PERMIT CLOSURE REPORT:
KING COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES GRADING PERMIT

for

Weyerhaeuser Snoqualmie Sawmill
Snoqualmie, Washington

Prepared for:

The Weyerhaeuser Company

Prepared by:

Pacific Environmental and Redevelopment Corporation
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1.0 INTRODUCTION:

A Grading Permit and SEPA review was required as part of a cleanup action conducted by Weyerhaeuser Company at the former Snoqualmie Mill in Snoqualmie, Washington. In the SEPA checklist submitted to King County on August 3, 2005, Weyerhaeuser estimated that approximately 3,500 cubic yards (CY) of petroleum-contaminated soil would require excavation, stockpiling and treatment. King County Department of Environmental Services reviewed this document and issued a Notice of Non-significance. Mr. Paul Meyer of King County Department of Environmental Services issued the grading permit and work began in October 2005. Following the first phase of work to excavate and stockpile the petroleum-contaminated soil estimated in the SEPA documents it became apparent that the extent of contamination was greater than anticipated. Mr. Meyer was contacted to obtain permission to expand the scope of work to excavate additional soils. Verbal permission was received and the work continued to completion.

This report presents a description of the work performed, including excavation areas, construction methods, and best management practices that were implemented during construction, and the findings/conclusions of the work.

2.0 PLANNED AREAS OF EXCAVATION

Weyerhaeuser proposed in the SEPA documents to complete the following work. The excavation of the petroleum-contaminated soil, as described within the SEPA documents, was to be conducted as part of an Independent Cleanup as allowed under the Model Toxics Control Act (MTCA) (WAC 173-340). The cleanup action consisted of removing petroleum-contaminated soil using earthwork excavation equipment. Weyerhaeuser estimated the excavation of petroleum-contaminated soils would occur in the following areas:

- Powerhouse/Mill. The approximate size of the excavation at the former Power House/Mill was estimated to be 783 square feet. The depth of the excavation was estimated to be approximately 5 feet but would depend on the extent of the Total Petroleum Hydrocarbons (TPH) contamination. Approximately 145 CY of soil was the estimated volume of the excavation. Concrete and other structures or debris within the excavation area were to also be removed.

- AST/Lube Oil Area. The size of the two excavations at the former AST/Lube Oil Area was estimated to be approximately 571 and 3,113 square feet. The depth of the excavation was estimated to be approximately 10 feet but would depend on the extent of the TPH contamination. Approximately 1,365 CY of soil was the estimated volume of the excavation. Concrete and other structures or debris within the excavation area were to also be removed.

- Lumber Strapping Area. The approximate size of the excavation at the former Lumber Strapping Area was estimated to be 3,705 square feet. The depth of the excavation was estimated to be approximately 6 feet and would depend on the extent of the TPH contamination. Approximately 823 CY of soil was the estimated volume of the excavation. Concrete and other structures or debris within the excavation area was also to be removed.

- Morbark Area. The approximate size of the four excavations at the former Morbark Area was estimated to be 1,172, 1,537, 1,984, and 1,302 square feet. The depth of the excavation was estimated to be approximately 2 to 6 feet and but would depend on the extent of the TPH contamination. Approximately 975 CY of soil was the estimated volume of the excavation. Concrete and other structures or debris within the excavation area was also to be removed.

3.0 REGULATORY CLEANUP LEVELS

Site characterization and voluntary remediation has taken place at the Site for close to 20 years primarily due to updating and modernization of processes and associated infrastructure. During that time, there were several regulatory changes to the cleanup levels (CLs) accepted by the Washington State Department of Ecology (Ecology). Therefore, there were a variety of different CLs referenced in the historical investigation reports. A brief summary of the CLs used for TPH is presented in the following paragraphs. The Ecology MTCA CLs that are currently applicable are also presented.

3.1 Total Petroleum Hydrocarbons (TPH)

The currently applicable CL for screening purposes is the MTCA Unrestricted Land Use Method A soil TPH CL of 2,000 mg/kg found in WAC 173-340-745. Where the TPH concentration exceeded this level, mixture-specific chemical characterization can be done to develop a CL tailored to the mixture of TPH compounds present at each area of a Site. This method is called TPH fractionation, which measures the concentrations of ten sub-groups based on the number of carbons present (i.e., extractable aliphatic and aromatic petroleum hydrocarbons (EPH) analysis). Using the TPH fractionation method CLs were developed for each work area excavated during this program. This involved the entering of the individual concentrations of each of the ten groups into the MTCA CLs and Risk Calculation spreadsheet for TPH where, together with their individual chemical and toxicological properties, the appropriate CL was determined.[1] Either the MTCA Industrial Method A TPH CL of 2,000 mg/kg or the MTCA Method B TPH CL developed through the fractionation approach is currently appropriate for use at the Site. The MTCA Method B TPH CL was developed for both future residential and industrial Site uses. Table 1 lists the CLs that are appropriate for each work area.

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[1] http://www.ecy.wa.gov/programs/tcp/tools/MTCATPH10.1_xp.xls

TABLE 1: APPLICABLE CLEANUP LEVELS BY WORK AREA

Work Area	Default CL - TPH	Method C CL Calc.- TPH	Method B CL Calc. - TPH	Method B CL Calc. Benzene
Saw Mill and Power House	2000 mg/kg	4,090 mg/kg	55,713 mg/kg	N/A
AST and Lube Oil Storage	2000 mg/kg	110,397 mg/kg	8,818 mg/kg	N/A
Lumber Strapping Area	2000 mg/kg	47,757 mg/kg	3,272 mg/kg	N/A
Morbark Area	2000 mg/kg	167,047 mg/kg	13,295 mg/kg	N/A
UST Area	2000 mg/kg	N/A	N/A	0.065 mg/kg

4.0 SUMMARY OF WORK COMPLETED

The results of the work completed in each area of concern are presented below.

4.1 Excavation Methods

Contaminated soil and concrete were removed using earthwork excavation equipment. Excavated materials were placed onto stockpiles on either a concrete or asphalt pads. The majority of the soil was stockpiled within buildings on the Site and did not require covering. Any stockpiles that were not under building structures were covered with plastic. Verification samples were collected from excavation sidewalls and bottoms. Once the cleanup levels were achieved the excavations were backfilled with either clean imported material or soils from the landfarming process that, as a result of the process, met regulatory standards.

Soil excavated below the perched water table was managed inside the excavation to remove drainable moisture. This was be done by consolidating the soil into piles set on the sloped walls of the excavation, allowing the soil to drain before stockpiling. The excavated soil was then be placed into a lined and bermed area on the ground where further drainage can occur and the drained waters were collected and processed through a oil/water separator before being returned to the excavation. Accumulated groundwater was pumped out of the excavation and processed through an oil/water separator before being returned to the excavation.

4.2 Best Management Practices

TPH excavation activities were conducted following MTCA. Best management practices (BMPs) that were implemented during excavation activities include the following:

- Excavated soil and concrete stockpiles will be placed within building on the Site or on concrete or asphalt pads and covered with plastic prevent rain water infiltration. Containment materials (straw bales or berming) were used to preclude runoff.

- Excavated soil was contained within an exclusion zone by decontaminating equipment and personnel leaving the exclusion zone to prevent off-site migration of contaminated soil.

4.3 Powerhouse and Sawmill Area

The Powerhouse and Sawmill Area includes the Powerhouse, where oil-saturated sawdust was burned as fuel to provide energy to the Sawmill, and the Sawmill Building where lumber was milled from logs. TPH impacts in soil were initially identified in this area when the Sawmill Building was demolished in 1989.The extent of TPH impacts was initially investigated in a subsurface contamination investigation, conducted in November 1989 following demolition of the Sawmill building. Initial investigations identified three locations that were impacted with elevated concentrations of TPH; two within the footprint of the Sawmill building (the log haul equipment area and the sash gang equipment area), and one located at the southwest corner of the powerhouse building.

Approximately 13 CY of soil was excavated from this area and stockpiled. The maximum depth of excavation was approximately 10 feet below ground surface (bgs). This volume was less than the 145 CY and the depth greater than the 5 foot depth estimated in the SEPA documents.

Characterization sampling results were used to calculate area-specific MTCA Method B unrestricted land use and Method C Industrial land use soil TPH CLs of 4,090 mg/kg and 55,713 mg/kg, respectively. Results from verification sampling conducted after soil remediation indicated that the maximum residual TPH concentration in this area was 299 mg/kg, which was below these CLs.

4.4 Road Oil Above-Ground Storage Tank (AST) and Lube Oil Storage Facility Area

The Road Oil AST and Lube Oil Storage Facility Area is where 2 ASTs containing road oil were previously located, and where a Lube Oil Storage Facility is currently located. Use of the ASTs was discontinued in 1988, at which time the tanks were removed. TPH impacts in soil were initially identified in this area when a subsurface soil investigation was conducted in 1989. Observation of these impacts led to the excavation of petroleum-saturated soil, followed by soil characterization studies and additional soil remediation in this area.

Approximately 6,787 CY of soil was excavated from this area and stockpiled. The maximum depth of excavation was approximately 13 feet below ground surface (bgs). The average depth was 4.5 feet. This volume and depth was greater than the 1,365 CY and 10 foot depth estimated in the SEPA documents. The greater volume and depth was necessary due to the extent of contamination above the original estimate. Concrete and other structures or debris within the excavation area were removed and stockpiled so that the work could be completed safely.

Characterization sampling results were used to calculate area-specific MTCA Method B unrestricted land use and the Method C Industrial land use CLs of 8,818 mg/kg and 110,397 mg/kg, respectively. Verification samples collected following the final round of excavation indicated that remaining TPH concentrations were all below the area-specific MTCA Method B unrestricted land use CL of 8,818 mg/kg.

4.5 Lumber Strapping Area

The Lumber Strapping Area is located north-central section of the site (Figure 1). Environmental evaluations were conducted in this area to address a sheen identified in backfill found in a concrete-lined trench that runs through this area. This sheen was later identified to contain TPH. Observation of these impacts led to the excavation of petroleum-saturated soil, followed by soil characterization studies and additional soil remediation in this area. During the excavation work red paint was noted in the northeast corner of the excavation, in an area previously used to paint the Weyerhaeuser logo on finished lumber. As part of the program, a sample of the paint/soil mixture was taken for analysis.

Approximately 751 CY of soil was excavated from this area and stockpiled. The maximum depth of excavation was approximately 5 feet below ground surface (bgs). The average depth was 4.5 feet. This volume and depth was less than the 823 CY and 6 foot depth estimated in the SEPA documents. Building structure supports limited the excavation in this area leading to the lesser volumes. Concrete and other structures or debris within the excavation area were removed and stockpiled so that the work could be completed safely.

Characterization sampling results were also used to calculate area-specific MTCA Method B unrestricted land use and the Method C Industrial land use CLs of 3,272 mg/kg and 47,757 mg/kg, respectively. Verification sampling conducted after the last round of excavation indicated that following remediation, all TPH concentrations in soil, with the exception of the southeast sidewall of the excavation, were below the area-specific MTCA Method B unrestricted land use CL. In addition, VOC and lead concentrations measured in the paint/soil mixture taken from the northeast corner of the excavation were below the associated MTCA Method B unrestricted land use CLs.

4.6 Morbark Area

The Morbark Area is the location of a former log debarker and chipper, located in the southwest area of the Site. Historical machine lubrication practices and leakage of hydraulic oil from the debarking and chipping machines resulted in soil TPH impacts in this area. TPH impacts in soil were initially characterized in this area in an evaluation conducted in 1991, when suspected soil impacts were identified. An interim cleanup was conducted following the discovery but the impacted soil was unsuccessful remediated. The analytical results from this interim work led to additional soil characterization studies and subsequent soil remediation..

Approximately 1,500 CY of soil was excavated from this area and stockpiled. The maximum depth of excavation was approximately 5 feet below ground surface (bgs). This volume and depth was greater than the 975 CY and 6 foot depth estimated in the SEPA documents. The greater volume and depth was necessary due to the extent of contamination above the original estimate. No removal of concrete or any other structures or debris was necessary in this area.

Characterization sampling results were used to calculate area-specific MTCA Method B unrestricted land use and the Method C Industrial land use CLs of 13,295 mg/kg and 167,047 mg/kg, respectively. Following remediation, TPH results for all samples were below the area-specific MTCA Method B unrestricted land use CL. In addition, verification benzene samples were collected from 2 test pits located where the historical samples were collected and analyzed for benzene (the only petroleum component that exceeded MTCA CLs in past samples). Benzene was not detected in either sample.

4.7 Areas added to the excavation program

The following additional areas were added to the excavation program after consultation with Mr. Meyer. The excavation of these areas required to remove and treat/dispose of all known areas of TPH contamination.

4.7.1 Underground Storage Tank (UST) Area

The Underground Storage Tank Area (UST) is where 10 underground storage tanks containing motor grade gasoline, diesel fuels, lubricating oil and the associated fuel dispensing equipment were previously located. Use of these underground storage tanks was discontinued in 1989, at which time the tanks were removed, and petroleum stained soils were identified. Initial characterization studies conducted in 1989 identified BTEX (the gasoline components Benzene, Toluene, Ethylbenzene and Xylene) and TPH impacted soil, which led to the excavation of the impacted soils. Following this phase of excavation the area was thought to be "clean."

Whereas past remediation efforts had been completed at this location and the area had been thought to have been "clean" two exploratory test pits where made. These excavations discovered strong gasoline odors in the soil and soil samples were taken. Laboratory analysis revealed BTEX concentrations exceeding MTCA cleanup levels. Post-excavation verification samples identified that BTEX, lead, and PAHs were all below the associated MTCA Method B CLs, and all TPH concentrations in soil were below the MTCA Method A total TPH CL of 2,000 mg/kg. Benzene was also below the MTCA Method B unrestricted land use CL of 0.065 mg/kg, the soil concentration considered to be protective of groundwater.

Approximately 6,787 CY of soil was excavated from this area and stockpiled. The maximum depth of excavation was approximately 13 feet below ground surface (bgs). The average depth was 6.7 feet.

5.0 SECONDARY TREATMENT OF SOILS - LANDFARMING

Once laboratory results were available it became apparent the active landfarming of the excavated soils was likely to be successful at lowering the TPH concentration to below site- specific MTCA Method B unrestricted land use and the Method C Industrial land use CLs. Once the resident TPH concentrations were below these levels the soil could be returned to the excavation or reused. Attachment A – TPH Landfarming Work Plan described the methods used to treat the excavated soils.

A total of 11,398 CY of soils excavated during this program. Of these soils 10,136 CY, or 89%, met site- specific MTCA Method B unrestricted land use cleanup standards following treatment and were returned to their original location and compacted. The exception was soils from the Lumber Strapping area (1,262 CY) which did not respond to treatment and were loaded into trucks and disposed of off-site at the Columbia Ridge Landfill in Arlington, Oregon.

6.0 SUMMARY AND CONCLUSIONS

Post-remediation confirmation sampling verified that all residual concentrations of TPH, and metals met the MTCA CLs appropriate for future unrestricted land use, with the exception of one location within the Lumber Strapping Area, where additional soil excavation will be required once the location is accessible.

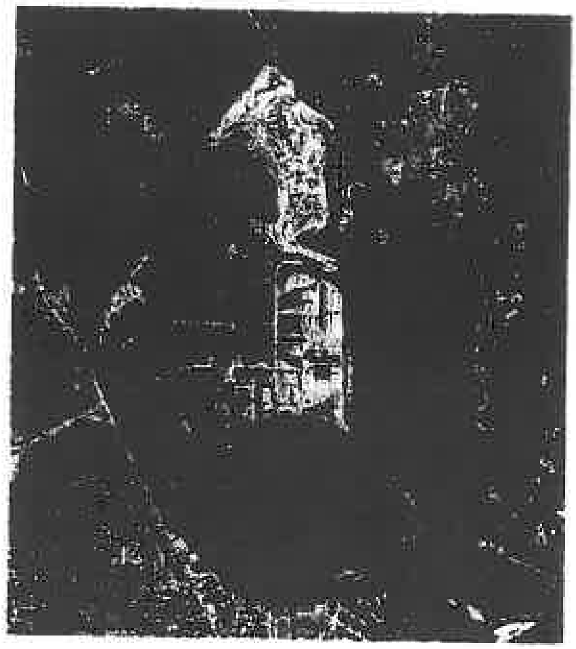
Landfarming was successful in lowering 89% (10,136 CY) of the soils excavated during this program to below site-specific MTCA Method B unrestricted land use cleanup standards and were reused on site. The remaining 1,262 CY were loaded into trucks and disposed of at the Columbia Ridge Landfill in Arlington, Oregon in December 2006.

Concrete and other debris that was stockpiled during this program was loaded into trucks and disposed of off-site(where?) . No stockpiles remain on site from this effort.

ATTACHMENT A:

TPH Landfarming Work Plan

Snoqualmie, Washington



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SECTION 1 – INTRODUCTION AND OVERVIEW

1.1 Introduction

This work plan describes the activities that will take place to implement an effective landfarming program and monitoring plan to successfully remediate total petroleum hydrocarbon (TPH) impacted soil at the former Weyerhaeuser Snoqualmie Mill Site (site). There are two types of TPH-impacted soils that will be remediated, those containing heavy oils (consisting of diesel range organics and heavy oil) and those containing BTEX (benzene, toluene, ethylbenzene, and xylene). Each TPH soil type will be landfarmed in a separate location. Soils were excavated and stockpiled because they exceeded MTCA Method A or B cleanup levels for TPH or BTEX. Landfarming is a technique that has been used successfully to effectively remediate such constituents. The purpose of this plan is to:

1. Evaluate soil stockpile conditions to determine their suitability for landfarming.
2. Identify which, if any, soil amendments are needed in order to implement an effective landfarming program.
3. Establish a maintenance and monitoring plan for landfarming operations to continue until the soil TPH concentrations are below cleanup levels.

1.2 Overview

Heavy oil and BTEX TPH impacted soils have been excavated and stockpiled separately. Soil containing heavy oils exceeded the MTCA Method A cleanup level of 2,000 mg/kg and the site-specific EPH based method B cleanup levels. Soil samples containing BTEX were in excess of MTCA Method A and Method B cleanup levels.

Three areas at the site (the former planer mill, clear lumber shed and common lumber shed) have been designated for land farming (see Figure 1-1). Each area is covered by a roof with asphalt floors and surrounded by hay bales to prevent water or soil runoff. The former planer mill has an area of approximately 114,763 $feet^2$, the former clear lumber shed is approximately 225,063 $feet^2$, and the common lumber shed, which may be used if additional area is required, is 101,048 $feet^2$.

TPH impacted soils will be evaluated for biological, chemical, and physical properties that are generally considered indicative of landfarm effectiveness. These characteristics will dictate any soil amendments that may be needed to attain the desired conditions for microbial-induced breakdown of the TPH constituents. Following the completion of the initial soil testing and subsequent design implementation, the landfarming operation will be monitored until soil is remediated to an acceptable level.

The following sections of this work plan present the landfarm design considerations and the operation and monitoring plans.

SECTION 2 – LANDFARM DESIGN

The approach used to design the landfarm at the site is described in this section.

2.1 Project Management / Resources

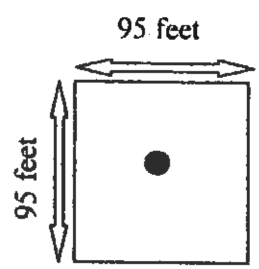
This project will be performed and maintained under the direction of Pacific Environmental and Redevelopment Corporation (PERC) and PIONEER Technologies Corporation (PTC). The landfarming will be done by Active Construction, Inc.

2.2 Initial Site Preparation and System Design

Stockpiled soil will be spread to a depth of approximately 18 inches to allow for easy manipulation of soil for aeration purposes. Hay bales will be maintained around the perimeter of the stockpiled area to contain the movement of soil and runoff, thus acting as a berm. The asphalt floor is a barrier that prevents any soil from leaching and the lack of drainage will also make it particularly important to monitor soil moisture levels and to avoid over-watering. Finally, cow manure will be blended prior to sample collection as it is generally understood that soil in the area tends to be nutrient poor.

2.3 Initial Sample Collection/Field Activities

Samples will be collected to provide background information regarding the chemical, biological, and physical characteristics of the stockpiled soil. One sample will be collected for every 500 yards of soil. This translates into taking a center-point sample for every 95x95' box at 6" below ground surface (bgs).



The analytical results will be evaluated to determine whether soil amendments are needed to augment conditions so that landfarming can proceed in an optimal manner. Five-point composites will be used to ensure homogenization and gain a better overall perspective of soils.

2.4 Analytical Methods and Data Analysis

All composite samples will be labeled and documented via chain of custodies. Depending on the type of analysis required, samples will be sent to STL-Seattle or Spectra Laboratories. The following analyses will be performed on all samples as part of the initial characterization program:

- Plate counts for total heterotrophic bacteria.
- TKN for total Nitrogen.
- Total Phosphorus by Method 365.1.
- Total Organic Carbon (TOC).
- Particle size by sieves ASTM D422 Mod.

Moisture levels and pH will be measured at the time of collection at each sample location using a KELWAY Dual pH and Water Moisture probe.

Data will be evaluated per recommendations made in *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites: A Guide for Corrective Action Plan Reviewers.* (EPA 510-B-95-007) as follows:

- Background heterotrophic bacteria colony forming unit (CFU) totals will be evaluated against a benchmark of 1,000 CFU/gram, which is considered the minimum bacterial plate count for landfarming to be effective.
- PH levels will be compared against the optimal range of between 6 and 8. Landfarming is generally considered to be effective in this range and amendments are needed when soils are more acidic (lower than 6) or alkaline (higher than 8).
- The Moisture content of the soil will be compared to the ideal range of between 40 and 85 percent of the soil's water holding capacity.
- Nutrient concentrations will be compared to the typical ratio necessary for biodegradation to happen (carbon:nitrogen:phosphorus). Biodegradation can typically happen in the range of 100:10:1 to 100:1:0.5.

2.5 Quality Assurance and Quality Control

Equipment blanks, duplicate samples, and matrix spike duplicates will be collected for quality control purposes. One equipment blank, duplicate sample and/or matrix spike will be collected and performed for each TPH soil type for each sampling event.

2.6 Soil Augmentation (If needed)

Soil may need to be augmented for landfarming to proceed based on the data analysis outlined in Section 2.4. If microbial counts are below the benchmark of 1,000 CFU/gram of soil, more animal manure will be blended to provide more nutrients and further augment the overall microbial population numbers.

The optimal range for soil pH is 6 to 8. Amendments will be added to soil outside this range to adjust the pH. Potential amendments include lime to increase the pH (soil pH low) or elemental sulfur to decrease the pH (soil pH high) as needed.

If the ratio of carbon to nitrogen to phosphorus lies outside the microbial preferred range of 100:10:1 to

100:1:0.5, nutrients will be added as necessary to support landfarming. Every effort will be made to avoid adding excessive amounts of nutrients, which can repress microbial growth. If nitrogen addition is necessary, attention will be placed on pH as nitrogen can lower the overall pH of the soil. Particle-size distribution analysis will also dictate whether soil amendments are needed. Specifically, if soil is found to have high silt and/or clay content, straw may be added to aide aeration and water drainage. Moisture content will be assessed bi-weekly and addressed as discussed in the Operations Plans.

SECTION 3—LANDFARM OPERATION AND MONITORING

Operation and monitoring plans will be developed to assess the effectiveness of the landfarming operations. These plans are described in this section.

3.1 Operation Plans

This section describes the operational plans that will be implemented during the landfarming program. The soil will be mixed (e.g., roto-tilled) at least once per week, and typically daily. This will be performed using a disk or similar device to avoid compaction. Directly following tilling, soil moisture content will be randomly sampled using a KELWAY Dual pH and Water Moisture probe. Regular monitoring of soil moisture levels will be critical to microbial growth and landfarming success and due to the lack of natural rainfall (roof) and the lack of drainage (asphalt surface). Figure 3-1 illustrates the process for addressing soil moisture concerns. In addition, Table 3-1 presents an operational checklist that identifies all of the different tests and subsequent actions.

3.2 Remedial Progress Monitoring Plans

The landfarming operation will be assessed on a monthly basis to monitor remediation progress and ensure that optimal site conditions exist for continued remediation. Nutrient content, pH, microbial population, and moisture levels will be assessed in addition to monitoring heavy oil (by Method WTPH 418.1) concentrations and BTEX (by Method 8020) concentrations depending on the contents of the pile. Amendments will be added as needed following the same prescribed methods described in Section 2.6 and Table 3-1.

Monthly sampling will occur using the same methods noted in Section 2.3. The end of operations will occur when samples for BTEX and TPH meet MTCA Method A or Method B cleanup levels. The specific landfarming decision points and outcomes are outlined in Figure 3-2.

Table 3-1 – Operational Checklist

<table>
<tr><th>Test/Condition</th><th>Recommended Testing Frequency</th><th>Explanation</th><th>Finding</th><th>Action</th></tr>
<tr><td>Particle Size Distribution by sieves ASTM D422 Mod.</td><td>Beginning of Program</td><td>The soil particle size distribution is an excellent indicator of aeration potential. Clumpy soils with high percentages of clay can inhibit oxygen from permeating into the soil.</td><td>High silt and/or clay content</td><td>Add and blend in straw</td></tr>
<tr><td>Plate counts for total heterotrophic bacteria.</td><td>Beginning of Program, Periodic After That</td><td>Background heterotrophic bacteria colony forming unit (CFU) totals will be evaluated against a benchmark of 1,000 CFU/gram, which is considered the minimum bacterial plate count for landfarming to be effective.</td><td>Count less than 1,000 CFU/gram</td><td>Add and blend in animal manure</td></tr>
<tr><td rowspan="2">pH</td><td rowspan="2">Beginning of Program, Monthly</td><td rowspan="2">PH levels will be compared against the optimal range of between 6 and 8. Landfarming is generally considered to be effective in this range and amendments are needed when soils are more acidic (lower than 6) or alkaline (higher than 8).</td><td>pH too High</td><td>Add and blend in lime</td></tr>
<tr><td>pH too low</td><td>Add and blend in elemental sulfur</td></tr>
<tr><td rowspan="2">Moisture Content</td><td rowspan="2">Following Tilling</td><td rowspan="2">The Moisture content of the soil will be compared to the ideal range of between 40 and 85 percent of the soil's water holding capacity.</td><td>Moisture < 40% of soil's water holding capacity</td><td>Water (but prevent standing water)</td></tr>
<tr><td>Moisture > 85 % of soil's water holding capacity</td><td>Till, take moisture test. Repeat as needed.</td></tr>
<tr><td>TKN for total Nitrogen.</td><td>Beginning of Program</td><td rowspan="3">Inorganic nutrients are required to support microbial cell growth and biodegradation; excessive amounts of nutrients can repress microbial metabolism. The optimal ratio of Carbon to Nitrogen to Phosphorus is between 100:10:1 and 100:1:0.5</td><td>Nutrient concentration ratio of C:N:P > 100:10:1</td><td>Add a phosphorus source</td></tr>
<tr><td>Total Phosphorus by Method 365.1.</td><td>Beginning of Program</td><td rowspan="2">Nutrient concentration ratio of C:N:P < 100:1:0.5</td><td rowspan="2">Add a slow-release nitrogen source; monitor pH</td></tr>
<tr><td>Total Organic Carbon (TOC).</td><td>Beginning of Program</td></tr>
<tr><td rowspan="2">Heavy Oil and BTEX testing</td><td rowspan="2">Monthly</td><td rowspan="2">Criteria by which the success of the landfarming will be judged.</td><td>Concentrations are above cleanup levels</td><td>Continue landfarming</td></tr>
<tr><td>TPH concentrations are below cleanup levels</td><td>Discontinue landfarming</td></tr>
</table>

Figure 3-1 **– Soil Moisture Monitoring**

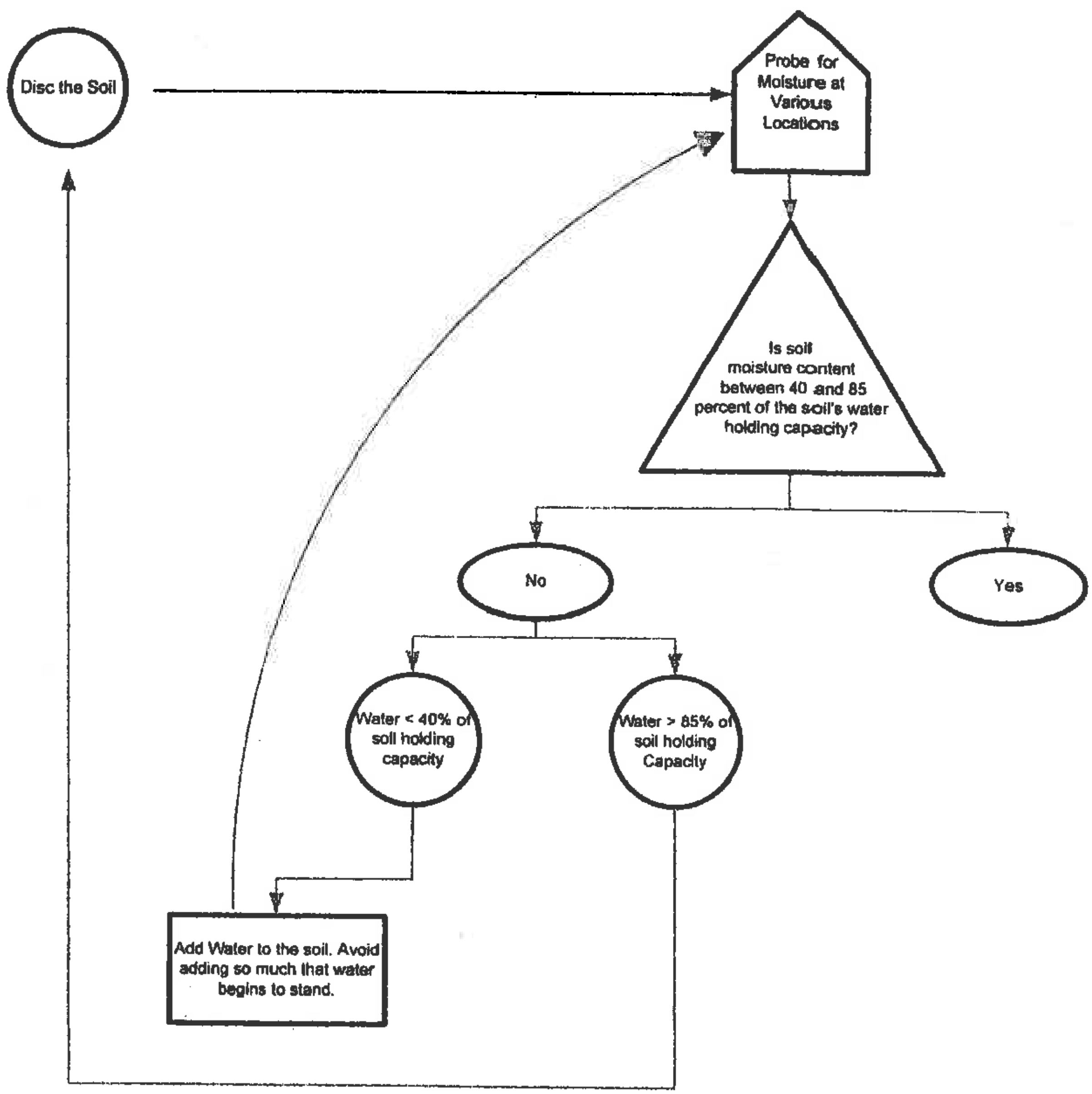
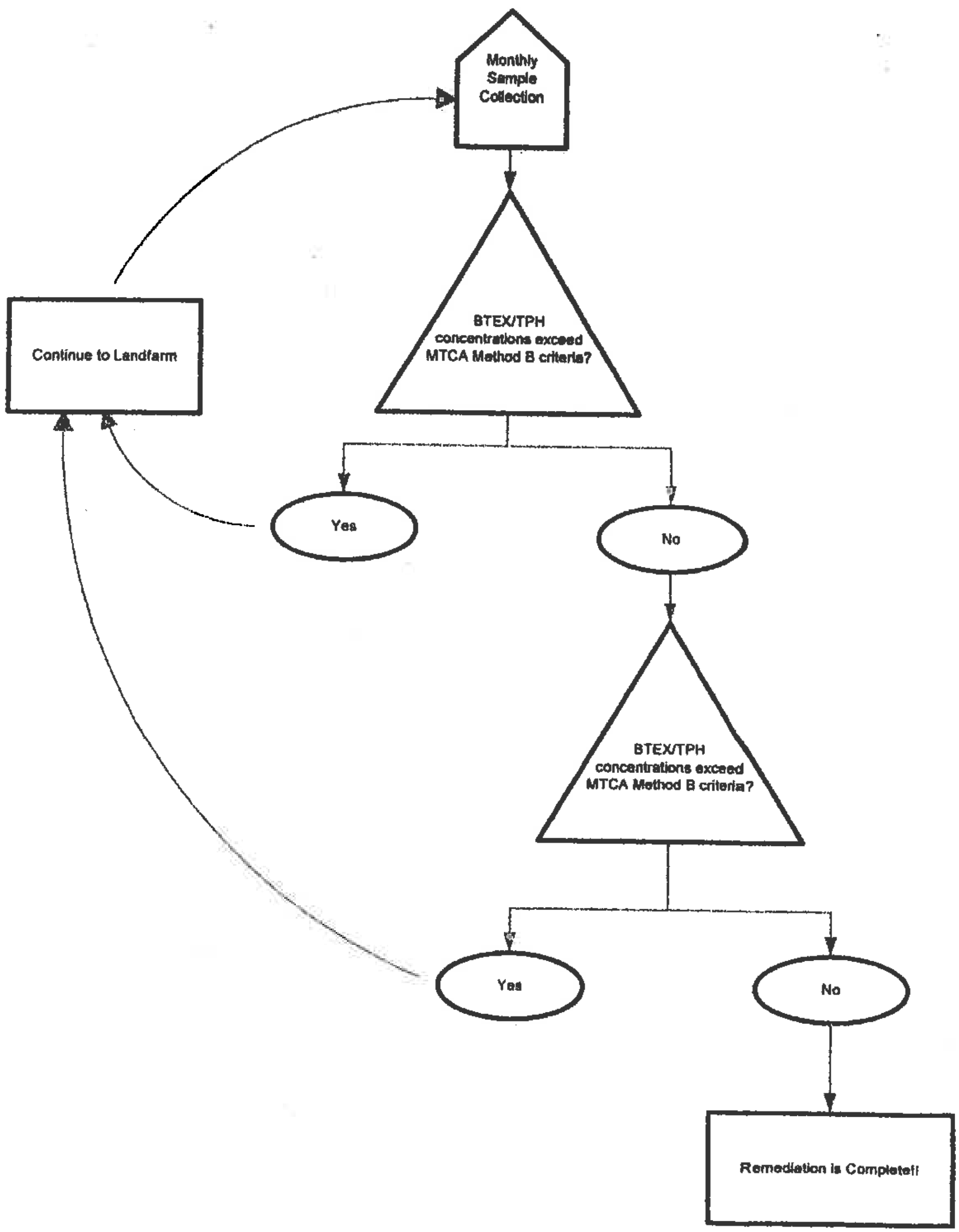


Figure 3-2 – Landfarming Closure Procedures



FIGURES