

Standard Operating Procedure for Landfarming Petroleum- Contaminated Soils

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**State of Idaho
Department of Environmental Quality**

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1 Title and Approval Page

Title: Standard Operating Procedure for Landfarming Petroleum-Contaminated Soils

Region/Division: Waste Management and Remediation Division

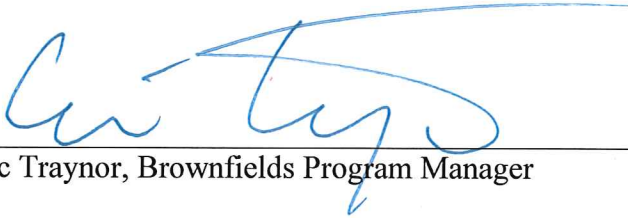
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Approval Signatures

Note: This SOP becomes effective on the date of the last approval signature.

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3 Procedures

3.1 Purpose

This standard operating procedure (SOP) was created for the Idaho Department of Environmental Quality (DEQ) Waste Management and Remediation Division staff to evaluate petroleum-contaminated soil (PCS) treatment by landfarming. The objective is statewide consistency for application of regulations related to treatment of petroleum storage tank (PST)-generated PCS using landfarming techniques.

3.2 Applicability/Scope

This SOP provides a process for determining the management and treatment requirements for landfarming PCS generated during the remediation of a release from a PST system. PSTs are defined by DEQ's "Water Quality Standards" (IDAPA 58.01.02) and "Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)" (40 CFR Part 280). This SOP identifies how DEQ will determine whether a proposed location is suitable to treat PCS using landfarming techniques and ensure proper management of the landfarm. Landfarming activities will be consistent with "Petroleum Release Response and Corrective Action" (IDAPA 58.01.02.852), "Standards and Procedures for Application of Risk Based Corrective Action at Petroleum Release Sites" (IDAPA 58.01.24), and the "Solid Waste Management Rules" (IDAPA 58.01.06).

3.3 Summary of Procedure

To landfarm PCS, a hazardous waste determination must be completed. If this determination identifies the source of the PCS as a petroleum product only release, then DEQ may approve landfarming at the Page Repository (section 3.6.1), a multi-use PCS landfarm (section 3.6.2), or a single-use landfarm (section 3.6.3) as described in this SOP.

3.4 Definitions

3.4.1 DEQ's Petroleum Storage Tank Definition

A **PST System** is one or more storage tanks or other containers, including connective pipes, dispensing equipment, and other connected ancillary equipment, and stationary or mobile equipment, that contains petroleum or a mixture of petroleum with *de minimis* quantities of other regulated substances (IDAPA 58.01.02.010.77).

3.4.2 Federal Petroleum Underground Storage Tank Definitions

A **Petroleum UST System** is "an underground storage tank system that contains petroleum or a mixture of petroleum with *de minimis* quantities of other regulated substances. Such systems include those containing motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils" (40 CFR §280.12).

An **UST** is "any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which (including the volume of underground pipes connected thereto) is 10 percent or more beneath the surface of the ground" (40 CFR §280.12).

3.4.3 Petroleum-Contaminated Soils

PCS is soil exceeding residential use screening levels (RUSLs) (IDAPA 58.01.24 Table 2) due to a release of petroleum products from a PST system.

3.4.4 Landfarming

Landfarming is the application of PCS to a suitable tract of land with the intent to allow volatilization, oxidation, and microbial action to break down the petroleum content of the soils.

3.5 Personnel Qualifications/Responsibilities

DEQ staff conducting evaluations of sites suitable for landfarming activities under this SOP must have experience in assessment and remediation for petroleum releases to the environment and know the regulatory requirements for managing and treating PCS through landfarming techniques.

3.6 SOP Preparation

Landfarming is a form of bioremediation that, with the proper controls, can be a practical, effective, durable, and cost-effective method for treating certain types of soil contamination. Landfarms are engineered bioremediation systems that utilize naturally occurring aerobic microorganisms in the soil to biodegrade the petroleum constituents. Enhancing the biodegradation rate can be accomplished through the introduction of oxygen and nutrients to the PCS. Tilling can both introduce oxygen to the soil and also increase rates of evaporation, and adding soil amendments such as manure and fertilizers can provide the necessary macronutrients to stimulate microbial growth rates.

PCS landfarms are approved areas of land where PCS can be treated by the process of biodegradation. Typically, the PCS is spread out and then tilled/turned on a consistent basis so that the petroleum hydrocarbons can volatilize. The PCS must also be managed properly so that biodegradation occurs. This document describes how to ensure proper management of PCS landfarms so the PCS is treated and does not cause any off-site or further on-site impacts.

Prior to utilizing a landfarm for PCS treatment, a hazardous waste determination (by process knowledge or sampling and analysis) must be made. This determination should identify whether petroleum product only or petroleum product and other constituents were released. DEQ should refer to the procedures identified in the *SOP for Management and Disposal of PCS Following a Release from a Non-UST PST* (EDMS 2011BAF2). PCS derived from petroleum product only releases can be landfarmed. It is not appropriate to approve landfarming of PCS that contains metals (above what would be considered background), herbicides, pesticides, solvents, or other nonpetroleum constituents.

3.6.1 Page Repository at Bunker Hill Superfund Site

Within the Bunker Hill Superfund Site (BHSS), PCS generated from cleanup of petroleum releases is considered an Institutional Control Program (ICP) waste. A *Waste Acceptance, Treatment and Disposal Requirements for Petroleum Contaminated ICP Soils* document (EDMS 2011BAP6) was developed by the DEQ Mine Waste Program to identify the special considerations given for the PCS generated within the BHSS. For instances where the Page Repository is proposed for treatment and disposal of PCS, discussion with the DEQ BHSS project manager is necessary to determine if the use of the Page Repository is acceptable. If the

Page Repository can be utilized, a BHSS ICP waste landfarming consent order (EDMS 2011BAP8) is required and further utilization of this SOP is not warranted.

3.6.2 Commercial (Multi-Use) PCS Landfarms

If the proposed PCS treatment location is a commercial PCS landfarm operation, or if the proposed landfarm site is planning to accept or has accepted PCS from other sites, determine if the PCS landfarm site has submitted notice to DEQ as a Tier I non-municipal solid waste processing facility or has received DEQ approval as a Tier II non-municipal solid waste processing facility. If the location is a Tier II facility, determine if the facility has an approved operating plan by the local health district and is approved to accept PCS.

Management of PCS at Tier I or Tier II processing facilities shall comply with applicable requirements in IDAPA 58.01.06 and conditions in the facility's approved operating plan and further utilization of this SOP is not warranted.

If the PCS landfarm site has not been approved, contact the solid waste program manager, as one of the following will apply:

- If the volume of material at the facility at any one time is ≤ 200 cubic yards, refer to the Tier I facility requirements in IDAPA 58.01.06.011.
- If the volume of material at the facility at any one time is > 200 cubic yards, refer to the Tier II facility requirements in IDAPA 58.01.06.012.

3.6.3 Single-Use PCS Landfarms

Per IDAPA 58.01.06.001.03.ix, wastes not regulated under the "Solid Waste Management Rules" include PCS from a leaking petroleum storage tank system managed as a one-time remediation pursuant to IDAPA 58.01.02.852. If PCS treatment is proposed by an owner/operator or their consultant at a single-use landfarm site, DEQ staff overseeing the release response should request a corrective action plan (CAP) be submitted by the owner/operator/responsible party for the release site and submitted for review and approval by the DEQ State Office and applicable regional office. The CAP must meet the requirements identified in the sections below to ensure appropriate responses to the release and landfarm treatment location are implemented (IDAPA 58.01.02.852 and IDAPA 58.01.02.852.02.d).

Landfarm Requirements

DEQ staff should confirm that the responsible party has completed the following actions as necessary. On a case-by-case basis at DEQ's discretion, some of these activities may be completed by a DEQ contractor.

- PCS should be sampled to obtain representative values for petroleum constituents. Analysis for benzene, toluene, ethylbenzene, xylene, volatile organic compounds, and polyaromatic hydrocarbons depends on the source.
- The native base of the landfarm may also need to be sampled prior to distribution of the PCS to demonstrate that no contamination remains as a condition of closure.
- If the PCS is treated on property not owned by the entity that generated the PCS, a third party waiver of liability and proof of ownership must be obtained and included with the CAP.

- The landfarm needs to comply with all federal, state, and local requirements. This may include obtaining a conditional use permit from the county.
- Land application and treatment of PCS shall not begin until the CAP, including the landfarm, is approved by DEQ.
- Non-soil material (e.g., wood, wire, metal, concrete) should be removed prior to treatment.
- Interim stockpile/storage should be located or covered so that there are no stormwater impacts off site.

Siting, Design, and Construction

DEQ staff should confirm that the following items or stipulations are included in the CAP.

- Quantity of PCS to be treated in the landfarm will be determined based on the size, location, adjacent property uses, and surface features of the proposed landfarm site.
- Landfarm cannot be located in a gravel pit, quarry, or other surface mining feature.
- Setbacks will be determined based on the location of the PCS landfarm (see Table 1).
- The location of the landfarm site will be identified based on proximity to residential areas, schools, businesses, surface water (including canals, ponds, lakes, and ditches), ground water wells, etc. The minimum distances from property line and to nearest residence, surface water, ground water well, building, sensitive receptor, etc., will also be identified. The landfarm cannot be within a 100-year flood plain or within 1,000 feet of the boundary of a state or national park or land reserved for scenic or natural use. The landfarm cannot cause or contribute to the taking of any endangered or threatened species.
- The CAP should identify landfarm site design items, including the following:
 - Size, topography, soil types
 - Distance to surface water, drainage swales, ditches, or other surface water conveyances
 - Stormwater runoff and runoff controls (e.g., berms, swaddles), including interim measures and controls for the winter, if necessary
 - Access controls (including security, fencing and signage)
 - Odor and dust controls, including during any tilling or other mechanical workings of the contaminated soils
 - Liners
 - A determination regarding the need for a liner will be made based on the location of the proposed landfarm.
 - Items of consideration to determine whether a liner is necessary would be depth to ground water, permeability of soils (sandy loams, sands, gravels), amount of annual precipitation, or other site-specific characteristics.
 - Stockpile or landfarm covers, including interim measures and controls for the winter, if necessary
- The CAP should identify operational parameters, including the following:
 - PCS application thickness at the treatment location; treatment method and schedule (e.g., method and frequency of turning/mixing/aeration of the soil during treatment based on petroleum characteristic, climate, time of year).

- Application processes, including spreading to a thickness of approximately 0.5 to 1.0 foot, use of windrows, and how to keep from mixing underlying soil in with the PCS.
- Tilling/turning process and duration
 - Gasoline PCS should be turned once every 2 weeks.
 - Diesel PCS should be turned once every month. Diesel PCS treatment may require enhancement, such as maintaining moisture content, nutrients, pH control, etc. Leachate collection and disposal, if necessary.

Table 1. Suggested setback distances.

Feature	Suggested Setback Distances (feet)
Residence or business	500
Water well	500
Property boundary	200
Surface water	200
Drainage swale, ditch, or other surface water conveyance	100

Landfarm Monitoring

DEQ staff should confirm that the responsible party completed the following items after the CAP has been approved and prior to closure. On a case-by-case basis at DEQ's discretion, some of these activities may be completed by a DEQ contractor.

- *Vapor monitoring.* Periodic site visits to screen the treatment unit with a photoionization detector to monitor vapors and locate any areas requiring more active tilling/turning. Specific information about the periodic monitoring of the landfarm, including how often and the criteria used to identify the need for more active turning, should be included in the CAP.
- *Sampling.* Sampling will be conducted in accordance with the PCS sampling plan, pursuant to the CAP, which will consist of the following:
 - Number and location of soil samples to be collected
 - Frequency of soil sampling, sample collection methods, and identification of grab/discrete versus composite sampling
 - Sample analytical methods
 - Criteria for treated PCS
 - Sample quality assurance/quality control (QA/QC) protocols, including chain-of-custody
 - Quality assurance project plan in accordance with the US Environmental Protection Agency's *EPA Requirements for Quality Assurance Project Plans* (EPA 2001) and *Guidance for Quality Assurance Project Plans* (EPA 2002)
 - This includes appropriate field QC samples (at least one duplicate for every 10 samples, applicable trip blank, etc.) and standard laboratory quality control samples and reporting. Petroleum constituents are identified by the type of petroleum released and are in "Standards and Procedures for Application of Risk Based Corrective Action at Petroleum Release Sites" (IDAPA 58.01.24). Samples for VOC analysis should be

collected using EPA Method 5035 to minimize loss of volatile organic compounds.

- Upon placement of PCS in the landfarm, baseline sampling in a grid across the area must occur. Randomly selected locations should be sampled using methods accepted by DEQ. After the first year, sampling the grid must occur again, unless the contamination is still obvious and the landfarm will need more work (turning the material at least once every 2 months as site conditions allow). Pile sampling methods are described in the *Pile Sampling White Paper* available at www.deq.idaho.gov/media/60177760/pile-sampling-white-paper.pdf.
- *Inspection and maintenance.* Periodic landfarm inspection and maintenance should be completed to ensure access controls, storm water controls, and other operational features are functioning as required.
- *Closure requirements.* DEQ will identify the “acceptable concentrations” of treated PCS and disposition of the treated PCS. Typical final end uses include returning the treated soil to the original excavation, left in-place at the treatment location, sub-grade or road base, municipal solid waste landfill daily cover, asphalt batching, structural fill, or landscaping soil in commercial locations. There will be a restriction on the use of the treated soil, such as not being used in residential developments or for growth of food chain crops (e.g., root crops, green vegetables, or pasture for cattle).

3.6.4 DEQ Conclusion

A petroleum release site cannot be closed (i.e., issued a closure letter) by DEQ until monitoring wells are abandoned per Idaho Department of Water Resources requirements and the landfarm location is closed by DEQ.

3.7 Criteria, Checklists, or Other Applicable Standards

All applicable criteria, checklists, and other applicable standards are discussed in the sections above.

4 Records Management

All written determinations, photos, and other documents associated with site remediation activities will be entered into the site-specific EDMS project folder following program protocols. This SOP should be reviewed, updated, and approved in the same manner as the original document every 5 years or when procedures, protocols, or activities change, whichever occurs first.

5 Quality Assurance and Quality Control

To determine whether a proposed location is suitable to treat PCS using landfarming, DEQ staff will evaluate project planning documents according to applicable regulations as defined in the previous sections. All DEQ determinations will go through senior technical review prior to finalization.

6 References

- CFR (Code of Federal Regulations). 2017. “Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST).” 40 CFR Part 280.
- EPA (US Environmental Protection Agency). 2001. *EPA Requirements for Quality Assurance Project Plans*. EPA QA/R-5. Washington, DC.
- EPA (US Environmental Protection Agency). 2002. *Guidance for Quality Assurance Project Plans*. EPA QA/G-5. Washington, DC.
- IDAPA. 2017. “Petroleum Release Response and Corrective Action.” Idaho Administrative Code. IDAPA 58.01.02.852.
- IDAPA. 2017. “Rules Regulating Underground Storage Tank Systems—Release Reporting Requirements.” Idaho Administrative Code. IDAPA 58.01.07.200.
- IDAPA. 2017. “Solid Waste Management Rules.” Idaho Administrative Code. IDAPA 58.01.06.
- IDAPA. 2017. “Standards and Procedures for Application of Risk Based Corrective Action at Petroleum Release Sites.” Idaho Administrative Code. IDAPA 58.01.24.

7 Attachments

None associated with this SOP.