

UST Cleanup Program – Approval of Bioremediation Technologies

This guidance document discusses a general process that all proposed bioremediation plans must follow to get DEQ approval for use at an underground storage tank or heating oil tank cleanup site. It also discusses other permits that may be required for certain bioremediation technology proposals.

General Information

Bioremediation technologies are applicable to most UST and HOT cleanup projects. The term “bioremediation” refers to microorganisms destroying, transforming or altering the structure of chemicals (i.e., petroleum hydrocarbons). The term “technologies” refers to a scientific method of activity that increases the biodegradation capabilities of microorganisms, in contrast to the natural attenuation rate of the indigenous microbes. Bioremediation occurs when oxygen, nutrients or bioremediation products are introduced to stimulate the growth of hydrocarbon-degrading microorganisms. The in-situ introduction of bio-products is usually through wells, galley systems and by near surface injections. Ex-situ uses include the treatment of petroleum-contaminated soil piles and surface applications. Some examples of how bioremediation activities are stimulated include:

- Introducing oxygen either as a gas, liquid or solid form. These forms include atmospheric air or ozone, hydrogen peroxide, and oxygen releasing compounds that consist mainly of magnesium peroxide or sodium peroxide.
- Introducing chemicals such as agricultural lime, ammonium sulfate or hydrochloric acid to maintain the soil and groundwater pH between 6 and 8.
- The addition of nutrients, typically nitrogen, and phosphorous, and other trace elements such as potassium, magnesium, sulfur and calcium, that are essential for the growth of microorganisms.
- Introducing complex proteins such as enzymes that are capable of producing

- Chemical changes in organic substances by catalytic actions.
- Using surfactants, soap-like cleaning agents that generally emulsify petroleum products, which in turn enhances bioremediation.
- Using bio-products consisting of organisms specifically selected to degrade petroleum hydrocarbons. Bio-products may involve augmenting local indigenous organisms or introducing proprietary mixtures of microbes, which are usually bacteria.

Corrective Action Plan

Any application of bioremediation technologies must be submitted to DEQ in the form of a CAP pursuant to OAR 340-122-0250. Guidance in preparing CAPs can be found in the UST Cleanup Manual (December 2000)

Because of the unique physical, chemical and environmental characteristics of each cleanup site, each proposed use of bioremediation technologies must be submitted on a site by site basis. CAPs must be submitted to the UST project manager assigned to the cleanup site, or in the case of an unassigned cleanup site, to the Regional Office responsible for the county within which the site is located.

DEQ Permitting Requirements

General

A full explanation of permit requirements, application processes and forms, processing time frames and filing and processing fees can be found in DEQ’s Permit Handbook

Water Quality Permits and Registration Requirements

A. 1500-B Permit - Water Pollution Control Facilities Permit

The water quality 1500-B Permit is a General Water Pollution Control Facilities (WPCF) Permit, which is a state permit issued by DEQ. The 1500-B permit governs treated contaminated



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water that is applied on land. Although the permit does have higher discharge limits than the 1500-A discussed below, it prohibits other conditions, such as surface run-off and overloading the land with nutrients and organics.

A 1500-B Permit must be obtained when conducting bioremediation activities at a petroleum hydrocarbon cleanup site if any treatment additives, including the use of microbes, have the potential to reach groundwater. One of the primary conditions of the permit is that these activities can not cause adverse impacts to groundwater beyond the project area. An application for this type of permit must include a Bioremediation Management Plan for approval by DEQ as described in Schedule C of the general permit.

The safety of human health and the environment is paramount and DEQ has adopted a “do no harm” philosophy at petroleum product cleanup projects. Under the “do no harm” philosophy, only naturally occurring microbes are to be used, except as noted below. DEQ does not have the staff or research capability to determine the long-term consequences of a genetically altered microbe in the environment. DEQ will consider the use of such a genetically altered microbe only if it has the prior written approval for use in the environment by the federal Environmental Protection Agency.

Most petroleum degrading products are mixtures of bacteria. While DEQ is sensitive to the proprietary nature of commercially produced microbial mixtures, DEQ requires that such mixtures be tested for toxicity and pathogens by an EPA accredited laboratory that is not affiliated with the company manufacturing or selling the proprietary product. The mixture and its carrying media must not be toxic or contain any human pathogens. DEQ requires documentation of the following test results before any 1500-B Permit is approved by DEQ:

Toxicity tests:

Static Acute Fish Toxicity Test
Acute Oral Rat Toxicity Test

Human Pathogen tests:

Total Coliform
E. coli
Salmonella
Streptococcus
Staphylococcus

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.

Note: A 1500-B permit is not required when injecting oxygen, which includes oxygen-releasing compounds. However, all other restrictions and regulations that apply to other bioremediation activities also apply to oxygen injection

B. Underground Injection Control - Class V Wells

Most delivery systems for the microbial solutions and nutrients into or near the contamination plume are considered a Class V well. The system may deliver the solutions through a galley of underground pipes or through vertical or inclined borings. The latter includes near-surface injection of solutions through stingers. Even if the system of underground pipes is used for dual purposes such as passive/active venting and as solution delivery system, it is still a Class V well. These types of systems are classified under the Underground Injection Control Program and require registration with DEQ.

You must submit an Underground Injection Well Registration Form if an injection well is part of the Bioremediation Management Plan. Most Class V wells are disposal wells, but any well or system that has the potential to deliver solutions into the ground are Class V wells. These are all considered possible conduits that may impact groundwater. In the case of a bioremediation project, the wells are typically used for injection of enhancement solutions but the wells still have the potential to be used for intentional or unintentional disposal.

The registration process has been modified to accommodate the UST Cleanup Program needs since a bioremediation project could involve several hundred injection points a few feet apart and a few feet deep. In these cases a Class V well registration is given for the site rather than by the well or injection point. As an example, if a site measured 100 by 200 feet and had injection points every 4 feet, the resulting 1300 plus injection points are permitted as one 100- by 200-foot site with injection points on 4-foot centers.

An approved 1500-B permit is required before registration and construction of any Class V well for a bio-cleanup.

C. 1500-A Permit - National Pollutant Discharge Elimination System Permits

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

Note: Even if you get a NPDES permit from DEQ, 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.

Solid Waste Permit Requirements – Solid Waste Letter of Authorization

You may need a Solid Waste Letter Authorization permit if your proposal to handle petroleum-contaminated soils 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.

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 the 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.

Air Quality Discharge Permit – Basic Permit

You must give prior “Notice of Intent to Construct” 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 in any given calendar-year (January 1 – December 31). Emissions of over 10 tons per year of any individual hazardous air pollutant, or 25 tons per 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, or where the emissions exceed risk-based concentrations, may also be required to obtain a permit.

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, DEQ requires 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 must treat or otherwise control the impacts of the discharge. A sample calculation is provided for your reference in Section 3.7 of the “UST Cleanup Manual”. For more information, please contact the UST project manager assigned to your project.

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

Water Resources Department Requirements

The Oregon State Water Resources Department is responsible for the construction, conversion, alteration, maintenance and abandonment of monitoring wells, geotechnical holes and other holes. Any of the excavations, injection and recovery wells and monitoring wells needed to implement bioremediation technologies are therefore required to comply with WRD requirements found in OAR 340 –Division 690. Furthermore, persons constructing monitoring wells and geotechnical holes may have to be licensed by WRD or be a registered geologist or engineer (see requirements in OAR 690-240-0035 (4)(c) and 690-240-0055). For more information, please contact WRD at 503-986-0900.

For More Information

Questions about specific treatment projects, permit requirements and/or the forms to be used should be directed to the DEQ Regional Office that has jurisdiction for the cleanup project that the treatment is associated with.

In Northwest Oregon (Clatsop, Clackamas, Columbia, Multnomah, Tillamook and Washington counties):

- Portland, 2020 SW Fourth Ave., Suite 400, 503-229-5263

In Western Oregon (Benton, Coos, Curry, Douglas, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Polk and Yamhill counties):

- Salem office: 750 Front St. NE, Suite 120, 503-378-8240
- Eugene office: 165 East 7th Avenue, Suite 100, 541-686-7838
- Coos Bay office: 381 N. Second Street., 541-269-2721

In Eastern Oregon (Baker, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco and Wheeler counties):

- The Dalles office: Columbia Gorge Community College, 400 E. Scenic Drive, Building 2, 541-298-7255

The Heating Oil Tank Program Operates Statewide out of the Following Office:

- Gresham, 1550 NW Eastman Parkway, Suite 290, 503-667-8414 ext. 55026

For additional information about the UST Program, please visit our Website at: www.deq.state.or.us/lq/tanks/ust/.

For more information about the heating oil tank program, please visit our Website at: www.deq.state.or.us/lq/tanks/hot/.

Alternative Formats

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