DECOMMISSIONING:

All Tanks: N/A = Not Applicable (Check (√) Appropriate Box)	YES	NO	UNKNOWN	N/A
1. All electrical equipment grounded and explosion proof?				
2. Safety equipment on job site?				
3. Overhead electrical lines located?				
4. Subsurface electrical lines off or disconnected?				
5. Natural gas lines off or disconnected?				
6. No open fires or smoking material in area?				
7. Vehicle and pedestrian traffic controlled?				
8. Excavation material area cleared?				
9. Rainwater runoff directed to treatment area?				
10. Drained and collected product from lines?				
11. Removed product and residual from tank?				
12. Cleaned tank?				
13. Excavated to top of tank?				
14. Removed tank fixtures? (pumps, leak detection equipment)				
15. Removed product, fill and vent lines?				

K. TANK ABANDONMENT IN-PLACE:

All Tanks: N/A = Not Applicable (Check (√) Appropriate Box)	YES	NO	UNKNOWN	N/A
16. Sampling plan approved by DEQ? Date: _____ DEQ Staff: _____				
17. Contamination concerns fully resolved?				
18. Fill Material? Type: _____				

L. TANK REMOVAL:

All Tanks: N/A = Not Applicable (Check (√) Appropriate Box)	YES	NO	UNKNOWN	N/A
19. Tank placement area cleared, chocks placed?				
20. Purged or ventilated tank to prevent explosion? Method used: _____ Meter reading: _____				
21. Were chains or steel cables wrapped around tank for removal?				
22. Tank removed, set on ground, blocked to prevent movement?				
23. Tank set on truck and secured with straps(s)?				
24. Tank labeled before leaving site?				

M. SITE ASSESSMENT:

All Tanks: N/A = Not Applicable (Check (√) Appropriate Box)	YES	NO	UNKNOWN	N/A
25. Site assessed for contamination? See OAR 340-122-0340				
26. Soil samples taken and analyzed?				
27. Was contamination found? Date/Time: _____				
28. Was hazardous waste determination made for tank contents (Liquids/sludges)?				

N. REQUIRED SIGNATURES:

I have personally reviewed this decommissioning checklist and site assessment report and the attachments and find them to be true and complete.

Permittee or Tank Owner: _____
(Please Print)

Permittee or Tank Owner: _____ Date: _____
(Signature)

I have personally reviewed this decommissioning checklist and site assessment report and the attachments and find them to be true and complete.

Licensed Supervisor: _____
(Please Print)

Licensed Supervisor: _____ Date: _____
(Signature)

I have personally reviewed this decommissioning checklist and site assessment report and the attachments and find them to be true and complete.

Executive Officer: _____
Licensed Service Provider (Please Print)

Executive Officer: _____ Date: _____
Licensed Service Provider (Signature)

O. REPORT FILING:

This report signed by the permittee or tank owner, licensed supervisor and executive officer of the Service Provider, complete with all applicable attachments, must be filed with the DEQ regional office within 30 days after the excavation is backfilled or change-in-service is complete. **Do not wait until any site related cleanup project is completed.** Contact the DEQ regional office prior to filing this report where special circumstances exist at the site (such as water in pit, remaining pockets of contamination, etc.).

P. HELP WITH THIS REPORT:

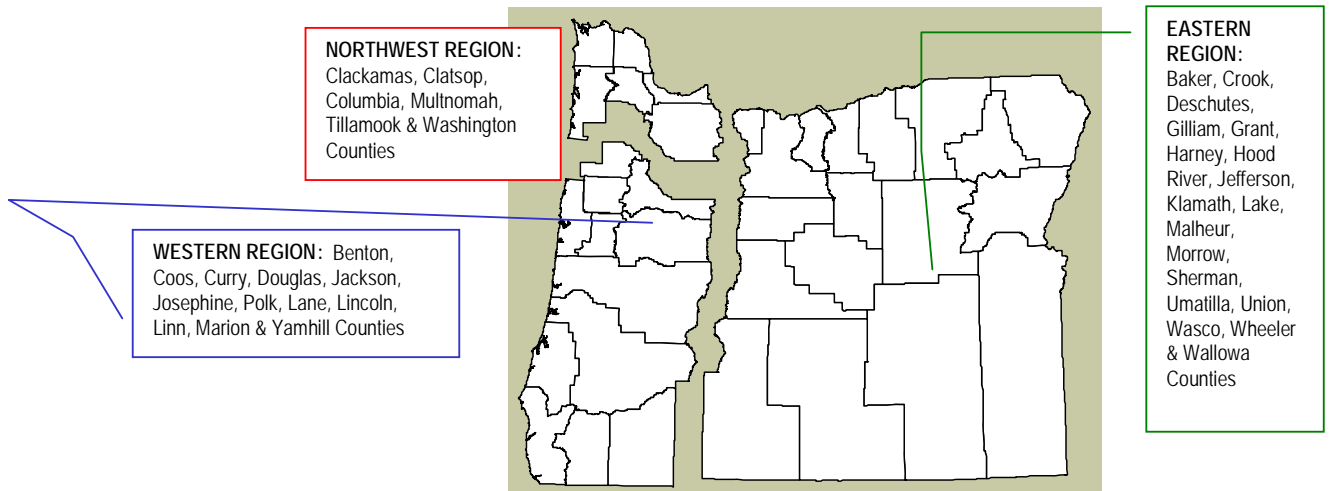
If you have any questions about this decommissioning checklist and site assessment report, please phone your DEQ Regional Office. You can also phone the UST Program's toll-free number, 1-800-742-7878. This is a message answering machine for calls made within Oregon. Underground Storage Tank Program staff will return your calls within 24 hours. You can also send an e-mail to tanks.info@deq.state.or.us. Our regional staff are also available to answer questions regarding tank decommissioning or change-in-service requirements (see below for telephone numbers).

Q. COPIES OF THE GENERAL PERMIT TO DECOMMISSION OR COMPLETE A CHANGE-IN-SERVICE:

Obtain copies of the general permit to decommission or complete a change-in-service conditions and requirements, UST Program rules and laws and UST Cleanup rules and laws at:

1. Any of the DEQ offices listed below,
2. By calling the UST HELPLINE at 1-800-742-7878,
3. Send an e-mail to tanks.info@deq.state.or.us or
4. Downloading from the UST home page at:

<http://www.deq.state.or.us/lq/tanks/ust/index.htm>



<p>EASTERN REGION / THE DALLES 400 E. Scenic Drive, Building 2 - 307 The Dalles, OR 97058 Phone: 541-298-7255 Fax: 541-298-7330</p>	<p>WESTERN REGION / COOS BAY 381 N SECOND STREET COOS BAY 97420 Phone: 541-269-2721 Fax: 541-269-7984</p>	<p>WESTERN REGION / SALEM 750 Front Street NE, Suite 120 Salem, OR 97301-1039 Phone: 503-378-8240 Fax: 503-373-7944</p>
<p>NORTHWEST REGION 2020 SW 4th Avenue, Suite 400 Portland, OR 97201-5884 Phone: 503-229-5263 Fax: 503-229-6945</p>	<p>WESTERN REGION / EUGENE 165 East 7th Avenue, Suite 100 Eugene, OR 97401 Phone: 541-686-7838 Fax: 541-686-7551</p>	

SECTION 4.4: SOIL MATRIX CHECKLIST AND SCORE SHEET

SOIL MATRIX CHECKLIST

- 1. The release of petroleum has been reported to the DEQ (0220).
- 2. The matrix score sheet has been completed for this site, unless the site is cleaned up to the most stringent cleanup level (0320).
- 3. The required hydrocarbon identification test (NWTPH-HCID) has been performed (0335(3)), and, if detectable levels were found, the appropriate analytical method or methods have been used to measure the levels of contamination (0218).
- 4. A sketch has been made of this site (0345(1)) which clearly shows:
 - a. The location of all buildings and other key features, both man-made and natural;
 - b. The names of adjacent streets and properties;
 - c. The location of all excavations including those that were for the removal of tanks and associated piping as well as those that were strictly for the removal of contaminated soils;
 - d. The location of all product storage tanks, lines and dispensers, including those that were decommissioned as well as those that remain on the site; and
 - e. All soil and water sample locations.
- 5. If any contaminated soil exceeding matrix limits has been left on site, the reason for leaving this soil has been explained and the requirements of 0340(1)(f) and 0355(4) have been met.
- 6. If water was present in the tank pit, the Department was notified, the water was pumped from the pit, and the requirements of 0340(4) have been met.
- 7. All soil and/or water samples have been collected, coded, stored and shipped as specified in the rules, and proper chain-of-custody forms have been filled out (0345).
- 8. If a release from a waste oil tank was discovered, at least one sample has been analyzed by the methods specified in 0218(1)(b)(D).
- 9. If a tank was decommissioned in place, the Department gave prior approval for a site-specific sampling plan (0340(5)).
- 10. A report has been prepared which includes a detailed description of everything that was observed and performed at the site, contains all of the information required by the rules (0360), and presents findings and recommendations which are consistent with Department regulations.

SOIL MATRIX SCORE SHEET

1. Depth to Groundwater		
< 25 feet	(10)	
25 - 50 feet	(7)	
51 - 100 feet	(4)	
> 100 feet	(1)	
2. Mean Annual Precipitation		
> 45 inches	(10)	
20 - 45 inches	(4)	
< 20 inches	(1)	
3. Native Soil Type		
Course sands, gravels	(10)	
Silts, fine sands	(5)	
Clays	(1)	
4. Sensitivity of Uppermost Aquifer		
Sole Source	(10)	
Current Potable	(7)	
Future Potable	(4)	
Non-potable	(1)	
5. Potential Receptors		
Many, near	(10)	
Medium	(5)	
Few, far	(1)	
TOTAL SCORE		=
MATRIX SCORE	Cleanup Level	(ppm TPH)
	Gasoline	Diesel
Level 1: > 40 pts.	40	100
Level 2: 25 - 40 pts.	80	500
Level 3: < 25 pts.	130	1000

SECTION 5: REFERENCES AND ADDITIONAL GUIDANCE

SECTION 5.1: REFERENCES

The following documents are referenced in this guidance manual. Copies of the DEQ documents can be obtained by calling the Department's Land Quality Division in Portland at 503-229-6652, or 1-800-742-7878 (toll free in Oregon).

You can also find these documents on the internet. The address for each is included in the larger list of guidance documents given in Section 5.2: Additional Guidance Documents.

Construction and Maintenance of Monitoring Wells and Other Holes in Oregon (Oregon Water Resources Department, 1995).

Groundwater Monitoring Well Drilling, Construction, and Decommissioning (DEQ, 1992).

Guidance for Applying the Low-Impact Site Rule to UST Cleanup Sites (DEQ, January 2008).

Guidance for Ecological Risk Assessment - Level I: Scoping (DEQ, 1998).

Guidance for Use of Institutional Controls (DEQ, 1998).

Heating Oil Tank Generic Remedy Guidance Document (DEQ, August 2007).

Northwest Total Petroleum Hydrocarbon Methods (DEQ, 1996).

Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites (DEQ, September 22, 2003).

Treatment of Petroleum-Contaminated Soils (DEQ, June 2007).

SECTION 5.2: ADDITIONAL GUIDANCE DOCUMENTS

The following is a list of DEQ, EPA, and other cleanup and risk-related guidance documents, permits, and forms, and the internet (web site) addresses* where they can be found. You can get printed copies of the DEQ documents by calling the Land Quality Division, 503-229-6652, or by leaving a message on the UST Helpline, 1-800-742-7878 (toll free in Oregon).

NAME OF DOCUMENT	WEB SITE ADDRESS
~ THE FOLLOWING ARE DEQ UST PROGRAM GUIDANCE DOCUMENTS ~	
Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites	http://www.deq.state.or.us/lq/pubs/docs/RBDMGuidance.pdf
Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites Spreadsheet	http://www.deq.state.or.us/lq/pubs/docs/RBDMSpreadsheetNotes.pdf
Guidance for Applying the Low-Impact Site Rule to UST Cleanup Sites	http://www.deq.state.or.us/lq/pubs/docs/tanks/LowImpactSiteRuleGuidance.pdf
Northwest Total Petroleum Hydrocarbon Methods	http://www.deq.state.or.us/lq/tanks/lust/nwpetroleum.htm
Treatment of Petroleum-Contaminated Soils	http://www.deq.state.or.us/lq/pubs/factsheets/tanks/PCSTreatmentOptions.pdf
Heating Oil Tank Generic Remedy Guidance Document	http://www.deq.state.or.us/lq/pubs/docs/tanks/hot/HOTGenericRemedyGuidance.pdf
Heating Oil Tank Generic Remedy Worksheets	http://www.deq.state.or.us/lq/pubs/forms/tanks/hot/HOTGenericRemedyWorksheets.pdf
Heating Oil Tank Generic Remedy Report Form	http://www.deq.state.or.us/lq/pubs/forms/tanks/hot/HOTGenericRemedyReportForm.pdf
Heating Oil Tank Generic Remedy Instructions	http://www.deq.state.or.us/lq/pubs/forms/tanks/hot/HOTGenericRemedyReportInstructions.pdf
Heating Oil Tank Generic Risk Assessment	http://www.deq.state.or.us/lq/pubs/docs/tanks/hot/HOTRiskBasedStandards.pdf
~ THE FOLLOWING ARE DEQ UST PROGRAM RULES ~	
Cleanup Rules for Leaking Petroleum UST Systems OAR 340-122-0205 through 340-122-0360	http://www.deq.state.or.us/regulations/rules.htm

NAME OF DOCUMENT	WEB SITE ADDRESS
Underground Storage Tank Compliance Rules OAR 340-150-0001 through 340-150-0166	http://www.deq.state.or.us/regulations/rules.htm
Underground Storage Tank Service Providers OAR 340-160-0005 through 340-160-0150	http://www.deq.state.or.us/regulations/rules.htm
UST Soil Matrix Cleanup Service Providers and Supervisors OAR 340-162-0005 through 340-162-0150	http://www.deq.state.or.us/regulations/rules.htm
Licensing Requirements for Service Providers and Supervisors Providing Heating Oil Tank Services OAR 340-163-0005 through 340-163-0150	http://www.deq.state.or.us/regulations/rules.htm
Heating Oil Underground Storage Tanks OAR 340-177-0001 through 340-177-0095	http://www.deq.state.or.us/regulations/rules.htm
~ THE FOLLOWING ARE DEQ UST PROGRAM COMPLIANCE PERMITS AND FORMS ~	
To Install and Operate Regulated Tanks , <u>and</u> EPA Notification for Underground Storage Tanks	http://www.deq.state.or.us/pubs/forms.htm
To Decommission Existing Unregistered Tanks , <u>and</u> EPA Notification for Underground Storage Tanks	http://www.deq.state.or.us/pubs/forms.htm
To Modify Tank Owner, Permittee or Property Owner Information	http://www.deq.state.or.us/pubs/forms.htm
UST Decommissioning/Change-in-Service 30-Day Notice	http://www.deq.state.or.us/pubs/forms.htm
UST Decommissioning Checklist and Site Assessment Report	http://www.deq.state.or.us/pubs/forms.htm
UST Installation Checklist	http://www.deq.state.or.us/pubs/forms.htm
UST System Modification 30-Day Notice	http://www.deq.state.or.us/pubs/forms.htm
UST System Modification Checklist	http://www.deq.state.or.us/pubs/forms.htm
~ THE FOLLOWING ARE DEQ ENVIRONMENTAL CLEANUP DIVISION GUIDANCE DOCUMENTS THAT MAY BE USEFUL FOR SOME UST APPLICATIONS ~	
Contaminated Aquifer Policy	http://www.deq.state.or.us/pubs/reports.htm
Groundwater Monitoring Well Drilling, Construction, and Decommissioning	http://www.deq.state.or.us/pubs/reports.htm

NAME OF DOCUMENT	WEB SITE ADDRESS
Guidance for Conduct of Deterministic Human Health Risk Assessments	http://www.deq.state.or.us/pubs/reports.htm
Guidance for Consideration of Land Use	http://www.deq.state.or.us/pubs/reports.htm
Guidance for Conducting Beneficial Water Use Determinations at Environmental Cleanup Sites	http://www.deq.state.or.us/pubs/reports.htm
Guidance for Ecological Risk Assessment - Level I: Scoping	http://www.deq.state.or.us/pubs/reports.htm
Guidance for Use of Institutional Controls	http://www.deq.state.or.us/pubs/reports.htm
~ THE FOLLOWING ARE DEQ ENVIRONMENTAL CLEANUP DIVISION GUIDANCE DOCUMENTS THAT MAY BE USEFUL FOR SOME NON-UST APPLICATIONS ~	
Generic Remedies for Soils Contaminated with PCBs	http://www.deq.state.or.us/pubs/reports.htm
Guidance for Ecological Risk Assessment - Level II: Screening	http://www.deq.state.or.us/pubs/reports.htm
Guidance for Ecological Risk Assessment - Level II Screening Benchmark Values	http://www.deq.state.or.us/pubs/reports.htm
Guidance for Ecological Risk Assessment - Level III: Baseline	http://www.deq.state.or.us/pubs/reports.htm
Guidance for Ecological Risk Assessment - Level IV: Field Baseline	http://www.deq.state.or.us/pubs/reports.htm
Toxicity Equivalency Factors (TEF) Policy Statement	http://www.deq.state.or.us/pubs/reports.htm
~ THE FOLLOWING ARE OREGON WATER RESOURCE DEPARTMENT RULES ON MONITORING WELLS ~	
Construction and Maintenance of Monitoring Wells and Other Holes in Oregon	http://arcweb.sos.state.or.us/rules/OARS_600/OAR_690/690_240.html
~ THE FOLLOWING ARE EPA GUIDANCE DOCUMENTS AND REFERENCES ~	
Catalog of EPA Materials on Underground Storage Tanks	http://www.epa.gov/swerust1/pubs/index.htm#fprg
Expedited Site Assessment Tools For Underground Storage Tank Sites	http://www.epa.gov/swerust1/pubs/index.htm#fprg
How to Effectively Recover Free Product At Leaking Underground Storage Tank Sites	http://www.epa.gov/swerust1/pubs/index.htm#fprg
How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites	http://www.epa.gov/swerust1/pubs/index.htm#fprg

NAME OF DOCUMENT	WEB SITE ADDRESS
Integrated Risk Information System (IRIS)	http://www.epa.gov/iris
Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups	http://www.epa.gov/superfund/policy/ic/guide/guide.pdf
Modeling Subsurface Transport of Petroleum Hydrocarbons	http://www.epa.gov/athens/learn2model
Notification for Underground Storage Tanks - EPA Form 7530-1	http://www.epa.gov/oust/fedlaws/notify98.pdf
RBCA Fate & Transport Models: Compendium and Selection Guidance	http://www.epa.gov/oust/rbdm/rbdmfnt.htm
Risk Assessment Guidance for Superfund (RAGS), Volume I - Human Health Evaluation Manual, Part B (1991)	http://www.epa.gov/oswer/riskassessment/ragsa/index.htm
Soil Screening Guidance: Technical Background Document	http://www.epa.gov/superfund/health/conmedia/soil/index.htm
Soil Screening Guidance: User's Guide	http://www.epa.gov/superfund/health/conmedia/soil/index.htm
Key OSWER Ground Water Guidances and Reports	http://www.epa.gov/ada/publications.html
Test Methods for Evaluating Solid Waste (SW-846)	http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm
~ THE FOLLOWING IS A GUIDANCE DOCUMENT PUBLISHED BY THE US ARMY CORPS OF ENGINEERS ~	
Evaluation of H.E.L.P. Mate 2000 for the Identification and Quantification of Petroleum Hydrocarbon Products	http://www.crrel.usace.army.mil/techpub/CRREL_Reports/reports/TR00-20.pdf
~ THE FOLLOWING ARE PETROLEUM PRODUCT DOCUMENTS PUBLISHED BY THE ASSOCIATION FOR THE ENVIRONMENTAL HEALTH OF SOILS ~	
Volume 1: Analysis of Petroleum Hydrocarbons in Environmental Media	http://aehs.com/publications/catalog/contents/tph.htm
Volume 2: Composition of Petroleum Mixtures	http://aehs.com/publications/catalog/contents/tph.htm
Volume 3: Selection of Representative TPH Fractions Based on Fate and Transport Considerations	http://aehs.com/publications/catalog/contents/tph.htm
Volume 4: Development of Fraction Specific Reference Doses (RfDs) and Reference Concentration (RfCs) for Total Petroleum Hydrocarbons (TPH)	http://aehs.com/publications/catalog/contents/tph.htm

* **Note:** Internet addresses are current as of the date of this guidance document, but are subject to change.