REMEDIAL ACTION REPORT

FORMER MORBARK LOG CHIPPER AREA - WEYERHAEUSER SNOQUALMIE MILL

3880 SE Millpond Rd

SNOQUALMIE, WASHINGTON 98065

Prepared for

Weyerhaeuser

December 21, 1998

Prepared by

EMCON
18912 North Creek Parkway, Suite 200
Bothell, Washington 98011-8016

Project 40141-083.006

CONTENTS

TABLES AND ILLUSTRATIONS

Following Text

Tables

Figures

1 INTRODUCTION

In August 1998, Weyerhaeuser Company (Weyerhaeuser) commissioned soil remediation activities at the former Morbark Log Chipper Area (site) of the Weyerhaeuser Snoqualmie Mill. The mill is an industrial facility located in a semi-rural area approximately 1 mile northeast of Snoqualmie, Washington (Figure 1). The former Morbark Log Chipper Area is located in the southwestern part of the mill.

Previous site investigation results showed that the soil beneath the site was impacted by petroleum hydrocarbons. Perched groundwater, when present, was also impacted by petroleum hydrocarbons. The purposes of the work described in this report were to remediate the impacted soil, remove the source for any future perched groundwater impacts, and to evaluate the direct contact and protection of groundwater risks associated with the remaining soil containing residual concentrations of petroleum hydrocarbons.

The tasks completed under the scope of work include the following:

- Excavated petroleum hydrocarbon-impacted soils and hauled the excavated soil off site for disposal.
- Collected composite soil samples from the sidewalls of the excavations for quantitative chemical analysis.
- Backfilled the excavations.
- Drilled five soil borings and completed each boring as a groundwater monitoring well. Collected soil samples from four of the borings for quantitative chemical analysis.
- Collected groundwater samples from the five monitoring wells for quantitative chemical analysis.
- Evaluated the direct contact and protection of groundwater risks associated with the remaining impacted soil.
- Prepared this report.

2 BACKGROUND

2.1 General Site Information

Morbark log chipping operations at the site were established during the late 1960s. The chipping facility consisted of a conveyor that fed logs to a debarker and a chipper (Figure 2). The Morbark 640 debarker and chipper were initially powered by diesel engines. During the mid-1970s, the operations were converted to electric power. A new debarker was installed in 1993 due to the leakage of hydraulic oil from the Morbark 640 debarker. It was reported that the chains were lubricated by pouring 5-gallon buckets of oil directly onto them. This lubricating practice was discontinued in the mid-1970s. The spilled oil was reportedly washed off of the asphalt pad and onto the gravel and wood debris ground surface to the south and southeast of the debarker and chipper. The chipping operations at the site were discontinued in September 1997, and all of the debarker and chipper equipment was removed in 1998.

The site is located approximately 1,200 feet northeast of the Snoqualmie River and approximately 1,000 feet northwest of the northern portion of Borst Lake (Figure 1). The ground surface elevation of the site is less than 10 feet above the river elevation of approximately 400 feet above mean sea level (Figure 1).

2.2 Previous Investigations

In 1991, GeoEngineers conducted a subsurface investigation at the site. Six test pits (TP-1 through TP-6) were excavated and soil samples were collected in the vicinity of the debarker and chipper (Figure 2). Soil sample were collected at depths ranging from 2 to 8 feet below the ground surface (bgs). The sample analytical results showed that total petroleum hydrocarbons (TPH) as diesel (TPH-D), TPH as oil (TPH-O), and TPH by Environmental Protection Agency (EPA) Method 418.1 (TPH-IR) were detected at concentrations above Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method A Cleanup Levels[1] in one or more soil samples from test pits TP-2, TP-4, and TP-5. The complete results of the investigation are documented in

---

[1] Chapter 173-340 WAC, *The Model Toxics Control Act Cleanup Regulation.* Amended January 1996.

the GeoEngineers report, *Subsurface Contamination Assessment, Chipping Machine Area*, dated May 8, 1991.

In June 1998, EMCON conducted remedial investigation activities at the site. Seven Geoprobe™ soil borings (GP-1 through GP-7) were advanced on site in the vicinity of the former debarker and chipper (Figure 2). Soil samples were collected from the borings and groundwater samples were collected from temporary wellpoints in four of the borings (GP-1, GP-2, GP-3, and GP-6). The results of the investigation showed that petroleum hydrocarbons were detected in all borings at a depth of approximately 2 feet bgs and extended to at least the perched groundwater table located at approximately 4 to 6 feet bgs.

A risk evaluation was performed using Ecology's Interim Policy Statement for the Cleanup of TPH (Interim TPH Policy)[2]. Based on the evaluation, EMCON determined that a TPH (combined TPH-D and TPH-O) concentration of 4,418 milligrams per kilogram (mg/kg) would result in a hazard index of 1.0 (protection of human health through direct contact) and a projected groundwater concentration below the MTCA Method A cleanup level of 1 milligram per liter (mg/L). Therefore, an MTCA Method B residential (based on Interim TPH Policy methods) soil action level of 4,400 mg/kg was established for the site. An explanation of the Interim TPH Policy is presented in more detail in Section 4 of this report.

Based on the risk evaluation, soil action levels were only exceeded in samples collected from borings GP-2, GP-6, and GP-7. The risk evaluation also showed that combined TPH (TPH-D + TPH-O) concentrations in soil exhibit acceptable risks based on the protection of groundwater; therefore, soil remaining at the site does not pose a threat to drinking water. Soil samples from borings GP-2, GP-6, and GP-7 were also analyzed for carcinogenic polynuclear aromatic hydrocarbons (CPAHs). The analytical results showed that CPAHs were only detected in sample GP-7, but the concentrations were below the MTCA Method A cleanup level.

The investigation also revealed that the groundwater samples from GP-1, GP-2, GP-3, and GP-6 contained TPH-D and/or TPH-O concentrations that exceeded the MTCA Method A cleanup levels based on the protection of drinking water. The complete results of the investigation and the Interim TPH Policy evaluation and action level determination

---

[2] Ecology. 1997. *Interim Interpretive and Policy Statement - Cleanup of Total Petroleum Hydrocarbons (TPH)*. Publication No. ECY97-600. Washington State Department of Ecology, Toxics Cleanup Program, Olympia, Washington. January.

are documented in EMCON's, *Remedial Investigation Report, Former Morbark Log Chipper Area*, dated July 24, 1997.

3 REMEDIATION ACTIVITIES

3.1 Soil Excavation

Based on the previous investigation results, the soils containing TPH concentrations above the action level (4,400 mg/kg) were located in the area around the former chipper and debarker (includes soil borings GP-1, GP-2, GP-7, and test pit TP-2) and in a localized area at the west end of the former western log infeed conveyor (includes boring GP-6; Figure 2). Prior to conducting the soil excavation activities, the concrete foundation and asphalt pad beneath the former debarker and chipper were removed. Approximately 110 tons of concrete and asphalt debris were transported and disposed of at the Weyerhaeuser Headquarters Landfill in Castle Rock, Washington.

On September 8, 9, and 10, 1998, approximately 1,386 tons of petroleum hydrocarbon-impacted soil were excavated from the two locations at the site. The approximate areas of excavation are shown on Figure 2. Wyser Construction of Everett, Washington, conducted the excavation activities. All of the excavated soil was hauled off site for disposal at the Weyerhaeuser Headquarters Landfill.

The excavation activities were conducted under the direction of an EMCON geologist. Excavation sidewall, floor (former log infeed conveyor excavation only), and stockpile samples were collected and submitted to a temporary laboratory set up by the Weyerhaeuser Analytical Testing Services laboratory in Longview, Washington, for chemical analysis. All soil samples collected during the excavation activities were analyzed for TPH-D and TPH-O by using Ecology Method WTPH-D extended with sulfuric acid/silica gel cleanup (to minimize woodwaste interference). The excavations extended laterally and vertically where possible until the combined TPH-D and TPH-O concentrations were below 4,400 mg/kg. This goal was achieved, except in the area of sample SW-5 (explained below). The soil sample analytical results for the excavations are shown in Table 1. A copy of the laboratory reports are presented in Appendix A.

3.1.1 Excavation - West End of the Former Western Log Infeed Conveyor

The excavation located near the west of the former western log infeed conveyor was approximately 15 feet in diameter and extended to approximately 6 feet bgs. The approximate area of the excavation is shown on Figure 2. One composite soil sample

(SW-11) was collected from the sidewall at approximately 4 feet bgs, and one discrete soil sample (B-1) was collected at the bottom of the excavation at approximately 6 feet bgs. The soil sample locations are shown on Figure 2. Groundwater was not encountered in the excavation.

No petroleum-like odors or sheens were observed in the soil samples collected during excavation activities. The laboratory results showed that the combined TPH-D and TPH-O concentrations in samples SW-11 and B-1 were both below the 4,400 mg/kg action level.

3.1.2 Excavation - Former Debarker and Chipper Area

The excavation located near the former debarker and chipper area was approximately 90 feet long by 55 feet wide and extended to approximately 5 feet bgs where perched groundwater was encountered. The approximate area of the excavation is shown on Figure 2. Ten composite soil samples (SW-1 through SW-10) were collected from the sidewalls of the excavation at approximately 4 feet bgs. The sidewall composite samples were collected by compositing soil over a 25-foot length of sidewall (as shown in Figure 2). No samples were collected from the bottom of the excavation due to the presence of the perched groundwater. The laboratory results showed the combined concentration of TPH-D and TPH-O were below 4,400 mg/kg for all collected samples, except a sample collected from the east sidewall (SW-5).

The area around SW-5 was extended approximately 3 feet based on the laboratory results. A second composite soil sample (SW-5-2) was collected from the overexcavated east sidewall at approximately 4 feet bgs (Figure 2). No petroleum-like odors or sheens were noted in the sample; however, the laboratory results showed the combined concentration of TPH-D and TPH-O was above 4,400 mg/kg.

The area around SW-5-2 was extended approximately 4 additional feet (up to the adjacent storage bin building). A small pool of product was noted at the bottom of the excavation at approximately 5 feet bgs. The excavation was deepened to 6 feet bgs and further evidence of product was no longer present. A third composite soil sample (SW-5-3) was collected from the overexcavated east sidewall at approximately 4 feet bgs (Figure 2). The laboratory results showed the combined concentration of TPH-D and TPH-O (15,500 mg/kg) was above 4,400 mg/kg. The excavation could not be extended further due to the presence of the storage bin foundation.

3.1.3 Backfilling

After completion of the excavation activities, both excavations were backfilled using clean sand from the Lonestar gravel pit in Snoqualmie, Washington.

4 RE-EVALUATION OF TPH RISK

4.1 General Description

The petroleum hydrocarbons that were commonly used at the Morbark Log Chipper Area (diesel, hydraulic fluid, and lubricating oil) are complex mixtures of compounds, each with distinct chemical, physical, and toxicological properties. Ecology's Interim TPH Policy introduced the surrogate approach, in which petroleum hydrocarbons are divided into 13 fractions based on the number and structure of carbon atoms in the hydrocarbon molecules. For example, molecules with 5 to 12 carbon atoms (EC5 to EC12) typically are found in gasoline, molecules with 8 to 18 carbon atoms (EC8 to EC18) typically are found in diesel fuel, and molecules with 14 to 30 carbon atoms (EC14 to EC30) typically are found in fuel oil or lube oil. The Interim TPH Policy establishes 6 aliphatic (chain structure) fractions and 7 aromatic (ring structure) fractions for petroleum hydrocarbons. A surrogate chemical is chosen to represent the chemical, physical, and toxicological properties of each fraction, and assumes that aliphatic hydrocarbons and aromatic hydrocarbons have the same potential human health risk as do surrogate chemicals (hexane and pyrene, respectively).

Unlike the methodology used under MTCA, the Interim TPH Policy approach does not yield a soil cleanup level. Instead, the Interim TPH Policy method evaluates the risk (hazard index) associated with direct contact with a soil containing a specific petroleum hydrocarbon concentration. If the calculated hazard index is less than or equal to 1.0, then the risk posed by direct contact with the petroleum hydrocarbons is considered acceptable. In addition, the Interim TPH Policy evaluates the potential for the leaching of dissolved-phase hydrocarbons from TPH-impacted soil and subsequent mixing with groundwater. The resultant TPH concentration in groundwater is then compared to water quality criteria. This site-specific application of a simple soil/pore water partitioning model offers an alternative to MTCA's default dilution attenuation factor of 100 for evaluating the soil to groundwater pathway.

4.2 Site Application - Direct Contact with Soil

For the former Morbark Log Chipper Area, the direct contact risk to human health was re-evaluated according to the Interim TPH Policy. The purpose of the re-evaluation was to verify that the soil remaining on site does not threaten human health or the environment.

Sample SW-7 was chosen to represent the residual soil conditions because it had the highest diesel-to-oil ratio (diesel will drive the VPH/EPH risk). Although sample SW-5-3 contained the highest combined TPH concentration, it does not represent the results of the remediation because the excavation could not be extended at that area.

One confirmation soil sample (SW-7) was analyzed by North Creek Analytical, Inc., of Bothell, Washington, for volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) by Ecology Interim TPH Methods WA-VPH and WA-EPH, respectively, and for PAHs by EPA Method 8270 SIM. The VPH and EPH results represent the concentrations of volatile and semi-volatile aliphatic and aromatic hydrocarbons remaining in the soil. The VPH and EPH results for the samples are presented in Table 2. A copy of the laboratory report is presented in Appendix A.

The hazard quotient (HQ) for direct contact with soil was calculated for the petroleum hydrocarbons in the representative soil sample by using MTCA Method B residential exposure assumptions (WAC 173-340-745). The residential exposure scenario is a conservative approach for an industrial site. The sum of HQs across all hydrocarbon fractions is the hazard index, which was compared with MTCA's hazard index action level of 1.0.

The Interim TPH Policy requires the separate evaluation of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and CPAHs. The soil samples were not analyzed for BTEX because products containing these compounds were not used at the site. CPAHs were not detected in sample SW-7. Because CPAHs were not detected and products containing BTEX were not used at the site, these compounds were not further evaluated.

Based on the VPH and EPH results for sample SW-7, the calculated residential scenario hazard index for the remaining TPH at the site was 0.26, significantly below the hazard index action level of 1.0. Based on this evaluation, TPH concentrations detected in the final confirmation sidewall and floor samples, except SW-5-3, indicate an acceptable human health risk through direct contact with soil. Table 3 presents the results of the direct contact with soil risk evaluation.

4.3 Site Application - Protection of Groundwater

The risk to groundwater beneath the site was evaluated according to the Interim TPH Policy by using a soil/water partitioning and groundwater mixing model. The model assigned solubility values to the hydrocarbon fractions detected in one representative soil sample. Estimated hydrocarbon concentrations in soil pore water due to leaching by infiltration of surface water were calculated based on the percentages of each petroleum hydrocarbon fraction in the soil sample. The estimated hydrocarbon concentrations in groundwater were calculated based on the mixing of dissolved hydrocarbons in soil pore

water with groundwater using the default dilution factor in the TPH Interim Policy. The total hydrocarbon concentration (sum of all hydrocarbon fractions) predicted in groundwater by the soil/water partitioning model was then compared to the MTCA Method A groundwater cleanup level for TPH.

The same hydrocarbon fractionation results used to calculate direct contact risk (sample SW-7) were also used to calculate the projected groundwater concentrations. The concentration of dissolved petroleum hydrocarbons in soil pore water generated by leaching of the TPH-impacted soil is independent of the TPH concentration in soil because the pore water is saturated with respect to petroleum hydrocarbons. The relative percentage of high solubility versus low solubility hydrocarbon fractions determines the resulting groundwater concentrations.

The estimated TPH concentrations in groundwater beneath the site resulting from leaching of hydrocarbons from soil at SW-7 was calculated to be 0.00062 mg/L. This estimated groundwater concentration is significantly below the MTCA Method A cleanup level for TPH (1 mg/L). The relative percentage of lower solubility hydrocarbons (C12 to C35) in the samples was greater than the percentage of higher solubility hydrocarbons (C8 to C12). The resulting groundwater concentration, therefore, is relatively low. Based on this evaluation, the remaining TPH concentrations in soil at the site do not present a risk to groundwater. Table 4 presents the results of the protection of groundwater evaluation.

5 GROUNDWATER EVALUATION AND MONITORING

5.1 Drilling and Soil Sampling

On September 14, 1998, five groundwater monitoring wells (A-1 through A-5) were installed to monitor the perched groundwater conditions at the site. Wells A-1, A-2, A-4, and A-5 were installed to the north, east, west, and south of the excavations, respectively. Well A-3 was installed within the clean backfill of the main excavation. The locations of the monitoring wells are shown on Figure 3. All drilling and sampling activities were conducted under the direction of an EMCON geologist. Cascade Drilling, Inc., of Woodinville, Washington, advanced five hollow-stem auger soil borings on site. The borings were advanced to approximately 9.5 feet bgs. The surficial geology beneath the site consists of up to 8 feet of gravelly sand to silty sand fill with abundant wood debris. Local areas of wood debris have degraded into peat. The fill is underlain by a sandy silt to silty sand unit that is at least 4 feet thick. Groundwater was encountered in all borings (except boring A-3) at the time of drilling at depths ranging from 3 to 7 feet bgs.

Soil samples were collected from the borings at 2.5-foot intervals using a 1.5 inch inside-diameter split-spoon sampler. Soil samples were screened in the field for volatile organic vapors using a portable photoionization detector (PID). Volatile organic vapors were not detected in any of the samples collected. The drilling and soil sampling procedures, and boring logs are included in Appendix B.

A total of four soil samples (A-1-2.5, A-2-1, A-4-5, and A-5-2.5) from borings A-1, A-2, A-4, and A-5, collected at depths above groundwater, were submitted to the Weyerhaeuser Analytical Testing Services laboratory in Federal Way, Washington, for chemical analysis. Soil samples from boring A-3 were not submitted for chemical analyses due to the location of the boring in the clean fill. The soil samples were analyzed for TPH-D and TPH-O by Ecology Method WTPH-D extended with sulfuric acid/silica gel cleanup.

5.2 Groundwater Monitoring Well Installation and Groundwater Sampling

All five borings (A-1 through A-5) were completed as 2-inch-diameter groundwater monitoring wells at the time of drilling. The monitoring wells were completed with above

ground casings and monuments. The wells were developed by surging and bailing with a steel bailer on September 15, 1998. Monitoring wells A-2 and A-5 were found to be good producers and produced approximately 15 to 20 gallons each during well development activities. Monitoring wells A-1, A-3, and A-4 went dry after 2 to 7 gallons of water were purged. EMCON surveyed the monitoring wells using an on-site arbitrary datum (assigned an elevation of 100.00 feet). Monitoring well installation, well development, and surveying details are documented in Appendix B.

The groundwater in monitoring wells A-1 through A-5 was sampled by EMCON on September 24, 1998. The depth to groundwater in each well was measured with an electronic water level probe prior to sampling activities. The depth to water measurements ranged from 5.11 feet below the top of the well casing (TOC) in A-2 to 8.30 feet below the TOC in A-4. The TOCs ranged from 3 to 3.75 feet above the ground surface; therefore, the depths to groundwater ranged from 2.11 feet bgs in A-2 to 5.30 feet bgs in A-4. The groundwater elevations in the wells ranged from 93.94 to 94.73 feet and showed variable groundwater flow directions. The variable flow directions may be due to the variable depths to the top of the underlying perching unit or that the perched groundwater is localized. The groundwater elevations on September 24, 1998, are presented in Table 5 and shown on Figure 3.

Prior to collecting groundwater samples, at least three well casing volumes of water were purged from each well by using a peristaltic pump. Groundwater parameters (temperature, pH, conductivity, and dissolved oxygen) were measured and recorded after each well casing volume of water purged. The groundwater parameter measurements recorded during sampling activities are presented in Table 5. The groundwater sampling procedures and sampling data sheets are included in Appendix B.

One groundwater sample was collected from each well and submitted to the Weyerhaeuser laboratory in Federal Way, Washington. The groundwater samples (samples A-1 through A-5) were analyzed for TPH-D and TPH-O using Ecology Method WTPH-D extended with sulfuric acid/silica gel cleanup, and for PAHs using EPA Method 8270 SIM.

5.3 Laboratory Results

5.3.1 Soil Samples

The laboratory results showed that TPH-D and TPH-O were detected in all submitted soil samples. All of the samples contained combined TPH concentrations significantly below the soil action level of 4,400 mg/kg. Laboratory results for soil samples collected during drilling activities are summarized on Table 6. The laboratory report is presented in Appendix C.

5.3.2 Groundwater Samples

The laboratory results showed that the TPH-O concentrations in the samples from wells A-1 and A-5 exceeded the MTCA Method A cleanup level (1 mg/L). The TPH-D and TPH-O concentrations in the samples from A-2, A-3, and A-4 were at or below Method A cleanup levels. The wells that contained TPH-O concentrations above the Method A cleanup level are located over 60 feet to the north and south of the former debarker and chipper excavation areas. PAHs were not detected above the method reporting limits in any of the groundwater samples. The groundwater sample analytical results are summarized in Table 7 and shown on Figure 3. The laboratory report is presented in Appendix C.

6 DISCUSSION AND CONCLUSIONS

Previous investigation revealed that petroleum hydrocarbon-impacted soil was present at shallow depths beneath the site. In September 1998, the site was remediated by excavating approximately 1,386 tons of impacted soil. One excavation was located near the west end of the former western log infeed conveyor and the other excavation was located near the former debarker and chipper area. Both excavations extended laterally and vertically until the TPH-D and TPH-O concentrations were below 4,400 mg/kg (the Interim TPH Policy soil action level established during the remedial investigation phase of the project), or until groundwater was encountered. The depths of the excavations were typically 6 feet bgs. Perched groundwater was only encountered in the larger excavation located near the former debarker and chipper area. All excavated soil was disposed at the Weyerhaeuser Headquarters Landfill in Castle Rock, Washington. The excavations were backfilled with "clean" imported fill.

The combined TPH concentrations (TPH-D + TPH-O) in the final confirmation sidewall and floor samples were all below the soil action level of 4,400 mg/kg except for the sample collected from the northeastern portion of the debarker/chipper area excavation (sample SW-5-3). Soil in this area could not be excavated further without jeopardizing the structural integrity of the adjacent building. Therefore, except for the localized pocket of soil near the building foundation, soil remaining on site does not exceed the Interim TPH Policy action level established for the protection of human health through direct contact with soil and for the protection of groundwater.

The remaining TPH concentrations in soil at the site were re-evaluated for direct contact and protection of groundwater risks in accordance with Ecology's Interim TPH Policy. The direct contact risk was conservatively evaluated using MTCA Method B residential exposure scenarios. Based on this re-evaluation, TPH concentrations detected in the final confirmation sidewall and floor samples exhibit acceptable direct contact and protection of groundwater risks. CPAHs were not detected in the samples.

In September 1998, five groundwater monitoring wells (A-1 through A-5) were installed at the site to monitor perched groundwater conditions. The soil samples that were collected in conjunction with the installation of the wells did not contain combined TPH concentrations above the soil action level. On September 25, 1998, the groundwater elevations in the wells showed variable flow directions. The results of the groundwater sampling conducted in September 1998 showed that TPH-O concentrations in the samples

from A-1 and A-5 exceeded the MTCA Method A cleanup level. The TPH-D and TPH-O concentrations in the samples from A-2, A-3, and A-4 were below Method A cleanup levels. PAHs were not detected in any of the samples. The groundwater sample analytical results confirmed the variable groundwater flow directions from the source areas (wells A-1 and A-5 and are located over 60 feet to the north and south, respectively, of the former debarker and chipper excavation).

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

TABLES

Table 1
Soil Sample Analytical Results
Excavation Sidewall and Floor Samples
Former Morbark Log Chipper Area Weyerhaeuser Snoqualmie Mill
Snoqualmie, Washington

Sample Number	Date Sampled	Approximate Sample Depth (feet)	Analytical Results (mg/kg)		
			TPH-D[a]	TPH-O[b]	Total CPAHs[c]
Excavation Sidewall Samples					
SW-1[d]	9/8/98	4[f]	<420	<1,100	NA
SW-2[d]	9/8/98	4[f]	<320	<780	NA
SW-3[d]	9/8/98	4[f]	560	3,400	NA
SW-4[d]	9/8/98	4[f]	990	790	NA
SW-5[d,e]	9/8/98	4[f]	1,000	5,700	NA
SW-5-2[d,e]	9/8/98	4[f]	2,500	12,000	NA
SW-5-3[d]	9/10/98	4[f]	2,500	13,000	NA
SW-6[d]	9/8/98	4[f]	860	<520	NA
SW-7[d]	9/9/98	4[f]	910	3,400	<0.35
SW-8[d]	9/9/98	4[f]	890	1,700	NA
SW-9[d]	9/8/98	4[f]	700	3,600	NA
SW-10[d]	9/8/98	4[f]	510	<490	NA
SW-11[d]	9/8/98	4[f]	<220	800	NA
Excavation Floor Sample					
B-1	9/9/98	6	290	770	NA

NOTE: mg/kg = milligrams per kilogram (ppm).
NA = not analyzed for particular analyte.

[a] TPH-D = Total petroleum hydrocarbons as diesel by Ecology Method WTPH-D extended.

[b] TPH-O = Total petroleum hydrocarbons as oil by Ecology Method WTPH-D extended.

[c] CPAHs = Carcinogenic polynuclear aromatic hydrocarbons by EPA Method 8270-SIM.

[d] Composite sample.

[e] Sample was not a final confirmation sidewall sample. The sample area was excavated further and the new sidewall was sampled.

[f] Average depth of the composite samples.

Table 2
Soil Sample Analytical Results
Volatile and Extractable Petroleum Hydrocarbons
Former Morbark Log Chipper Area
Weyerhaeuser Snoqualmie Mill,
Snoqualmie, Washington

	Sample SW-7		
Group	VPH	EPH	Total
Aliphatics EC5-EC6	< 5		ND
Aliphatics >EC6-EC8	< 5		ND
Aliphatics >EC8-EC10	< 5	< 5	ND
Aliphatics >EC10-EC12	< 5	< 5	ND
Aliphatics >EC12-EC16		< 5	ND
Aliphatics >EC16		1013.1	1013.1
Total Aliphatics			1013.10
Aromatics >EC8-EC10	< 5		ND
Aromatics >EC10-EC12	< 5	< 5	ND
Aromatics >EC12-EC16	< 5	< 5	ND
Aromatics >EC16-EC21		18.0	18.0
Aromatics >EC21-EC35		88.4	88.4
Total Aromatics			106.40
Total TPH			1119.50
Percent Aliphatics			90%
Percent Aromatics			10%
Total VPH or EPH	ND	1119.50	
TPH as diesel by WTPH-Dx			910
TPH as oil by WTPH-Dx			3,400
CPAHs	< 0.35		

NOTE: All values in milligrams per kilogram (mg/kg).
ND = not detected at or above the method reporting limit.
EC = equivalent carbon number.
EPH = extractable petroleum hydrocarbons.
VPH = volatile petroleum hydrocarbons.
TPH = total petroleum hydrocarbons.
CPAH = total carcinogenic polycyclic aromatic hydrocarbons.

Table 3
Protection of Direct Contact for Residential Scenario - Sample SW-7
Former Morbark Log Chipper Area
Weyerhaeuser Snoqualmie Mill
Snoqualmie, Washington

Compound Group	Soil Concentration SC (mg/kg)	Reference Dose ORfD (mg/kg/day)	Potency Factor OCPF $(mg/kg/day)^{-1}$	Soil Ingestion Factor (1/day)	Multiplier (kg/mg)	HQ or Risk (unitless)
Source (TPH Policy)	Table 2	ITPH Policy	ITPH Policy	Expo.Param.	Equations 1&2	Equations 3&4
Noncarcinogens						
Total Aliphatics	1013.10	0.06	NA	1.25E-05	2.08E-04	0.211
Total Aromatics	106.40	0.03	NA	1.25E-05	4.17E-04	0.044
Total Hazard Index						0.26
Carcinogens						
CPAHs	0	NA	7.3	1.00E-06	7.30E-06	0.00E+00
Total Cancer Risk						0.00E+00

Exposure Parameters

Parameter	Abbreviation	Value	Units	Source
Average body weight	ABW	16	kg	WAC 173-340-745
Soil ingestion rate	SIR	200	mg/day	WAC 173-340-745
Frequency of contact	FOC	1	unitless	WAC 173-340-745
Lifetime	LIFE	75	yr	WAC 173-340-745
Duration of exposure	DUR	20	yr	WAC 173-340-745
Gastrointestinal absorption rate	AB1	1	unitless	WAC 173-340-745
Units conversion factor	UCF	1.00E+06	mg/kg	WAC 173-340-745
Noncancer soil ingestion factor	$Factor_n$	1.25E-05	1/day	SIR*FOC/(ABW*AB1*UCF)
Cancer soil ingestion factor	$Factor_c$	1.00E-06	1/day	SIR*FOC*DUR/(ABW*AB1*UCF*LIFE)

NOTE:

Abbreviations:

EC = Equivalent carbon number.

HQ = Hazard quotient.

NA = Not applicable.

OCPF = Oral carcinogenic potency factor.

ORfD = Oral reference dose

A concentration of 0 mg/kg is assumed for fractions reported as not detectable (ND).

Equations:

1: Noncarcinogens: $Multiplier_n = Factor_n / ORfD$

2: Carcinogens: $Multiplier_c = Factor_c * OCPF$

3: Noncarcinogens: $HQ = SC * Multiplier_n$

4: Carcinogens: $Risk = SC * Multiplier_c$

Table 4
Protection of Potable Groundwater Concentrations - Sample SW-7
Former Morbark Log Chipper Area
Weyerhaeuser Snoqualmie Mill
Snoqualmie, Washington

Compound Group	Soil Conc. SC (mg/kg)	Molecular Weight MW (g/mole)	Moles M (unitless)	Mole Fraction X (percent)	Solubility S (mg/L)	Effective Solubility ES (mg/L)	Dilution Factor DF (unitless)	Groundwater Concentration GC (mg/L)	Groundwater Cleanup Level GWCUL (mg/L)
Source (TPH Policy)	Table 2	ITPH Policy	SC/MW	M/sum(M)	ITPH Policy	X*S	Default	ES/DF	MTCA Method A
Aliphatics EC5-EC6	0	81	0.00E+00	0.00E+00	2.80E+01	0.00E+00	20	0.00E+00	
Aliphatics >EC6-EC8	0	100	0.00E+00	0.00E+00	4.20E+00	0.00E+00	20	0.00E+00	
Aliphatics >EC8-EC10	0	130	0.00E+00	0.00E+00	3.30E-01	0.00E+00	20	0.00E+00	
Aliphatics >EC10-EC12	0	160	0.00E+00	0.00E+00	2.60E-02	0.00E+00	20	0.00E+00	
Aliphatics >EC12-EC16	0	200	0.00E+00	0.00E+00	5.90E-04	0.00E+00	20	0.00E+00	
Aliphatics >EC16	1013.1	270	3.75E+00	8.90E-01	1.00E-06	8.90E-07	20	4.45E-08	
Aromatics >EC8-EC10	0	120	0.00E+00	0.00E+00	6.50E+01	0.00E+00	20	0.00E+00	
Aromatics >EC10-EC12	0	130	0.00E+00	0.00E+00	2.50E+01	0.00E+00	20	0.00E+00	
Aromatics >EC12-EC16	0	150	0.00E+00	0.00E+00	5.80E+00	0.00E+00	20	0.00E+00	
Aromatics >EC16-EC21	18.00	190	9.47E-02	2.25E-02	5.10E-01	1.15E-02	20	5.73E-04	
Aromatics >EC21-EC35	88.4	240	3.68E-01	8.74E-02	1.00E-02	8.74E-04	20	4.37E-05	
Total "TPH"	1119.50		4.22E+00	1.00E+00				6.17E-04	1.00[a]

NOTE: EC = equivalent carbon number.
MTCA = Model Toxics Control Act.
NA = not applicable.
TPH = total petroleum hydrocarbons.
A concentration of 0 mg/kg is assumed for fractions reported as not detectable (ND).

Table 5
Groundwater Monitoring Results
Former Morbark Log Chipper Area, Weyerhaeuser Snoqualmie Mill
Snoqualmie, Washington

Well I.D.	TOC Elevation[a] (feet)	Date Measured	Depth to Water (feet below TOC)	GW Elevation[b] (feet)	pH	Temperature (°C)	Conductivity (uS)	Dissolved Oxygen (mg/L)
A-1	102.60	9/25/98	8.09	94.51	6.21	16.6	358	1.76
A-2	99.44	9/25/98	5.11	94.33	6.25	16.6	712	1.63
A-3	101.28	9/25/98	6.86	94.42	6.50	17.0	1,280	2.60
A-4	102.24	9/25/98	8.30	93.94	6.50	17.1	2,660	1.73
A-5	101.89	9/25/98	7.16	94.73	6.27	16.6	1,289	1.92

NOTE: TOC = top of well casing (note TOCs are 3 to 3.75 feet above ground level).
mg/L = milligrams per liter.
uS = microsiemens.

[a] Surveyed elevation based on an arbitrary site datum.

[b] Calculated elevation based on survey data.

Table 6
Soil Sample Analytical Results - Soil Borings
Former Morbark Log Chipper Area
Weyerhaeuser Snoqualmie Mill
Snoqualmie, Washington

Sample Number	Well Number	Sample Date	Sample Depth (feet)	Analytical Results	
				TPH-D[a] (mg/kg)	TPH-O[b] (mg/kg)
A-1-2.5	A-1	9/14/98	2.5	9.1	31
A-2-1.0	A-2	9/14/98	1.0	72	690
A-4-5	A-4	9/14/98	5.0	42	160
A-5-2.5	A-5	9/14/98	2.5	180	750

NOTE: mg/kg = milligrams per kilogram (ppm).

[a] TPH-D = total petroleum hydrocarbons as diesel by Ecology Method WTPH-D extended.

[b] TPH-O = total petroleum hydrocarbons as oil by Ecology Method WTPH-D extended.

Table 7
Groundwater Sample Analytical Results
Former Morbark Log Chipper Area
Weyerhaeuser Snoqualmie Mill
Snoqualmie, Washington

Well I.D.	Sample I.D.	Sample Date	Analytical Results		
			TPH-D[a] (mg/L)	TPH-O[b] (mg/L)	CPAHs[c] (mg/L)
MTCA Method A Cleanup Levels[d]			1.0	1.0	0.0001[e]
A-1	A-1-0998	9/25/98	0.72	1.3	ND[f]
A-2	A-2-0998	9/25/98	0.56	1.0	ND[f]
A-3	A-3-0998	9/25/98	0.19	0.18J	ND[f]
A-4	A-4-0998	9/25/98	0.19	0.42	ND[f]
A-5	A-5-0998	9/25/98	0.94	1.2	ND[f]

NOTE: Shading indicates result exceeds MTCA Method A Cleanup Level.

[a] TPH-D = Total petroleum hydrocabons as diesel by Ecology Method WTPH-D extended.

[b] TPH-O = Total petroleum hydrocarbons as oil by Ecology Method WTPH-D extended.

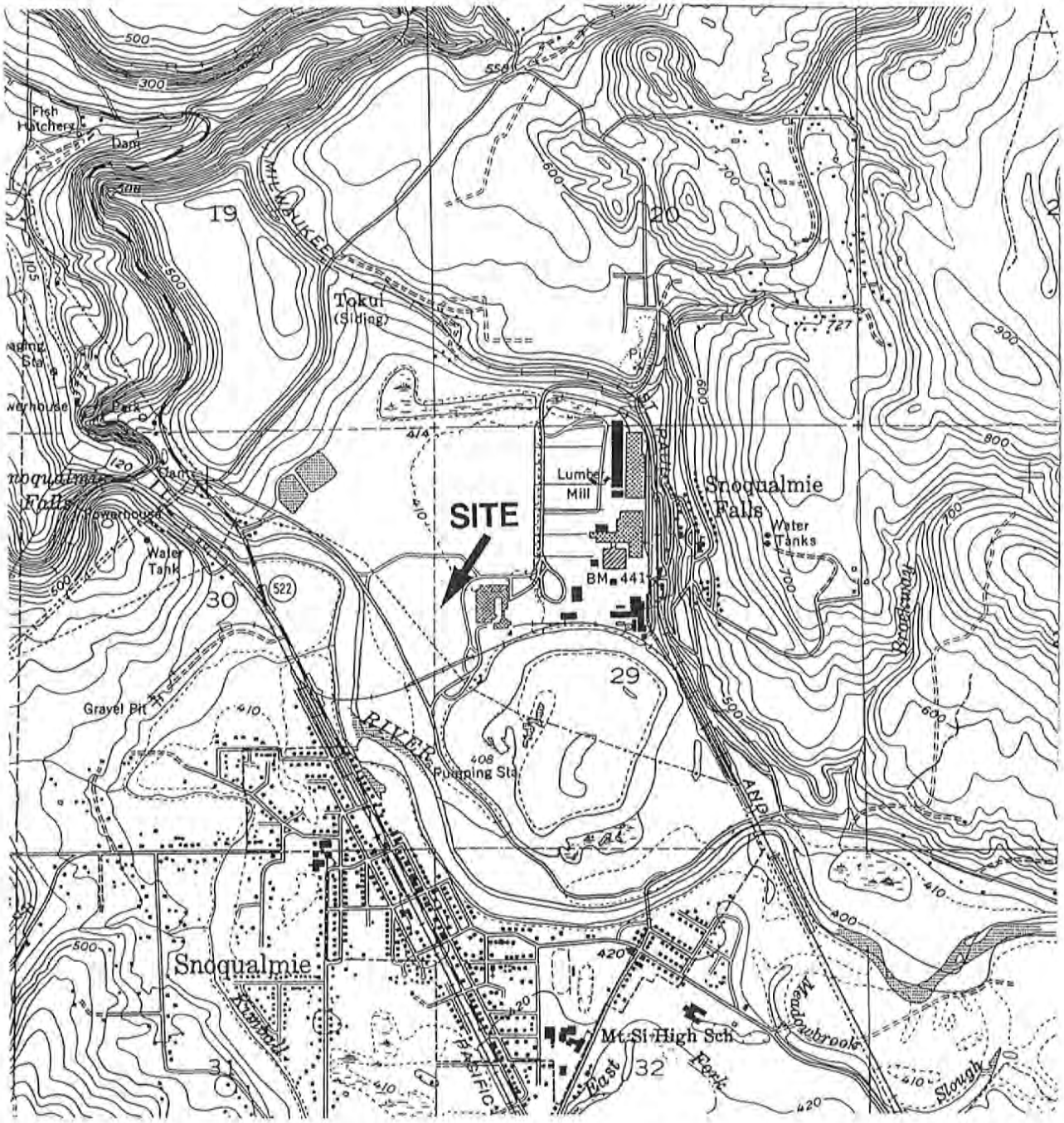
[c] PAHs = Polynuclear aromatic hydrocarbons by USEPA Method 8270, SIM.

[d] Chapter 173-340 WAC, *The Model Toxics Control Act Cleanup Regulations, Method A Cleanup Levels*.

[e] MTCA Method A Cleanup Level for total carcinogenic PAHs.

[f] ND = No PAHs detected above the method reporting limits.

FIGURES



SOURCE: USGS 7.5 X 15 MINUTE SERIES, SNOQUALMIE, WASHINGTON 1973.

WASHINGTON

N

0 2000 4000

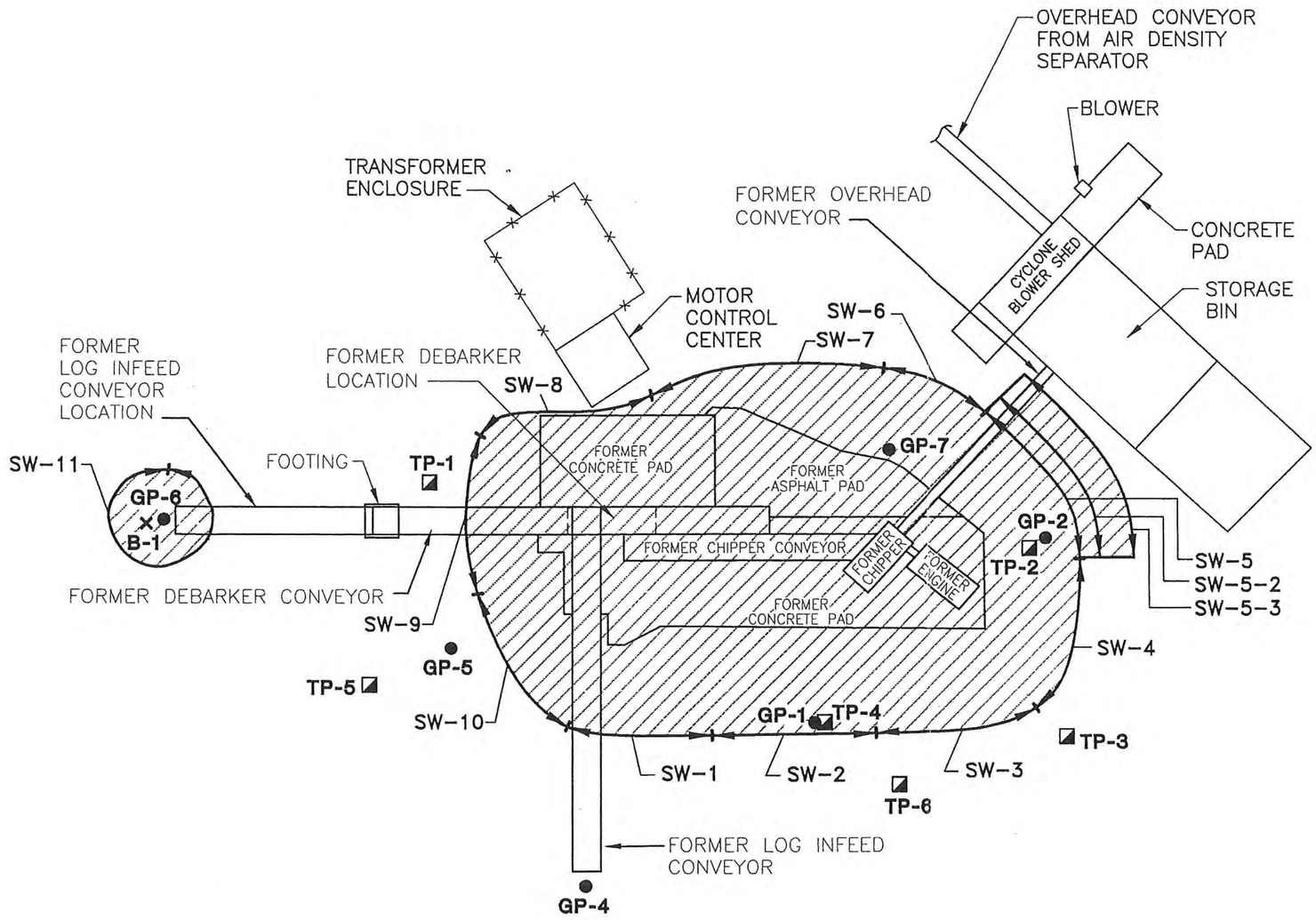
SCALE (ft)

EMCON

DATE 10-98
DWN mlp
APP
REV
PROJECT NO.
40141-083.006

FIGURE 1
FORMER MORBARK LOG CHIPPER AREA
WEYERHAEUSER SNOQUALMIE MILL
SNOQUALMIE, WASHINGTON

SITE VICINITY MAP



LEGEND:

- Approximate Area of Soil Excavation
- **GP-3** ● EMCON Soil Boring Location, June 1998
- **TP-3** ◪ GeoEngineers Test Pit Location, 1991
- Excavation Sidewall Soil Sample Location,
- **SW-6** Composited Over the Area Shown
- × Excavation Bottom Soil Sample Location,
- **B-1** Discrete Sample

N

0 20 40

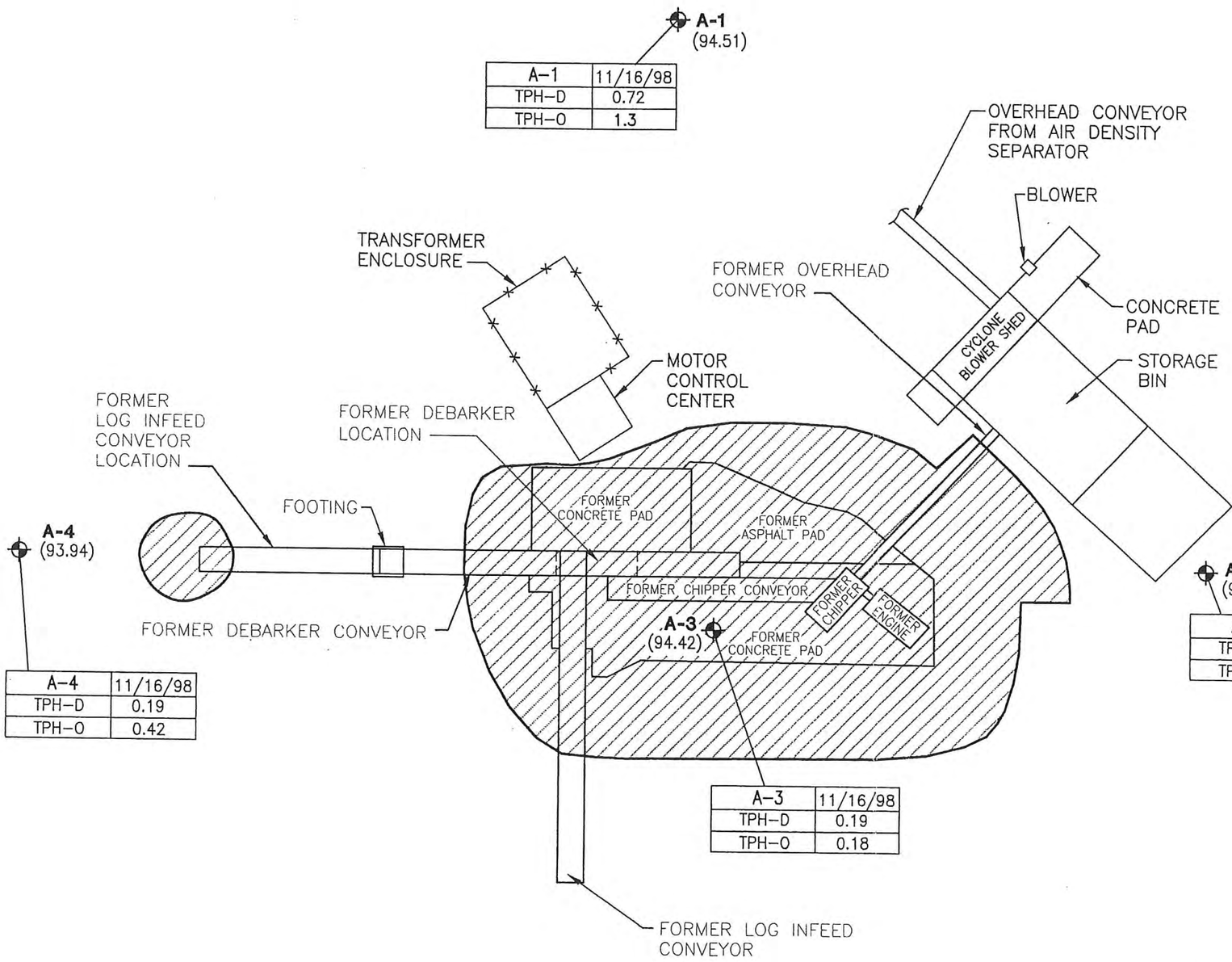
SCALE (ft)

NOTE: Until at least 1991, the concrete pads beneath the debarker and chipper were covered with asphalt. The southern extent of the asphalt pad extended to test pit TP-4.

EMCON

DATE	11-98
DWN	mlp
APP	
REV	
PROJECT NO.	40141-083.006

FIGURE 2
FORMER MORBARK LOG CHIPPER AREA
WEYERHAEUSER SNOQUALMIE MILL
SNOQUALMIE, WASHINGTON
SOIL EXCAVATION AND SAMPLE LOCATIONS



LEGEND:

Approximate Area of Soil Excavation

A-1 EMCON Groundwater Monitoring Well Location

(94.51) Groundwater Elevation Measured September 25, 1998, Referenced to an Arbitrary Site Datum (100.00 feet)

A-2	11/16/98
TPH-D	0.56
TPH-O	1.0

Laboratory Results in Milligrams Per Liter (mg/L)

TPH-D = Total Petroleum Hydrocarbons as Diesel
TPH-O = Total Petroleum Hydrocarbons as Oil

Results in **BOLD** Exceed MTCA Method A Cleanup Levels

NOTE: Groundwater present in wells A-1 through A-5 is perched and does not represent a continuous system, or has variable flow directions.

emcon

DATE	11-98
DWN	JA
APP	
REV	
PROJECT NO.	40141-083.006

FIGURE 3
FORMER MORBARK LOG CHIPPER AREA
WEYERHAEUSER SNOQUALMIE MILL
SNOQUALMIE, WASHINGTON

MONITORING WELL LOCATIONS

APPENDIX A

LABORATORY REPORTS
SOIL EXCAVATION

Weyerhaeuser

32901 Weyerhaeuser Way South
Federal Way WA 98003
Tel (253) 924-6872
Fax (253) 924-6654

SDG NARRATIVE

Organic Analysis

WEYERHAEUSER (WEYER)
ANALYTICAL AND TESTING SERVICES

Case Number 98-1068
SDG Number 908-1

PROJECT: Weyerhaeuser Snoqualmie Morbark Site OOE 7089771

The samples from this SDG were received on 9/8/98, 9/10/98,. and 9/11/98 at our Longview temporary laboratory . The SDG was composed of soil samples for analysis of WTPH-Dex with acid silica cleanup, PAHs by GC/MS-SIM, VPH and EPH. The following analyses were performed:

SAMPLE ID	LAB ID	MATRIX	ANALYSIS
SW-1	908-1	SOIL	WTPH-DEX
SW-1Dup	908-1Dup	SOIL	WTPH-DEX
SW-2	908-2	SOIL	WTPH-DEX
SW-3	908-3	SOIL	WTPH-DEX
SW-4	908-4	SOIL	WTPH-DEX
SW-5	908-5	SOIL	WTPH-DEX
SW-6	908-6	SOIL	WTPH-DEX
SW-9	908-7	SOIL	WTPH-DEX
SW-10	908-8	SOIL	WTPH-DEX
SW-11	908-9	SOIL	WTPH-DEX
SW-11Dup	908-9Dup	SOIL	WTPH-DEX
B1	908-10	SOIL	WTPH-DEX
SW-7	910-1	SOIL	WTPH-DEX;VPH;EPH;PAH
SW-8	910-2	SOIL	WTPH-DEX
CSS-1	910-3	SOIL	WTPH-DEX
CSS-2	910-4	SOIL	WTPH-DEX
CSS-3	910-5	SOIL	WTPH-DEX
CSS-3Dup	910-5Dup	SOIL	WTPH-DEX
SW-5-2	910-6	SOIL	WTPH-DEX
SW-5-3	911-1	SOIL	WTPH-DEX

Laboratory comments for this sample delivery group are listed below. The comments are broken up into categories for ease of explanation.

1. WTPH-D ex

    a) These samples were all run through the acid/silica gel cleanup as per the work plan..

    b) The motor oil was above the high standard on samples CSS-3, SW-5-2, and SW-5-3. These values are reported with an "E" qualifier. Due to the fact that they were above the cleanup criteria, we were informed that these numbers would not require dilutions.

2. EPH/VPH

    a) These samples were contracted out to NorthCreek Analytical. No comments with this data set.

3. PAH

    a) These samples were contracted out to NorthCreek Analytical. The report has not been completed as of this time.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Dennis Catalano
Project Manager

10/9/98
Date

Please feel free to contact me with any questions concerning this data report. I can be reached at (253) 924-6242.

Sincerely,

Dennis Catalano
Weyerhaeuser Analytical & Testing Services

Weyerhaeuser

Analytical & Testing Services

Sample Analysis Request/Chain of Custody Form

Date 9/8/98

Page 1 of 1

Facility

Sampler's Project No. 40141-083-006

Weyerhaeuser Account No. 60E project# 70897

Project Manager (print): Kelly Rankich

Sampled by:

- ☐ Facility
- ☐ E&AS/WTC
- ☐ E&AS/NB

Consultant: EMCON

Address: 18912 N. Creek Pkwy Bothell WA

Phone No.: (425) 485-5000 FAX: (425) 486-9766

Sampler Name (print): J. Russell Stolsen

Recorded By (signed):

Sample Description (ID, Date, Time are Required)

Method	Field Sample ID (15 characters max.)		Date (m/d/y)	Time (hh:mm)	Depth (ft / m)	Matrix: Water	Matrix: Soil/Sed	Matrix: Oil	Preservative: HCl	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: $Na_2S_2O_3$	Preservative: Filtered	Number of Containers
D	SW-1	408-1	9/8/98	1000	4.0		X							2
D	SW-2	2		1035			X							2
D	SW-3	3		1045			X							2
D	SW-4	4		1245			X							2
D	SW-5	5		1330			X							2
D	SW-6	6		1345			X							2
D	SW-9	7		1410			X							2
D	SW-10	8		1400			X							2
D	SW-11	9		1420			X							2
D	B-1	10		1425	6		D							2

Method: G, grab; D, depth composite; T, time composite. Depth required for soil or sediment samples.

Analyses Requested (circle or write in parameters)

Number of Containers	pH Cond TDS TSS Color Tannins	Volatile Organics / BTEX	Semi-volatile Organics	TPH: 418.1 TPH-G	TPH-D ext	Ca Mg Na K Fe Mn	Metals (list below)	NH_3 HCO_3 CO_3 Cl F NO_3 SO_4	AOX	TCLP: Metals VOA SVOA Pest Herb PCBs	Dioxin: Total / 2,3,7,8-TCDD / 2,3,7,8-TCDF	CN	BOD P-ortho	TKN P-total TOC COD	Notes
2				X											(1)
2				X											
2				X											☆
2				X											☆
2				X											☆
2				X											☆
2				X											☆
2				X											
2				X											☆
2				X											

Remarks/Detection Limit Requirements

DWTPH-D ext. by silica gel/sulfuric acid cleanup methods.

Call Kelly Rankich w/results. (425) 485-5000 ext. 256

☒ Samples on Ice or Blue Ice

Lab Turn-Around Time

☒ 24 Hr ☐ 48 Hr ☐ 7 Day

☐ 2-3 wk Date Due:

Reporting and QA/QC Requirements

RESULTS TO:

CC:

- ☐ CLP Package
- ☐ NPDES Permit
- ☐ Other:
- ☐ Electronic Report

Laboratory

☒ WATS/WTC ☐ WATS/NB

☐ Other:

Lab SR#:

Case ID:

SDG ID:

Sample Chain of Custody and Shipping Method Record

Relinquished By Sampler (signature)	Date	Time	Received By (signature)	Shipping Method
J. Russell Stolsen	9/8/98	1430	JL Angle	
Relinquished By (signature):	Date	Time	Received By (signature):	Airbill No.
Relinquished By (signature):	Date	Time	Received For Laboratory By (signature):	
			Samples Received Intact:	Cooler Temp: °C

WATS/WTC: 32901 Weyerhaeuser Way South, Federal Way, WA 98003 (206-924-6293)

WATS/NB: New Bern R&D Field Station, Highway 43 North, New Bern, NC 28563 (919-633-7238)

Form 16307 (2/96) Printing Services TP-1 Tacoma

Weyerhaeuser

Analytical & Testing Services

Sample Analysis Request/Chain of Custody Form

Date 7/10/98

Page 1 of 11

Facility: Weyerhaeuser Snoqualmie Mill

Sampler's Project No.: 40141-083.006

Weyerhaeuser Account No.: OOE proj # 70897

Project Manager (print): Kelly Rankich

Sampled by:
- ☐ Facility
- ☐ E&AS/WTC
- ☐ E&AS/NB

Consultant: EMCON

Address: 18912 N. creek Pkwy Bothell

Phone No.: (425)485-5000 FAX: (425)486-9766 WA

Sampler Name (print): J. Russell Stolsen

Recorded By (signed):

Sample Description (ID, Date, Time are Required)

Method	Field Sample ID (15 characters max.)	Date (m/d/y)	Time (hh:mm)	Depth (ft / m)	Matrix: Water	Matrix: Soil/Sed	Matrix: Oil	Preservative: HCl	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: $Na_2S_2O_3$	Preservative: Filtered	Number of Containers	Analyses Requested	Notes
D	SW-5-3	9/10/98				X		0911	-	1			2	TPH: 418.1 TPH-G TPH-D ext	(1)

Analyses Requested (circle or write in parameters): pH Cond TDS TSS Color Tannins; Volatile Organics / BTEX; Semi-volatile Organics; TPH: 418.1 TPH-G TPH-D ext; Ca Mg Na K Fe Mn; Metals (list below); NH_3 HCO_3 CO_3 Cl F NO_3 SO_4; AOX; TCLP: Metals VOA SVOA Pest Herb PCBs; Dioxin: Total / 2,3,7,8-TCDD / 2,3,7,8-TCDF; CN; BOD P-ortho; TKN P-total TOC COD

Method: G, grab; D, depth composite; T, time composite. Depth required for soil or sediment samples.

☐ Samples on Ice or Blue Ice

Lab Turn-Around Time

☒ 24 Hr ☐ 48 Hr ☐ 7 Day

☐ 2-3 wk Date Due:

Reporting and QA/QC Requirements

RESULTS TO:

CC:

- ☐ CLP Package
- ☐ NPDES Permit
- ☐ Other:
- ☐ Electronic Report

Remarks/Detection Limit Requirements

(1) WTPH-D ext. w/silica gel/sulfuric acid cleanup methods.

Laboratory

☒ WATS/WTC ☐ WATS/NB

☐ Other:

Lab SR#:

Case ID:

SDG ID:

Sample Chain of Custody and Shipping Method Record

Relinquished By Sampler (signature)	Date	Time	Received By (signature)	Shipping Method
	9/10/98	1510		
Relinquished By (signature):	Date	Time	Received By (signature):	Airbill No.
Relinquished By (signature):	Date	Time	Received For Laboratory By (signature):	

Samples Received Intact: 0805

Cooler Temp: ICE °C

WATS/WTC: 32901 Weyerhaeuser Way South, Federal Way, WA 98003 (206-924-6293)

WATS/NB: New Bern R&D Field Station, Highway 43 North, New Bern, NC 28563 (919-633-7238)

Form 16307 (2/96) Printing Services TP-1 Tacoma

STANDARD

Weyerhaeuser

Analytical & Testing Services

Sample Analysis Request/Chain of Custody Form B809415

Date________

Page ___ of ___

Facility: Weyerhaeuser

Sampler's Project No.:

Weyerhaeuser Account No.: PO# RD0092838

Project Manager (print):

Sampler Name (print):

Recorded By (signed):

Sampled by: ☐ Facility ☐ E&AS/WTC ☐ E&AS/NB

Consultant:

Address:

Phone No.: FAX:

Sample Description (ID, Date, Time are Required) / Matrix / Preservative

Method	Field Sample ID (15 characters max.)	Date (m/d/y)	Time (hh:mm)	Depth (ft / m)	Water	Soil/Sed	Oil	HCl	H_2SO_4	HNO_3	$Na_2S_2O_3$		Filtered	Number of Containers
	SW-7	9/9/98	1230	–		X								

Analyses Requested (circle or write in parameters)

pH Cond TDS TSS Color Tannins	Volatile Organics / BTEX	Semi-volatile Organics	TPH: 418.1 TPH-G TPH-D	Ca Mg Na K Fe Mn	Metals (list below)	NH_3 HCO_3 CO_3 Cl F NO_3 SO_4	AOX	TCLP: Metals VOA SVOA Pest Herb PCBs	Dioxin: Total / 2,3,7,8-TCDD / 2,3,7,8-TCDF	CN	BOD P-ortho	TKN P-total TOC COD		EPH / VPH			Notes
					B809415-01									X			

Method: G, grab; D, depth composite; T, time composite. Depth required for soil or sediment samples.

Remarks/Detection Limit Requirements

W/O

H.O

☐ Samples on Ice or Blue Ice

Lab Turn-Around Time

☐ 24 Hr ☐ 48 Hr ☐ 7 Day

☐ 2-3 wk Date Due:

Reporting and QA/QC Requirements

RESULTS TO: Rick Bogar

CC:

☐ CLP Package

☐ NPDES Permit

☐ Other:________

☐ Electronic Report

Laboratory

☐ WATS/WTC ☐ WATS/NB

☐ Other:

Lab SR#: 98-1068

Case ID:

SDG ID:

Sample Chain of Custody and Shipping Method Record

Relinquished By	Date	Time	Received By	Shipping Method
Relinquished By Sampler (signature): Bonnie Mappel	9/16/98	0900	Received By (signature): S. Wideen 9-16-98 1100	
Relinquished By (signature):	Date	Time	Received By (signature):	Airbill No.
Relinquished By (signature):	Date	Time	Received For Laboratory By (signature):	
			Samples Received Intact:	Cooler Temp: °C

WATS/WTC: 32901 Weyerhaeuser Way South, Federal Way, WA 98003 (206-924-6293)

WATS/NB: New Bern R&D Field Station, Highway 43 North, New Bern, NC 28563 (919-633-7238)

Form 16307 (2/96) Printing Services TP-1 Tacoma

000606

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1068

Report
Snoqualmie Morbark

Client ID	BLK0908	LCS0908	SW-3	SW-4	SW-5	SW-6
Sample Date			9/8/98	9/8/98	9/8/98	9/8/98
Lab ID	BLK0908	LCS0908	908-3	908-4	908-5	908-6
Analyte	mg/kg O.D. basis	%Recovery	mg/kg O.D. basis	mg/kg O.D. basis	mg/kg O.D. basis	mg/kg O.D. basis
Diesel Fuel Range	<210	113%	560	990	1000	860
Motor Oil Range	<510	-	3400	790	5700	<520
Surrogate (%recovery)						
o-Terphenyl	89%	100%	99%	101%	93%	98%
Cleanup	No	No	acid/silica	acid/silica	acid/silica	acid/silica

Method: WTPH-D

Approved: Richard Bogar
Telephone: (253)-924-6521 Date: 9/30/98

000007

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1068

Report
Snoqualmie Morbark

Client ID	**BLK0909**	**LCS0909**	**SW-9**	**SW-10**	**SW-11**	**SW-11 DUP**
Sample Date			**9/8/98**	**9/8/98**	**9/8/98**	**9/8/98**
Lab ID	BLK0909	LCS0909	908-7	908-8	908-9	908-9DUP
	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg
Analyte	O.D. basis	%Recovery	O.D. basis	O.D. basis	O.D. basis	O.D. basis
Diesel Fuel Range	<210	109%	700	510	<220	350
Motor Oil Range	<510	-	3600	<490	800	<510
Surrogate (%recovery)						
o-Terphenyl	99%	102%	99%	93%	87%	92%
Cleanup	acid/silica	acid/silica	acid/silica	acid/silica	acid/silica	acid/silica

Method: WTPH-D

Approved: Richard Bogar
Telephone: (253)-924-6521 Date: 9/30/98

000008

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1068

Report
Snoqualmie Morbark

Client ID	SW-1	SW-1 DUP	SW-2	B-1	BLK0910	LCS0910
Sample Date	**9/8/98**	**9/8/98**	**9/8/98**	**9/8/98**		
Lab ID	908-1	908-1DUP	908-2	908-10	BLK0910	LCS0910
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	O.D. basis	O.D. basis	O.D. basis	O.D. basis	O.D. basis	O.D. basis
Diesel Fuel Range	<420	<430	<320	290	<210	120%
Motor Oil Range	<1100	<1100	<780	770	<510	-
Surrogate (%recovery)						
o-Terphenyl	87%	91%	102%	93%	111%	111%
Cleanup	acid/silica	acid/silica	acid/silica	acid/silica	acid/silica	acid/silica

Method: WTPH-D

Approved: Richard Bogar
Telephone: (253)-924-6521 Date: 9/30/98

000009

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1068

Client ID	SW-7	SW-8	BLK0911	LCS0911	SW-5-2	SW-5-3
Sample Date	9/9/98	9/9/98			9/9/98	9/10/98
Lab ID	910-1	910-2	BLK0911	LCS0911	910-6	911-1
Analyte	mg/kg O.D. basis	mg/kg O.D. basis	mg/kg O.D. basis	mg/kg %Recovery	mg/kg O.D. basis	mg/kg O.D. basis
Diesel Fuel Range	910	890	<210	98%	2500	2500
Motor Oil Range	3400	1700	<510	-	12000E	13000E
Surrogate (%recovery)						
o-Terphenyl	104%	93%	87%	96%	106%	104%
Cleanup	acid/silica	acid/silica	No	No	acid/silica	acid/silica

Method: WTPH-D

Approved: Richard Bogar
Telephone: (253)-924-6521 Date: 9/30/98

OCT 19 1998

Weyerhaeuser

32901 Weyerhaeuser Way South
Federal Way WA 98003
Tel (253) 924-6872
Fax (253) 924-6654

October 16, 1998

Ms. Kelly Rankich
EMCON
18912 North Creek Parkway, Suite 100
Bothell, WA 98011

Dear Kelly:

Please find attached a copy of NorthCreek Analytical's final report for the samples that you requested we analyze for Snoqualmie Morbark. This contains the additional PAH results that were not completed when this report went out on 10/9/98. These are from our service request number 98-1068. Invoicing for this work will be sent directly to Weyerhaeuser. If you have any questions concerning this report, please feel free to contact me at (253) 924-6242.

Thank you for using our laboratory for this analysis and we look forward to working with you on future projects.

Sincerely,

Dennis Catalano, Project Manager
Weyerhaeuser Analytical and Testing Services

Attachments

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Weyerhaeuser	Project:	PO #RD0092838	Sampled:	9/9/98
32901 Weyerhaeuser Way South	Project Number:	not provided	Received:	9/16/98
Federal Way, WA 98003	Project Manager:	Dennis Catalano	Reported:	10/13/98 15:32

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
SW-7	B809415-01	Soil	9/9/98

Matthew Essig, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Weyerhaeuser	Project:	PO #RD0092838	Sampled: 9/9/98
32901 Weyerhaeuser Way South	Project Number:	not provided	Received: 9/16/98
Federal Way, WA 98003	Project Manager:	Dennis Catalano	Reported: 10/13/98 15:32

Volatile Petroleum Hydrocarbons by modified WDOE Interim TPH Policy Method
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
SW-7			B809415-01				Soil	
C5-C6 Aliphatics	0980644	9/21/98	9/21/98		5.00	ND	mg/kg dry	
C6-C8 Aliphatics	"	"	"		5.00	ND	"	
C8-C10 Aliphatics	"	"	"		5.00	ND	"	
C10-C12 Aliphatics	"	"	"		5.00	ND	"	
C8-C10 Aromatics	"	"	"		5.00	ND	"	
C10-C12 Aromatics	"	"	"		5.00	ND	"	
C12-C13 Aromatics	"	"	"		5.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*60.0-140*		*101*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*60.0-140*		*86.1*	"	

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Weyerhaeuser	Project:	PO #RD0092838	Sampled:	9/9/98
32901 Weyerhaeuser Way South	Project Number:	not provided	Received:	9/16/98
Federal Way, WA 98003	Project Manager:	Dennis Catalano	Reported:	10/13/98 15:32

Extractable Petroleum Hydrocarbons by modified WDOE Interim TPH Policy Method
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
SW-7			B809415-01				Soil	
C8-C10 Aliphatics	0980654	9/18/98	9/22/98		5.00	ND	mg/kg dry	
C10-C12 Aliphatics	"	"	"		5.00	ND	"	
C12-C16 Aliphatics	"	"	"		5.00	ND	"	
C16-C21 Aliphatics	"	"	"		5.00	**56.1**	"	
C21-C34 Aliphatics	"	"	"		5.00	**957**	"	
C10-C12 Aromatics	"	"	"		5.00	ND	"	
C12-C16 Aromatics	"	"	"		5.00	ND	"	
C16-C21 Aromatics	"	"	"		5.00	**18.0**	"	
C21-C34 Aromatics	"	"	"		5.00	**88.4**	"	
Extractable Petroleum Hydrocarbons	"	"	"			**1120**	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*56.0*	%	
Surrogate: Octacosane	"	"	"	*50.0-150*		*58.3*	"	
Surrogate: Undecane	"	"	"	*30.0-150*		*47.0*	"	

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Weyerhaeuser	Project:	PO #RD0092838	Sampled: 9/9/98
32901 Weyerhaeuser Way South	Project Number:	not provided	Received: 9/16/98
Federal Way, WA 98003	Project Manager:	Dennis Catalano	Reported: 10/13/98 15:32

Polynuclear Aromatic Hydrocarbons by GC/MS-SIM
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
SW-7			B809415-01				Soil	
Acenaphthene	0980654	9/18/98	10/7/98		0.0500	ND	mg/kg dry	
Acenaphthylene	"	"	"		0.0500	ND	"	
Anthracene	"	"	"		0.0500	ND	"	
Benzo (a) anthracene	"	"	"		0.0500	ND	"	
Benzo (a) pyrene	"	"	"		0.0500	ND	"	
Benzo (b) fluoranthene	"	"	"		0.0500	ND	"	
Benzo (ghi) perylene	"	"	"		0.0500	ND	"	
Benzo (k) fluoranthene	"	"	"		0.0500	ND	"	
Chrysene	"	"	"		0.0500	ND	"	
Dibenz (a,h) anthracene	"	"	"		0.0500	ND	"	
Fluoranthene	"	"	"		0.0500	ND	"	
Fluorene	"	"	"		0.0500	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.0500	ND	"	
2-Methylnaphthalene	"	"	"		0.0500	ND	"	
Naphthalene	"	"	"		0.0500	ND	"	
Phenanthrene	"	"	"		0.0500	ND	"	
Pyrene	"	"	"		0.0500	0.0600	"	
Surrogate: p-Terphenyl-d14	"	"	"	*30.0-150*		*74.7*	%	

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Weyerhaeuser	Project:	PO #RD0092838	Sampled:	9/9/98
32901 Weyerhaeuser Way South	Project Number:	not provided	Received:	9/16/98
Federal Way, WA 98003	Project Manager:	Dennis Catalano	Reported:	10/13/98 15:32

Dry Weight Determination
North Creek Analytical - Bothell

Sample Name	Lab ID	Matrix	Result	Units
SW-7	B809415-01	Soil	94.4	%

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Weyerhaeuser	Project:	PO #RD0092838	Sampled: 9/9/98
32901 Weyerhaeuser Way South	Project Number:	not provided	Received: 9/16/98
Federal Way, WA 98003	Project Manager:	Dennis Catalano	Reported: 10/13/98 15:32

Volatile Petroleum Hydrocarbons by modified WDOE Interim TPH Policy Method/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0980644	**Date Prepared: 9/21/98**					**Extraction Method: EPA 5030B (P/T)**				
Blank	**0980644-BLK1**									
C5-C6 Aliphatics	9/21/98			ND	mg/kg dry	5.00				
C6-C8 Aliphatics	"			ND	"	5.00				
C8-C10 Aliphatics	"			ND	"	5.00				
C10-C12 Aliphatics	"			ND	"	5.00				
C8-C10 Aromatics	"			ND	"	5.00				
C10-C12 Aromatics	"			ND	"	5.00				
C12-C13 Aromatics	"			ND	"	5.00				
Surrogate: 4-BFB (FID)	"	*4.00*		*4.30*	"	*60.0-140*	*108*			
Surrogate: 4-BFB (PID)	"	*4.00*		*3.74*	"	*60.0-140*	*93.5*			
LCS	**0980644-BS1**									
C5-C6 Aliphatics	9/21/98	2.00		1.91	mg/kg dry	70.0-130	95.5			
C6-C8 Aliphatics	"	1.00		0.874	"	70.0-130	87.4			
C8-C10 Aliphatics	"	1.00		0.949	"	70.0-130	94.9			
C10-C12 Aliphatics	"	1.00		0.933	"	70.0-130	93.3			
C8-C10 Aromatics	"	4.00		3.52	"	70.0-130	88.0			
C10-C12 Aromatics	"	1.00		1.00	"	70.0-130	100			
C12-C13 Aromatics	"	2.00		1.75	"	70.0-130	87.5			
Surrogate: 4-BFB (FID)	"	*4.00*		*4.23*	"	*60.0-140*	*106*			
Surrogate: 4-BFB (PID)	"	*4.00*		*3.74*	"	*60.0-140*	*93.5*			
Duplicate	**0980644-DUP1**		**B809237-02**							
C5-C6 Aliphatics	9/21/98		ND	ND	mg/kg dry			25.0		
C6-C8 Aliphatics	"		ND	ND	"			25.0		
C8-C10 Aliphatics	"		ND	ND	"			25.0		
C10-C12 Aliphatics	"		ND	ND	"			25.0		
C8-C10 Aromatics	"		ND	ND	"			25.0		
C10-C12 Aromatics	"		ND	ND	"			25.0		
C12-C13 Aromatics	"		ND	ND	"			25.0		
Surrogate: 4-BFB (FID)	"	*4.25*		*4.04*	"	*60.0-140*	*95.1*			
Surrogate: 4-BFB (PID)	"	*4.25*		*3.29*	"	*60.0-140*	*77.4*			

North Creek Analytical - Bothell

**Refer to end of report for text of notes and definitions.*

Matthew Essig, Project Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Weyerhaeuser	Project:	PO #RD0092838	Sampled: 9/9/98
32901 Weyerhaeuser Way South	Project Number:	not provided	Received: 9/16/98
Federal Way, WA 98003	Project Manager:	Dennis Catalano	Reported: 10/13/98 15:32

Extractable Petroleum Hydrocarbons by modified WDOE Interim TPH Policy Method/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0980654	**Date Prepared: 9/21/98**					**Extraction Method: EPA 3550B**				
Blank	0980654-BLK1									
C8-C10 Aliphatics	9/22/98			ND	mg/kg dry	5.00				
C10-C12 Aliphatics	"			ND	"	5.00				
C12-C16 Aliphatics	"			ND	"	5.00				
C16-C21 Aliphatics	"			ND	"	5.00				
C21-C34 Aliphatics	"			ND	"	5.00				
C10-C12 Aromatics	"			ND	"	5.00				
C12-C16 Aromatics	"			ND	"	5.00				
C16-C21 Aromatics	"			ND	"	5.00				
C21-C34 Aromatics	"			ND	"	5.00				
Extractable Petroleum Hydrocarbons	"			ND	"					
Surrogate: 2-FBP	"	*12.0*		*7.43*	"	*50.0-150*	*61.9*			
Surrogate: Octacosane	"	*12.0*		*8.39*	"	*50.0-150*	*69.9*			
Surrogate: Undecane	"	*12.0*		*6.34*	"	*30.0-150*	*52.8*			
LCS	0980654-BS1									
Extractable Petroleum Hydrocarbons	9/22/98	167		78.4	mg/kg dry	30.0-120	46.9			
Surrogate: 2-FBP	"	*12.0*		*7.27*	"	*50.0-150*	*60.6*			
Surrogate: Octacosane	"	*12.0*		*8.37*	"	*50.0-150*	*69.7*			
Surrogate: Undecane	"	*12.0*		*7.03*	"	*30.0-150*	*58.6*			
LCS Dup	0980654-BSD1									
Extractable Petroleum Hydrocarbons	9/22/98	167		84.2	mg/kg dry	30.0-120	50.4	40.0	7.19	
Surrogate: 2-FBP	"	*12.0*		*6.39*	"	*50.0-150*	*53.2*			
Surrogate: Octacosane	"	*12.0*		*8.73*	"	*50.0-150*	*72.7*			
Surrogate: Undecane	"	*12.0*		*6.74*	"	*30.0-150*	*56.2*			
Matrix Spike	0980654-MS1		B809504-01							
Extractable Petroleum Hydrocarbons	9/22/98	243	325	1670	mg/kg dry	30.0-120	NR			1
Surrogate: 2-FBP	"	*17.5*		*9.45*	"	*50.0-150*	*54.0*			
Surrogate: Octacosane	"	*17.5*		*8.76*	"	*50.0-150*	*50.1*			
Surrogate: Undecane	"	*17.5*		*9.14*	"	*30.0-150*	*52.2*			

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Weyerhaeuser	Project:	PO #RD0092838	Sampled: 9/9/98
32901 Weyerhaeuser Way South	Project Number:	not provided	Received: 9/16/98
Federal Way, WA 98003	Project Manager:	Dennis Catalano	Reported: 10/13/98 15:32

Polynuclear Aromatic Hydrocarbons by GC/MS-SIM/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0980654	**Date Prepared: 9/21/98**					**Extraction Method: EPA 3550B**				
Blank	**0980654-BLK1**									
Acenaphthene	10/7/98			ND	mg/kg dry	0.0100				
Acenaphthylene	"			ND	"	0.0100				
Anthracene	"			ND	"	0.0100				
Benzo (a) anthracene	"			ND	"	0.0100				
Benzo (a) pyrene	"			ND	"	0.0100				
Benzo (b) fluoranthene	"			ND	"	0.0100				
Benzo (ghi) perylene	"			ND	"	0.0100				
Benzo (k) fluoranthene	"			ND	"	0.0100				
Chrysene	"			ND	"	0.0100				
Dibenz (a,h) anthracene	"			ND	"	0.0100				
Fluoranthene	"			ND	"	0.0100				
Fluorene	"			ND	"	0.0100				
Indeno (1,2,3-cd) pyrene	"			ND	"	0.0100				
2-Methylnaphthalene	"			ND	"	0.0100				
Naphthalene	"			ND	"	0.0100				
Phenanthrene	"			ND	"	0.0100				
Pyrene	"			ND	"	0.0100				
Surrogate: p-Terphenyl-d14	"	*0.250*		*0.201*	"	*30.0-150*	*80.4*			
LCS	**0980654-BS1**									
Chrysene	10/7/98	0.333		0.241	mg/kg dry	10.0-125	72.4			
Fluorene	"	0.333		0.238	"	11.0-116	71.5			
Indeno (1,2,3-cd) pyrene	"	0.333		0.249	"	10.0-147	74.8			
Surrogate: p-Terphenyl-d14	"	*0.250*		*0.179*	"	*30.0-150*	*71.6*			
LCS Dup	**0980654-BSD1**									
Chrysene	10/7/98	0.333		0.255	mg/kg dry	10.0-125	76.6	28.0	5.64	
Fluorene	"	0.333		0.251	"	11.0-116	75.4	32.0	5.31	
Indeno (1,2,3-cd) pyrene	"	0.333		0.245	"	10.0-147	73.6	34.0	1.62	
Surrogate: p-Terphenyl-d14	"	*0.250*		*0.169*	"	*30.0-150*	*67.6*			
Matrix Spike	**0980654-MS1**		**B809504-01**							
Chrysene	10/7/98	0.487	ND	0.423	mg/kg dry	10.0-125	86.9			
Fluorene	"	0.487	0.156	0.409	"	10.0-154	52.0			
Indeno (1,2,3-cd) pyrene	"	0.487	ND	0.331	"	10.0-144	68.0			
Surrogate: p-Terphenyl-d14	"	*0.365*		*0.258*	"	*30.0-150*	*70.7*			

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (425) 420-9200 ▪ FAX 420-9210
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 906-9200 ▪ FAX 906-9210

Weyerhaeuser	Project:	PO #RD0092838	Sampled: 9/9/98
32901 Weyerhaeuser Way South	Project Number:	not provided	Received: 9/16/98
Federal Way, WA 98003	Project Manager:	Dennis Catalano	Reported: 10/13/98 15:32

Notes and Definitions

#	Note
I	Analyses are not controlled on matrix spike RPD and/or percent recoveries when the sample concentration is significantly higher than the spike level.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
Recov.	Recovery
RPD	Relative Percent Difference

Matthew Essig, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

APPENDIX B

SUBSURFACE EXPLORATION PROCEDURES, BORING LOGS, AND GROUNDWATER SAMPLING DATA SHEETS

SUBSURFACE EXPLORATION PROCEDURES

This appendix documents the procedures EMCON used to perform the 1998 field investigation activities described in this report. The discussion included information on the following subjects:

- Drilling
- Soil sampling
- Well installation
- Groundwater sampling

Soil Borings

The subsurface exploration program conducted for this investigation consisted of advancing and sampling five soil borings by using a hollow stem auger rig. The borings penetrated to a maximum depth of 9.5 feet bgs. Boring logs, which include soil descriptions, are contained in this appendix. The soil boring locations are shown on Figure 2 of this report.

The soil borings were drilled on September 14, 1998, by Cascade Drilling, Inc., of Woodinville, Washington. The borings were completed by using a hollow stem auger rig. Representative soil samples were obtained from all borings by using a standard penetration test (SPT). This sampling method consisted of driving a split-spoon sampler 18 inches into the undisturbed soils beneath the auger bit. The driving force was provided by a 140-pound hammer free falling a distance of 30 inches. The number of blows required to drive the sampler the final 12 inches was considered the standard penetration resistance (N-value) or blow count. This N-value provided a measure of relative density of granular soils or the relative consistency of cohesive soils.

Samples were collected at depths of approximately 2.5 to 4 feet bgs, 5 to 6.5 feet bgs, and 7 to 8.5 feet bgs. Each soil sample was described generally consistent with the Unified Soil Classification System (Figure A-1). The drilling and sampling tools were steam cleaned or washed in distilled water before each use. The drilling activities were directed and logged by an EMCON geologist.

All borings were completed as 2-inch diameter groundwater monitoring wells.

Soil Sampling

Soil samples recovered from the borings were split into two approximately equal portions. The first portion was transferred to laboratory-prepared glass jars with Teflon™-lined lids by using stainless steel spoons. The jars were placed in a chilled cooler for transport to the testing laboratory. Chain-of-custody procedures were used to document the sampling handling.

The second portion was placed in a clean glass jar for field screening. Soil samples were screened for the presence of volatile organic compounds with a portable photoionization detector (PID) at the time of collection. This is a subjective analysis, affected by, among other influences, climate (e.g., temperature and humidity), soil type and conditions, instrument calibration, and operation. The intent of this analysis is to qualitatively compare samples and assist in sample selection for chemical analysis.

An OVM Model 580B, calibrated to 100 ppm isobutylene, was used to obtain the measurements. A sample of the soil was placed in a clean jar and aluminum foil was placed over the mouth of the jar. The jar was then allowed to stand in the back of a field vehicle for approximately one-quarter hour. The aluminum foil was then punctured with the PID probe and the maximum reading in the headspace above the soil was recorded. These measurements are listed on the boring logs at their respective depth intervals.

Well Installation

Soil borings A-1 through A-5 were completed as groundwater monitoring wells. The wells were constructed of 2-inch-diameter, schedule 40, flush threaded PVC riser pipe attached to a 5-foot section of 0.010-inch mill-cut screen. Lonestar 2/12 silica sand was installed as filter material from the bottom of the boring to approximately 1 foot above the screened interval. Hydrated bentonite chips were placed above the sand pack to approximately 0.5-foot bgs. Above-ground steel monuments were secured in place with concrete to protect the well. Figure A-2 presents generalized monitoring well construction details.

Groundwater monitoring wells were developed immediately following installation to remove accumulated sediment and to improve the flow of formation water into the well screen. Bailers were utilized to "surge" and develop the wells. Purged groundwater was transported to the EMCON office for treatment and disposal.

Depth-to-groundwater Measurements

Depth to groundwater measurements were obtained at each well using an electronic water level indicator. Measurements were obtained by lowering the device into the well until it indicated that the water surface was encountered, and by measuring the distance from the top of the inside riser pipe to the probe. All of the measurements were recorded to the nearest 0.01 foot.

Well Surveying

All groundwater monitoring wells were surveyed for vertical elevations to the nearest 0.01-foot by EMCON personnel. The wells were surveyed to a local arbitrary site datum allowing determination of relative elevations of groundwater, and consequently, groundwater migration direction at the time the measurements were obtained. The site datum selected was assumed to be 100.00 feet.

Groundwater Sampling

Groundwater samples were collected from monitoring wells A-1 through A-5 on September 25, 1998. The depth to water was measured in each well using an electronic well probe. Groundwater was detected in all wells from approximately 5.11 feet below the top of casing (TOC) to 8.30 feet below TOC. After measuring the water levels, three pore volumes of water were purged from each well using a peristaltic pump. Groundwater parameters including temperature, pH, conductivity, and dissolved oxygen were measured following each pore volume removal.

Purging continued until field parameter measurements stabilized to within 10 percent of the previous measurement, or until the well was purged dry. Groundwater samples were collected using Teflon™ or disposable PVC bailers, when water levels had recovered sufficiently. Samples were submitted in laboratory-prepared glass containers, under standard chain-of-custody procedures. The measured groundwater parameters are documented on Table 6 of this report. Purged groundwater transported to the EMCON office for treatment and disposal.

General Decontamination Procedures

All sampling equipment (e.g., spoons, bailers, etc.) were routinely decontaminated after each use and between sample locations. The equipment was decontaminated with a non-

phosphatic soap in a tap water solution, a stiff-bristle brush, a 1:1 (methanol:deionized water) rinse, followed by a thorough deionized water rinse. A new disposable polyethylene bailer was used to collect a single sample set at each monitoring well. The bailers were disposed after each use. The water used for decontamination was transported to the EMCON office for treatment and disposal.

Sample Descriptions

Classification of soils in this report is based on visual field observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless stated. Visual-manual classification methods of ASTM D 2488 were used as an identification guide. Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS: MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS: MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS: MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS: MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS: LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS: LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

DENSITY/CONSISTENCY			
SAND or GRAVEL		SILT or CLAY	
Density	Standard Penetration Resistance in Blows/Foot	Consistency	Standard Penetration Resistance in Blows/Foot
Very loose	0-4	Very soft	0-2
Loose	4-10	Soft	2-4
Medium dense	10-30	Medium stiff	4-8
Dense	30-50	Stiff	8-15
Very dense	>50	Very stiff	15-30
		Hard	>30

MOISTURE	
Modifier	Description
Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

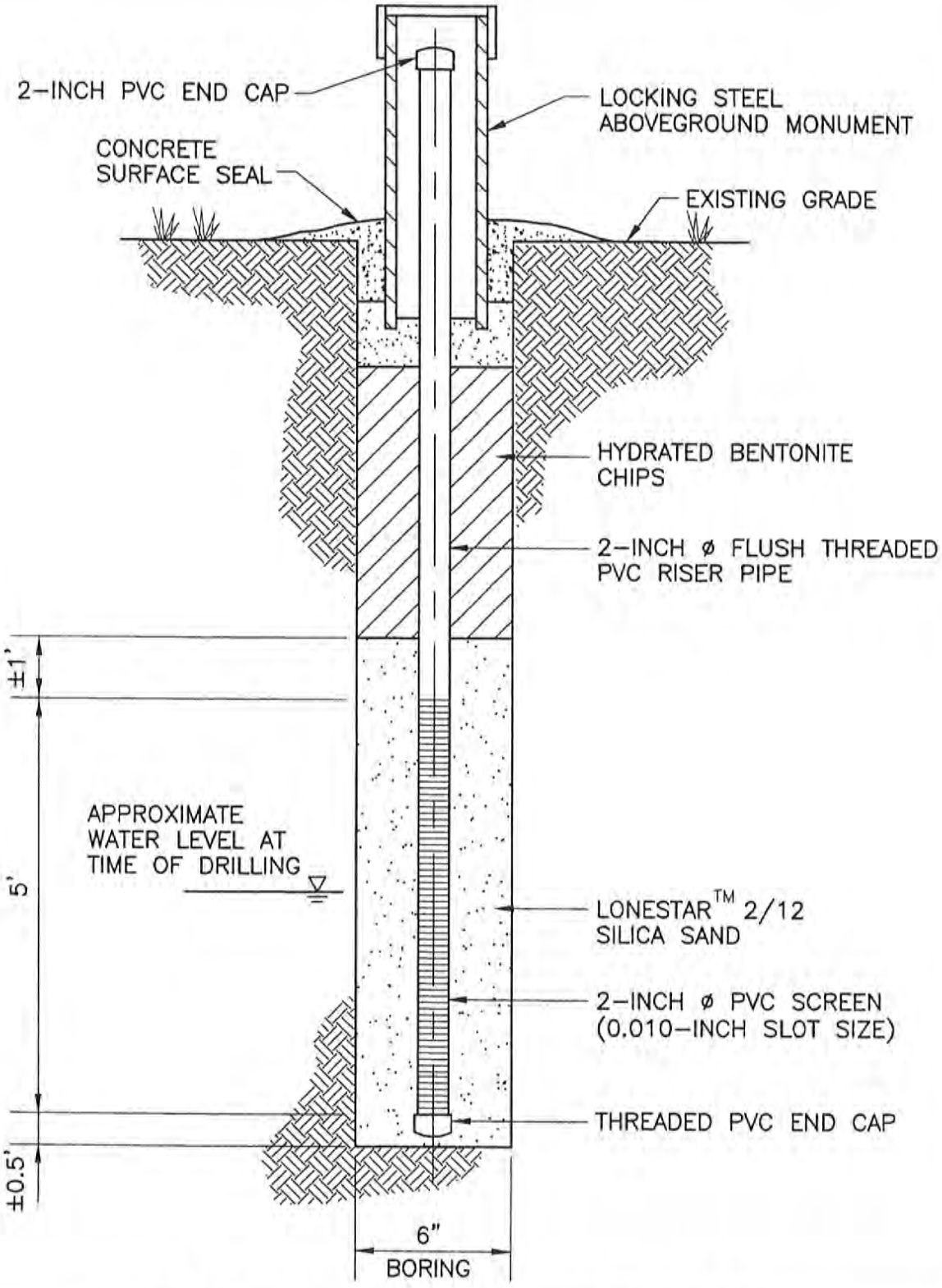
MINOR CONSTITUENTS	
Modifier	Estimated Percentage
Trace	<5
Few	5-10
Little	10-25
Some	25-45

EMCON

DATE 11-98
DWN mlp
APP KR
REV
PROJECT NO. 40141-083.006

FIGURE A-1
FORMER MORBARK LOG CHIPPER AREA
WEYERHAEUSER SNOQUALMIE MILL
SNOQUALMIE, WASHINGTON

SOIL CLASSIFICATION SYSTEM



EMCON

DATE 11-98
DWN mlp
APP
REV
PROJECT NO. 40141-083.006

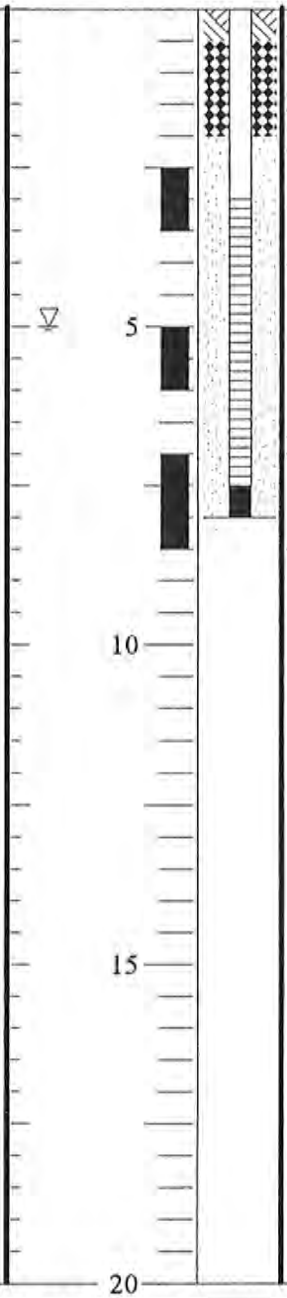
FIGURE A-2
FORMER MORBARK LOG CHIPPER AREA
WEYERHAEUSER SNOQUALMIE MILL
SNOQUALMIE, WASHINGTON
GENERALIZED WELL INSTALLATION DETAIL

ENW-BOTHELL2/DATA: G:\DWG\40141083\B0006N04.dwg Xrefs: <NONE>
Scale: 1 = 1.00 DimScale: 1 = 1.00 Date: 11/16/98 Time: 4:56 PM Operator: HSCHUBER

LOG OF EXPLORATORY BORING

PROJECT NAME	**Weyerhaeuser Former Morbark Log Chipper Area**		
LOCATION	**Snoqualmie, Washington**	BORING NO.	**A-1**
DRILLED BY	**Cascade Drilling, Inc.**	PAGE	**1 of 1**
DRILL METHOD	**Hollow Stem Auger**	TOTAL DEPTH	**9'**
LOGGED BY	**Michelle Macias**	DATE COMPLETED	**9/14/98**

SAMPLE NUMBER AND TYPE	BLOWS PER FOOT	PID (ppm)
A-1-2.5* SS	49 50/6"	0
A-1-5 SS	19 50/7"	0
A-1-7.5 SS	2 2 2	0



0.0 to 7.0 feet: SAND (SP); brown; fine to medium; gravelly little coarse sand to fine subangular gravel; few nonplastic silt; trace wood debris; very dense; damp to wet. (FILL)

@ 5.0 feet: wet.

7.0 to 8.5 feet: SANDY SILT (ML); brown; low plasticity; some fine sand; few medium sand to fine subangular to subrounded gravel; soft; wet; trace organic debris. (ALLUVIAL DEPOSIT)

Total depth drilled = 8.0 feet.
Total depth sampled = 9.0 feet.

WELL COMPLETION DETAILS:

+3.75 to 3.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC blank riser pipe.

3.0 to 8.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC well screen with 0.010-inch machine-cut slots, and 2-inch-diameter flush-threaded pointed end caps.

0.0 to 0.5 foot: Concrete.

0.5 to 2.0 feet: Medium bentonite chips hydrated with potable water.

2.0 to 8.0 feet: Lonestar 2/12 silica sand.

EMCON®

REMARKS

(1) SS = Samples collected with a 1.5-inch inside diameter split spoon sampler.
(2) Soil samples field screened with a photoionization detector (PID) in parts per million (ppm).
(3) Blow counts are shown per 6 inches and represent SPT results.
(4) White triangle = field estimate of water level at time of drilling.
(5) * = Soil sample submitted for laboratory analysis.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Weyerhaeuser Former Morbark Log Chipper Area**		
LOCATION	**Snoqualmie, Washington**	BORING NO.	**A-2**
DRILLED BY	**Cascade Drilling, Inc.**	PAGE	**1 of 1**
DRILL METHOD	**Hollow Stem Auger**	TOTAL DEPTH	**9'**
LOGGED BY	**Michelle Macias**	DATE COMPLETED	**9/14/98**

SAMPLE NUMBER AND TYPE	BLOWS PER FOOT	PID (ppm)	LITHOLOGIC DESCRIPTION
A-2-1*	N/A	0	**0.0 to 4.5 feet: SILTY SAND (SM);** brown; fine; some nonplastic silt; loose; damp to wet; some wood debris. (FILL)
A-2-3 SS	1 2 3	0	@ 3.0 feet: wet.
A-2-5 SS	3 7 4	0	**4.5 to 8.5 feet: SAND WITH SILT (SP-SM);** brown; fine; few little medium sand; few nonplastic silt; trace coarse sand to medium subangular gravel; medium; wet. (ALLUVIAL DEPOSIT)
A-2-7.5 SS	4 8 9	0	@ 7.5 feet: increasing coarse sand to medium gravel; organic debris.
			Total depth drilled = 8.0 feet. Total depth sampled = 9.0 feet.
			WELL COMPLETION DETAILS: +3.0 to 3.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC blank riser pipe. 3.0 to 8.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC well screen with 0.010-inch machine-cut slots, and 2-inch-diameter flush-threaded pointed end cap. 0.0 to 0.5 foot: Concrete. 0.5 to 2.0 feet: Medium bentonite chips hydrated with potable water. 2.0 to 8.0 feet: Lonestar 2/12 silica sand.

GROUND WATER LEVEL | DEPTH IN FT. | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN

EMCON®

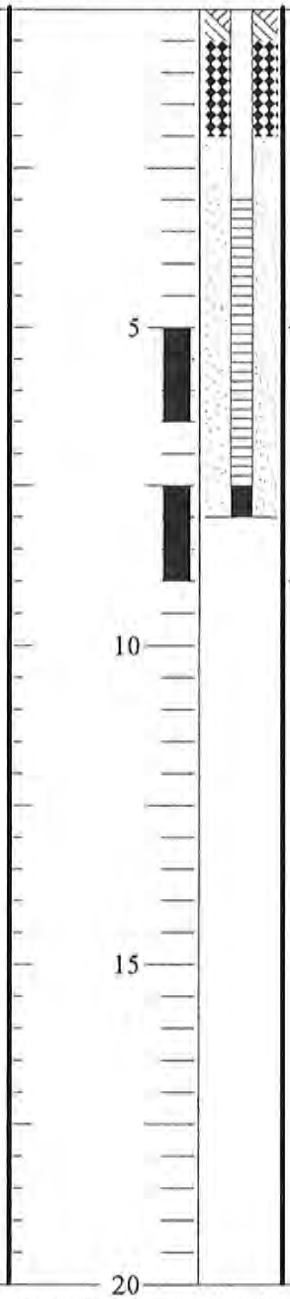
REMARKS

(1) SS = Samples collected with a 1.5-inch inside diameter split spoon sampler.
(2) Soil samples field screened with a photoionization detector (PID) in parts per million (ppm).
(3) Blow counts are shown per 6 inches and represent SPT results.
(4) White triangle = field estimate of water level at time of drilling.
(5) * = Soil sample submitted for laboratory analysis.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Former Morbark Log Chipper Area		
LOCATION	Snoqualmie, Washington	BORING NO.	A-3
DRILLED BY	Cascade Drilling, Inc.	PAGE	1 of 1
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	9'
LOGGED BY	Michelle Macias	DATE COMPLETED	9/14/98

SAMPLE NUMBER AND TYPE	BLOWS PER FOOT	PID (ppm)	LITHOLOGIC DESCRIPTION
A-3-2.5 SS	3 4 7	N/A	@ 2.5 feet: no recovery.
A-3-5 SS	9 10 11	0	**5.0 to 9.0 feet: SILT WITH SAND (ML);** gray with localized iron staining; nonplastic; little fine sand; trace medium to coarse sand; medium; damp. (ALLUVIAL DEPOSIT)
A-3-7.5 SS	2 3 5	0	@ 7.5 to 9.0 feet: grayish brown; loose.



Total depth drilled = 8.0 feet.
Total depth sampled = 9.0 feet.

WELL COMPLETION DETAILS:

+3.0 to 3.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC blank riser pipe.

3.0 to 8.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC well screen with 0.010-inch machine-cut slots and 2-inch-diameter flush-threaded pointed end cap.

0.0 to 0.5 foot: Concrete.

0.5 to 2.0 feet: Medium bentonite chips hydrated with potable water.

2.0 to 8.0 feet: Lonestar 2/12 silica sand.

EMCON®

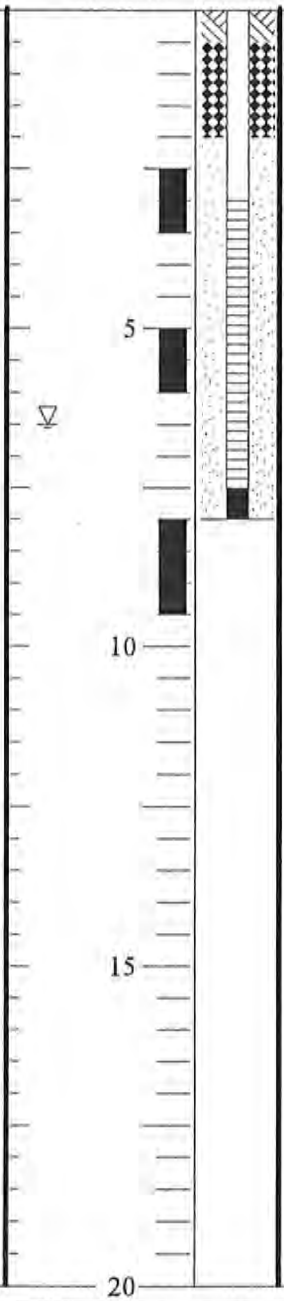
REMARKS

(1) SS = Samples collected with a 1.5-inch inside diameter split spoon sampler.
(2) Soil samples field screened with a photoionization detector (PID) in parts per million (ppm).
(3) Blow counts are shown per 6 inches and represent SPT results.
(4) White triangle = field estimate of water level at time of drilling.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Weyerhaeuser Former Morbark Log Chipper Area**		
LOCATION	**Snoqualmie, Washington**	BORING NO.	**A-4**
DRILLED BY	**Cascade Drilling, Inc.**	PAGE	**1 of 1**
DRILL METHOD	**Hollow Stem Auger**	TOTAL DEPTH	**9.5'**
LOGGED BY	**Michelle Macias**	DATE COMPLETED	**9/14/98**

SAMPLE NUMBER AND TYPE	BLOWS PER FOOT	PID (ppm)
A-4-2.5 SS	15 50/3"	0
A-4-5* SS	47 50/5"	0
A-4-7.5 SS	2 2 3	0



LITHOLOGIC DESCRIPTION

0.0 to 4.5 feet: PEAT (PT); brown; wood debris; moist. (FILL)

4.5 to 7.0 feet: GRAVELLY SAND WITH PEAT (SP-PT); brown to gray; fine to coarse; little fine to medium subangular to subrounded gravel; dense; moist. (FILL)

@ 6.5 feet: wet.

7.0 to 7.8 feet: PEAT (PT); brown; wood debris; wet. (FILL)

7.8 to 9.5 feet: SILT WITH SAND (ML); gray; nonplastic to low plasticity; little fine sand; trace organic debris; firm; wet. (ALLUVIAL DEPOSIT)

Total depth drilled = 8.0 feet.
Total depth sampled = 9.5 feet.

WELL COMPLETION DETAILS:

+3.0 to 3.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC blank riser pipe.

3.0 to 8.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC well screen with 0.010-inch machine-cut slots, and 2-inch-diameter flush-threaded pointed end cap.

0.0 to 0.5 foot: Concrete.

0.5 to 2.0 feet: Medium bentonite chips hydrated with potable water.

2.0 to 8.0 feet: Lonestar 2/12 silica sand.

EMCON®

REMARKS

(1) Samples collected with a 1.5-inch inside diameter split spoon sampler.
(2) Soil samples field screened with a photoionization detector (PID) in parts per million (ppm).
(3) Blow counts are shown per 6 inches and represent SPT results.
(4) White triangle = field estimate of water level at time of drilling.
(5) * = Soil sample submitted for laboratory analysis.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser Former Morbark Log Chipper Area		
LOCATION	Snoqualmie, Washington	BORING NO.	A-5
DRILLED BY	Cascade Drilling, Inc.	PAGE	1 of 1
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	9'
LOGGED BY	Michelle Macias	DATE COMPLETED	9/14/98

SAMPLE NUMBER AND TYPE	BLOWS PER FOOT	PID (ppm)	GROUND WATER LEVEL	DEPTH IN FT.	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
A-5-2.5* SS	50/3"	0						**0.0 to 4.5 feet: GRAVELLY SAND WITH PEAT (SP-PT);** gray to brown; fine to medium; little coarse sand to fine subangular to subrounded gravel; some peat; dense; moist. (FILL)
A-5-5 SS	10 21 15	0	▽	5				**4.5 to 8.0 feet: PEAT (PT);** brown; wood debris; moist. (FILL) @ 7.0 feet: wet.
A-5-7.5 SS	3 5 5	0		10				**8.0 to 9.0 feet: SILT WITH SAND (ML);** gray; nonplastic to low plasticity; little fine sand; trace organic debris; firm; wet. (ALLUVIAL DEPOSIT) Total depth drilled = 8.0 feet. Total depth sampled = 9.0 feet.
				15				**WELL COMPLETION DETAILS:** +3.0 to 3.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC blank riser pipe. 3.0 to 8.0 feet: 2-inch-diameter flush-threaded Schedule 40 PVC well screen with 0.010-inch machine-cut slots, and 2-inch-diameter flush-threaded pointed end cap. 0.0 to 0.5 foot: Concrete. 0.5 to 2.0 feet: Medium bentonite chips hydrated with potable water. 2.0 to 8.0 feet: Lonestar 2/12 silica sand.
				20				

EMCON®

REMARKS

(1) SS = Samples collected with a 1.5-inch inside diameter split spoon sampler.
(2) Soil samples field screened with a photoionization detector (PID) in parts per million (ppm).
(3) Blow counts are shown per 6 inches and represent SPT results.
(4) White triangle = field estimate of water level at time of drilling.
(5) * = Soil sample submitted for laboratory analysis.

FIELD SAMPLING DATA SHEET

EMCON
18912 North Creek Parkway, Suite 100
Bothell, Washington 98011-8016
Office: (425) 485-5000 Fax: (425) 486-9766

Project Name: Weyerhauser Snoqualmie-Morbark Area **Well ID:** A- 1

Site Address: Weyerhauser Snoqualmie Mill **Sample ID:** A- 1 -998

EMCON Contact: Kelly Rankich **Client Contact:** ~~Pete Matsch~~ Shari Brown **Project #:** 40141-083.006

Weather: (Part) Sun | (Part) Cloudy | Rain | | Temperature: 60 °F

WATER LEVEL MEASUREMENTS (Nearest 0.01 ft)

[Product Thickness]

Date	Time	DT-Bottom	DT-Water	DTB-DTW	DT-Product	DTP-DTW
9/25/98	1233	12.09	8.09	4.00		

Well dia. = Gal/ft: 1"=0.041 2"=0.163 4"=0.653 6"=1.469 10"=4.080 12"=5.875

[Water Col x Gal/ft]

	Volume (gal)
X 1	.65
X 3	1.95

WATER QUALITY DATA

Pore Vol	Method §	Purged (gal)	pH	Temp (°C)	E Cond (µS)	Turbidity (NTU)	Diss O2 (mg/l)	Other
1	PP	0.65	6.24	17.0	409		1.90	
2	"	1.30	6.27	17.4	355		1.65	
3	"	1.95	6.21	17.6	358		1.76	
4								
5								

§ METHOD: (SB) Submersible Pump (PP) Peristaltic Pump (DB) Disposable Bailer (PTB) PVC/Teflon Bailer (Ded B) Dedicated Bailer (DP) Dedicated Pump

GROUNDWATER SAMPLING DATA (If product is detected, do NOT sample)

Parameter	Date	Time	Method §	# Bottles	Volume (ml)	Type	Preservative	Ice	Filter
PAHs	9/25/98	1315	DB	1	1000	Amber	none	Yes	No
WTPH-Dx	"	"	DB	2	~~1000~~ 500	Amber	none	Yes	No

Total Bottles (include duplicate count): 3 **Duplicate ID:** Time:

Water Characterization			Decontamination Materials			
Color	Clarity	Odor	Liquinox	Methanol	HCl	Nitric
lt brown	sl. cloudy	SHCLO	D.I. Water	Distilled water	Hexane	

Notes:

SAMPLER: Michelle Lange/Susan Wilson (PRINTED NAME) (SIGNATURE)

FIELD SAMPLING DATA SHEET

EMCON
18912 North Creek Parkway, Suite 100
Bothell, Washington 98011-8016
Office: (425) 485-5000 Fax: (425) 486-9766

Project Name: Weyerhauser Snoqualmie-Morbark Area **Well ID:** A- 2
Site Address: Weyerhauser Snoqualmie Mill **Sample ID:** A- 2 -998
EMCON Contact: Kelly Rankich **Client Contact:** ~~Pete Malsch~~ Shari Brown **Project #:** 40141-083.006

Weather: (Part) Sun | (Part) Cloudy | Rain | | Temperature: 60 °F

WATER LEVEL MEASUREMENTS (Nearest 0.01 ft)

[Product Thickness]

Date	Time	DT-Bottom	DT-Water	DTB-DTW	DT-Product	DTP-DTW
9/25/98	1216	11.72	5.11			

Well dia. = Gal/ft: 1"=0.041 2"=0.163 4"=0.653 6"=1.469 10"=4.080 12"=5.875

[Water Col x Gal/ft]

	Volume (gal)
X 1	1.08
X 3	3.24

WATER QUALITY DATA

Pore Vol	Method §	Purged (gal)	pH	Temp (°C)	E Cond (µS)	Turbidity (NTU)	Diss O2 (mg/l)	Other
1	PP	1.08	6.31	15.5	786		2.43	
2	"	2.16	6.27	16.5	721		1.60	
3	"	3.24	6.25	16.6	712		1.63	
4								
5								

§ METHOD: (SB) Submersible Pump (PP) Peristaltic Pump (DB) Disposable Bailer (PTB) PVC/Teflon Bailer (Ded B) Dedicated Bailer (DP) Dedicated Pump

GROUNDWATER SAMPLING DATA (If product is detected, do NOT sample)

Parameter	Date	Time	Method §	# Bottles	Volume (ml)	Type	Preservative	Ice	Filter
PAHs	9/25/98	1230	DB	1	1000	Amber	none	Yes	No
WTPH-Dx	"	"	DB	2	~~1000~~ 500	Amber	none	Yes	No

Total Bottles (include duplicate count): 3 **Duplicate ID:** Time:

Water Characterization			Decontamination Materials			
Color	Clarity	Odor	Liquinox	Methanol	HCl	Nitric
H brown	cloudy	mn()	D.I. Water	Distilled water	Hexane	

Notes:

SAMPLER: Michelle Lange/Susan Wilson
(PRINTED NAME) (SIGNATURE)

FIELD SAMPLING DATA SHEET

EMCON
18912 North Creek Parkway, Suite 100
Bothell, Washington 98011-8016
Office: (425) 485-5000 Fax: (425) 486-9766

Project Name: Weyerhauser Snoqualmie-Morbark Area **Well ID:** A- 3

Site Address: Weyerhauser Snoqualmie Mill **Sample ID:** A- 3 -998

EMCON Contact: Kelly Rankich **Client Contact:** ~~Pete Malsch~~ Shari Brown **Project #:** 40141-083.006

Weather: (Part) Sun | (Part) Cloudy | Rain | | Temperature: 60 °F

WATER LEVEL MEASUREMENTS (Nearest 0.01 ft)

[Product Thickness]

Date	Time	DT-Bottom	DT-Water	DTB-DTW	DT-Product	DTP-DTW
9/25/98	1109	11.49	6.86	4.63		

Well dia. = Gal/ft: 1"=0.041 2"=0.163 4"=0.653 6"=1.469 10"=4.080 12"=5.875

[Water Col x Gal/ft]

	Volume (gal)
X 1	.75
X 3	2.25

WATER QUALITY DATA

Pore Vol	Method §	Purged (gal)	pH	Temp (°C)	E Cond (µS)	Turbidity (NTU)	Diss O2 (mg/l)	Other
1	PP	0.75	6.75	15.9	1941		3.26	
2	"	1.5	6.59	15.9	1510		2.47	
3	"	2.25	6.50	17.0	1280		2.60	
4								
5								

§ METHOD: (SB) Submersible Pump (PP) Peristaltic Pump (DB) Disposable Bailer (PTB) PVC/Teflon Bailer (Ded B) Dedicated Bailer (DP) Dedicated Pump

GROUNDWATER SAMPLING DATA (If product is detected, do NOT sample)

Parameter	Date	Time	Method §	# Bottles	Volume (ml)	Type	Preservative	Ice	Filter
PAHs	9/25/98	1130	DB	1	1000	Amber	none	Yes	No
WTPH-Dx	"	"	DB	2	~~1000~~ 500	Amber	none	Yes	No

Total Bottles (include duplicate count): | **Duplicate ID:** | Time:

Water Characterization			Decontamination Materials			
Color	Clarity	Odor	Liquinox	Methanol	HCl	Nitric
lt. br	Clear	NO	D.I. Water	Distilled water	Hexane	

Notes:

SAMPLER: Michelle Lange/Susan Wilson
(PRINTED NAME) (SIGNATURE)

FIELD SAMPLING DATA SHEET

EMCON
18912 North Creek Parkway, Suite 100
Bothell, Washington 98011-8016
Office: (425) 485-5000 Fax: (425) 486-9766

Project Name: Weyerhauser Snoqualmie-Morbark Area **Well ID:** A-4

Site Address: Weyerhauser Snoqualmie Mill **Sample ID:** A-4 -998

EMCON Contact: Kelly Rankich **Client Contact:** ~~Pete Matsch~~ Shari Brown **Project #:** 40141-083.006

Weather: (Part) Sun | (Part) Cloudy | Rain | | Temperature: 55 °F

WATER LEVEL MEASUREMENTS (Nearest 0.01 ft)

[Product Thickness]

Date	Time	DT-Bottom	DT-Water	DTB-DTW	DT-Product	DTP-DTW
9/25/98	1024	11.36	8.30			

Well dia. = Gal/ft: 1"=0.041 2"=0.163 4"=0.653 6"=1.469 10"=4.080 12"=5.875

[Water Col x Gal/ft]

	Volume (gal)
X1	.50
X3	1.50

WATER QUALITY DATA

Pore Vol	Method §	Purged (gal)	pH	Temp (°C)	E Cond (µS)	Turbidity (NTU)	Diss O2 (mg/l)	Other
1	PP	0.50	6.27	17.1	2470		2.55	
2	↓	1.00	6.36	17.5	2610		2.00	
3	↓	1.50	6.50	17.1	2660		1.73	
4								
5								

§ METHOD: (SB) Submersible Pump (PP) Peristaltic Pump (DB) Disposable Bailer (PTB) PVC/Teflon Bailer (Ded B) Dedicated Bailer (DP) Dedicated Pump

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Parameter	Date	Time	Method §	# Bottles	Volume (ml)	Type	Preservative	Ice	Filter
PAHs	9/25/98	1050	DB	1	1000	Amber	none	Yes	No
WTPH-Dx	↓	↓	DB	2	~~1000~~ 500	Amber	none	Yes	No

Total Bottles (include duplicate count): 3 **Duplicate ID:** Time:

Water Characterization			Decontamination Materials			
Color	Clarity	Odor	Liquinox	Methanol	HCl	Nitric
lt brown	clear	mo	D.I. Water	Distilled water	Hexane	

Notes:

SAMPLER: Michelle Lange/Susan Wilson
(PRINTED NAME) (SIGNATURE)

0010 ▷ 0000
754 ▷ 720
7.03 ▷ 7.00
4.00 ▷ 4.00

FIELD SAMPLING DATA SHEET

EMCON
18912 North Creek Parkway, Suite 100
Bothell, Washington 98011-8016
Office: (425) 485-5000 Fax: (425) 486-9766

Project Name: Weyerhauser Snoqualmie-Morbark Area **Well ID:** A-5

Site Address: Weyerhauser Snoqualmie Mill **Sample ID:** A-5 -998

EMCON Contact: Kelly Rankich **Client Contact:** ~~Pete Matsch~~ Shari Brown **Project #:** 40141-083.006

Weather: (Part) Sun | (Part) Cloudy | Rain | | Temperature: 60 °F

WATER LEVEL MEASUREMENTS (Nearest 0.01 ft)

[Product Thickness]

Date	Time	DT-Bottom	DT-Water	DTB-DTW	DT-Product	DTP-DTW
9/25/98	1125	11.15	7.16	3.99		

Well dia. = Gal/ft: 1"=0.041 2"=0.163 4"=0.653 6"=1.469 10"=4.080 12"=5.875

[Water Col x Gal/ft]

	Volume (gal)
X 1	0.65
X 3	1.95

WATER QUALITY DATA

Pore Vol	Method §	Purged (gal)	pH	Temp (°C)	E Cond (µS)	Turbidity (NTU)	Diss O2 (mg/l)	Other
1	PP	0.65	6.32	16.7	1400		2.42	
2	"	1.30	6.32	17	1330		2.02	
3	"	1.95	6.27	16.6	1289		1.92	
4								
5								

§ METHOD: (SB) Submersible Pump (PP) Peristaltic Pump (DB) Disposable Bailer (PTB) PVC/Teflon Bailer (Ded B) Dedicated Bailer (DP) Dedicated Pump

GROUNDWATER SAMPLING DATA (If product is detected, do NOT sample)

Parameter	Date	Time	Method §	# Bottles	Volume (ml)	Type	Preservative	Ice	Filter
PAHs	9/25/98	1155	DB	1	1000	Amber	none	Yes	No
WTPH-Dx	"	"	DB	2	1000/500	Amber	none	Yes	No

Total Bottles (include duplicate count): 3 **Duplicate ID:** Time:

Water Characterization			Decontamination Materials			
Color	Clarity	Odor	Liquinox	Methanol	HCl	Nitric
lt yellow	Clear	mno	D.I. Water	Distilled water	Hexane	

Notes:

SAMPLER: Michelle Lange/Susan Wilson
(PRINTED NAME) (SIGNATURE)

APPENDIX C

LABORATORY REPORTS
DRILLING AND GROUNDWATER SAMPLING

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Dennis Catalano
Project Manager

10/14/98
Date

Please feel free to contact me with any questions concerning this data report. I can be reached at (253) 924-6242.

Sincerely,

Dennis Catalano
Weyerhaeuser Analytical & Testing Services

ANALYTICAL LABORATORY SERVICES REQUEST
Weyerhaeuser Research and Development-Analysis and Testing

Service Request 98-1100

SR Title : Weyerhaeuser/Emcon/Snoqualmie Mill (former Morbark) - soils
Number of Samples : 4

Submitter Name : Rankich, Kelly
Submitter Address : Bothell, WA
Submitter Phone : 425-485-5000
Charge Number : 046-5648
PO Number : OOE 7089771

Date Received : 09/15/98
Date Desired : 09/29/98
Cost Multiplier : 1.000
Hardcopy Format :
Disk Format :

Reviewer : Bogar, Rick
Reviewer Address : WTC 2F25
Reviewer Phone : 6251

ORB Number :
Date Completed :

Copy to :
Comments/Notes : Emcon # 40141-083.006

Reference SR :

Revisions :

Test Name	Test Description	Component List
1-AS-TPH	Acid/Silica Cleanup	
1-TPHDW-S	WTPH-D/Soil Prep	
DIESEL-S	Diesel in Soil WTPHD	

Lab ID	Client Sample ID	Date Sampled	Test Name
001	A-1-2.5	09/14/98 0000	1-AS-TPH
			1-TPHDW-S
			DIESEL-S
002	A-2-1.0	09/14/98 0000	1-AS-TPH
			1-TPHDW-S
			DIESEL-S
003	A-4-5	09/14/98 1530	1-AS-TPH
			1-TPHDW-S
			DIESEL-S

004	A-5-2.5	09/14/98 1630	1-AS-TPH	
			1-TPHDW-S	
			DIESEL-S	

Weyerhaeuser

Analytical & Testing Services

Sample Analysis Request/Chain of Custody Form

Date 9-14-18

Page 1 of 1

Facility: Weyerhaeuser - Snoqualmie Mill (Former Morbark)

Sampler's Project No.: 40141-083.006 (EMCON #)

Weyerhaeuser Account No.: COE Proj # 70897

Project Manager (print): Kelly Rankich

Sampled by:
- ☐ Facility
- ☐ E&AS/WTC
- ☐ E&AS/NB

Consultant: EMCON

Address: 18912 N. Creek Pkwy, Bothell

Phone No.: (425) 485-8000 FAX: (425) 486-9766

Sampler Name (print): Michelle Lange

Recorded By (signed): Michelle Lange

Sample Description (ID, Date, Time are Required)

Method	Field Sample ID (15 characters max.)	Date (m/d/y)	Time (hh:mm)	Depth (ft / m)	Matrix: Water	Matrix: Soil/Sed	Matrix: Oil	Preservative: HCl	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: $Na_2S_2O_3$	Preservative: Filtered	Number of Containers
	A-1-2.5	9-14-98		2.5		X							1
	A-2-1.0	"		1.0		X							1
	A-4-5	"	1530	5		X							1
	A-5-2.5	"	1630	2.5		X							1

Analyses Requested (circle or write in parameters)

Method	pH Cond TDS TSS Color Tannins	Volatile Organics / BTEX	Semi-volatile Organics (Wash. ext.)	TPH: 418.1 TPH-G	TPH-D ext.	Ca Mg Na K Fe Mn	Metals (list below)	NH_3 HCO_3 CO_3 Cl F NO_3 SO_4	AOX	TCLP: Metals VOA SVOA Pest Herb PCBs	Dioxin: Total / 2,3,7,8-TCDD / 2,3,7,8-TCDF	CN	BOD P-ortho	TKN P-total TOC COD	Notes
				X	X										8021 - heavy spec
				X	X										
				X	X										
				X	X										

Method: G, grab; D, depth composite; T, time composite. Depth required for soil or sediment samples.

Remarks/Detection Limit Requirements

① with silica gel / sulfuric acid cleanup methods

☐ Samples on Ice or Blue Ice

Lab Turn-Around Time

☐ 24 Hr ☐ 48 Hr ☐ 7 Day

☒ 2-3 wk Date Due:

Reporting and QA/QC Requirements

RESULTS TO: Kelly Rankich

CC:

☐ CLP Package

☐ NPDES Permit

☐ Other:

☐ Electronic Report

Laboratory

☐ WATS/WTC ☐ WATS/NB

☐ Other:

Lab SR#:

Case ID:

SDG ID:

Sample Chain of Custody and Shipping Method Record

Relinquished By Sampler (signature)	Date	Time	Received By (signature)	Shipping Method
Michelle Lange	9-14-98	1700		Courier
Relinquished By (signature):	Date	Time	Received By (signature):	Airbill No.
Relinquished By (signature):	Date	Time	Received For Laboratory By (signature): Mapped	9.15.98 0800

Samples Received Intact: YES Cooler Temp: 4 °C

WATS/WTC: 32901 Weyerhaeuser Way South, Federal Way, WA 98003 (206-924-6293)

WATS/NB: New Bern R&D Field Station, Highway 43 North, New Bern, NC 28563 (919-633-7238)

Form 16307 (2/96) Printing Services TP-1 Tacoma

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1100

Report
Snoqualmie Mill (former Morbark)

Client ID	A-1-2.5	A-2-1.0	A-4-5
Sample Date and Time	9/14/98 0000	9/14/98 0000	9/14/98 1530
Lab ID	001	002	003
	mg/Kg	mg/Kg	mg/Kg
Analyte	(O.D. basis)	(O.D. basis)	(O.D. basis)
Diesel Fuel Range	9.1	72	42
Motor Oil Range	31	690	160
Surrogate (%recovery)			
o-Terphenyl	80%	77%	90%

Method: WTPH-D

Approved: Dennis Catalano
Telephone: (253)-924-6242

Date: 10/14/98

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1100

Report
Snoqualmie Mill (former Morbark)

Client ID	A-5-2.5	A-1-2.5Dup	Method Blank
Sample Date and Time	9/14/98 1630	9/14/98 0000	
Lab ID	004	001Dup	Blank1
	mg/Kg	mg/Kg	mg/Kg
Analyte	(O.D. basis)	(O.D. basis)	(O.D. basis)
Diesel Fuel Range	180	14	8.2
Motor Oil Range	750	23	<17
Surrogate (%recovery)			
o-Terphenyl	93%	77%	82%

Method: WTPH-D

Approved: Dennis Catalano DNC
Telephone: (253)-924-6242 Date: 10/14/98

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1100

Report
Snoqualmie Mill (former Morbark)

Client ID	**LCS**
Sample Date and Time	
Lab ID	**LCS1**

Analyte	% Recovery
Diesel Fuel Range	140%
Motor Oil Range	-
Surrogate (%recovery)	
o-Terphenyl	94%

Method: WTPH-D

Approved: Dennis Catalano DNC
Telephone: (253)-924-6242 Date: 10/14/98

Weyerhaeuser

32901 Weyerhaeuser Way South
Federal Way WA 98003
Tel (253) 924-6872
Fax (253) 924-6654

October 27, 1998

Ms. Kelly Rankich
EMCON
18912 North Creek Parkway, Suite 100
Bothell, WA 98011

Dear Kelly:

Please find attached a copy of our final report for the samples that you requested we analyze for Snoqualmie UST/AST and Snoqualmie former Morbark sites. These are from our service request number 98-1197 and 98-1198. Invoicing for this work will be sent directly to Weyerhaeuser. If you have any questions concerning this report, please feel free to contact me at (253) 924-6242.

Thank you for using our laboratory for this analysis and we look forward to working with you on future projects.

Sincerely,

Dennis Catalano, Project Manager
Weyerhaeuser Analytical and Testing Services

Attachments

Weyerhaeuser

32901 Weyerhaeuser Way South
Federal Way WA 98003
Tel (253) 924-6872
Fax (253) 924-6654

SDG NARRATIVE

Organic Analysis

WEYERHAEUSER (WEYER)
ANALYTICAL AND TESTING SERVICES

Case Number 98-1198
SDG Number 98-1198-001

PROJECT: Snoqualmie Morbark Area

The samples from this SDG were received on 9/26/98. The SDG was composed of water samples for analysis of PAHs and WTPH-D extended with acid silica gel cleanup. The following analyses were performed:

SAMPLE ID	LAB ID	MATRIX	ANALYSIS
A1-0998	98-1198-001	Water	PAH;WTPH-D
A2-0998	98-1198-002	Water	PAH;WTPH-D
A3-0998	98-1198-003	Water	PAH;WTPH-D
A4-0998	98-1198-004	Water	PAH;WTPH-D
A5-0998	98-1198-005	Water	PAH;WTPH-D

Laboratory comments for this sample delivery group are listed below. The comments are broken up into categories for ease of explanation.

1. WTPH-D

   a) No comments with this data set.

2. PAH

   a) Terphenyl-d4 surrogate recovery was below our laboratory limits, however, it was within the method limits and required no further action.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Dennis Catalano
Project Manager

10/27/98
Date

Please feel free to contact me with any questions concerning this data report. I can be reached at (253) 924-6242.

Sincerely,

Dennis Catalano
Weyerhaeuser Analytical & Testing Services

Weyerhaeuser

Analytical & Testing Services

Sample Analysis Request/Chain of Custody Form

Date 9-25-98

Page 1 of 1

Facility Weyerhaeuser - Snoqualmie Mill Marbark

Sampler's Project No. 70897

Weyerhaeuser Account No. 00E

Project Manager (print) Kelly Rankich

Sampler Name (print) Susan Wilson

Recorded By (signed)

Sampled by:
- ☐ Facility
- ☐ E&AS/WTC
- ☐ E&AS/NB

Consultant EMCON

Address 18912 N Crk Pkwy Suite 200

Phone No. (425) 485-5000 FAX (425) 486-9766

Sample Description (ID, Date, Time are Required)

Method	Field Sample ID (15 characters max.)	Date (m/d/y)	Time (hh:mm)	Depth (ft / m)	Matrix: Water	Soil/Sed	Oil	Preservative: HCl	H_2SO_4	HNO_3	$Na_2S_2O_3$	Filtered	Number of Containers
	A-1-0998	9-25-98	1315		X								3
	A-2-0998	9-25-98	1230		X								3
	A-3-0998	9-25-98	1130		X								3
	A-4-0998	9-25-98	1050		X								3
	A-5-0998	9-25-98	1155		X								3

Analyses Requested (circle or write in parameters)

pH	Cond	TDS	TSS	Color	Tannins	Volatile Organics / BTEX	Semi-volatile Organics	WA TPH-D ext (1)	TPH: 418.1	TPH-G	Ca	Mg	Na	K	Fe	Mn	Metals (list below)	NH_3	HCO_3	CO_3	Cl	F	NO_3	SO_4	AOX	TCLP: Metals VOA SVOA Pest Herb PCBs	Dioxin: Total / 2,3,7,8-TCDD / 2,3,7,8-TCDF	CN	BOD	P-ortho	TKN	P-total	TOC	COD	8270 (PAHs)	Notes
								X																										X		X	
								X																										X	X	X	
								X																										X	X	X	
								X																										X	X	X	
								X																										X	X	X	

Method: G, grab; D, depth composite; T, time composite. Depth required for soil or sediment samples.

☐ Samples on Ice or Blue Ice

Lab Turn-Around Time

☐ 24 Hr ☐ 48 Hr ☐ 7 Day

☒ 2-3 wk Date Due:

Reporting and QA/QC Requirements

RESULTS TO: Kelly Rankich

CC:

- ☐ CLP Package
- ☐ NPDES Permit
- ☐ Other:
- ☐ Electronic Report

Remarks/Detection Limit Requirements

(1) W TPH-Dx w/ silica gel / sulfuric acid cleanup step

Laboratory

- ☐ WATS/WTC ☐ WATS/NB
- ☐ Other:

Lab SR#:

Case ID:

SDG ID:

Sample Chain of Custody and Shipping Method Record

	Date	Time		
Relinquished By Sampler (signature):	9-25-98	1445	Received By (signature): Left at Weyerhaeuser	Shipping Method
Relinquished By (signature):			Received By (signature):	Airbill No.
Relinquished By (signature):			Received For Laboratory By (signature):	9/26/98 1500

Samples Received Intact: Yes Cooler Temp: 4 °C

WATS/WTC: 32901 Weyerhaeuser Way South, Federal Way, WA 98003 (206-924-6293)

WATS/NB: New Bern R&D Field Station, Highway 43 North, New Bern, NC 28563 (919-633-7238)

Form 15307 (2/96) Printing Services TP-1 Tacoma

SR Title : Weyerhaeuser - Snoqualmie Mill - Morbark OOE# 7089771
Number of Samples : 5

Submitter Name : Rankich, Kelly
Submitter Address : Bothell, WA
Submitter Phone : 425-485-5000
Charge Number : 046-5648
PO Number : OOE# 7089771

Date Received : 09/26/98
Date Desired : 10/12/98
Cost Multiplier : 1.000
Hardcopy Format :
Disk Format :

Reviewer : Bogar, Rick
Reviewer Address : WTC 2F25
Reviewer Phone : 6251

ORB Number :
Date Completed :

Copy to :
Comments/Notes :

Reference SR : 98-1100

Revisions :

Test Name	Test Description	Component List
1-AS-TPH	Acid/Silica Cleanup	
1-EXT3520	Ext 3520C	
1-TPHDW-W	WTPH-D/Water Prep	
BNAW-8270C PAH-ONLY	BNA in Water by 8270	BNA 8270C - PAH Only
DIESEL-W	Diesel in H2O WTPHD	

Lab ID	Client Sample ID	Date Sampled	Test Name
001	A-1-0998	09/25/98 1315	1-AS-TPH
			1-EXT3520
			1-TPHDW-W
			BNAW-8270C PAH-ONLY
			DIESEL-W
002	A-2-0998	09/25/98 1230	1-AS-TPH
			1-EXT3520

			1-TPHDW-W	
			BNAW-8270C	PAH-ONLY
			DIESEL-W	
003	A-3-0998	09/25/98 1130	1-AS-TPH	
			1-EXT3520	
			1-TPHDW-W	
			BNAW-8270C	PAH-ONLY
			DIESEL-W	
004	A-4-0998	09/25/98 1050	1-AS-TPH	
			1-EXT3520	
			1-TPHDW-W	
			BNAW-8270C	PAH-ONLY
			DIESEL-W	
005	A-5-0998	09/25/98 1155	1-AS-TPH	
			1-EXT3520	
			1-TPHDW-W	
			BNAW-8270C	PAH-ONLY
			DIESEL-W	

Group	Test Name	No. of Samples	Cost per Sample($)	Cost Mult	Line Total
CHROM	1-AS-TPH	5	10.00	1.00	50.00
CHROM	1-EXT3520	5	0.00	1.00	0.00
CHROM	1-TPHDW-W	5	0.00	1.00	0.00
CHROM	BNAW-8270C PAH-ONLY	5	250.00	1.00	1250.00
CHROM	DIESEL-W	5	79.00	1.00	395.00
		Total CHROM Charges ($)			1695.00

Ref #	Group	Memo Charge Description	Notes/PO Number	Line Total($)

Cost Summary

Total Test Charges ($)	1695.00
Total Memo Charges ($)	0.00
Total Charges for Service Request ($)	1695.00

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1198

Report
Weyerhaeuser - Snoqualmie Mill - Morbark OOE# 7089771

Client ID		A-1-0998	A-2-0998	A-3-0998
Sample Date and Time		9/25/98 13:15	9/25/98 12:30	9/25/98 11:30
Lab ID		98-1198-001	98-1198-002	98-1198-003
Analyte (ug/L, ppb)	CAS			
Naphthalene	91-20-3	4 U	4 U	4 U
2-Methylnaphthalene	91-57-6	4 U	4 U	1 J
2-Chloronaphthalene	91-58-7	4 U	4 U	4 U
Acenaphthylene	208-96-8	4 U	4 U	4 U
Acenaphthene	83-32-9	4 U	4 U	4 U
Dibenzofuran	132-64-9	4 U	4 U	4 U
Fluorene	86-73-7	4 U	4 U	4 U
Phenanthrene	85-01-8	4 U	4 U	4 U
Anthracene	120-12-7	4 U	4 U	4 U
Fluoranthene	206-44-0	4 U	4 U	4 U
Pyrene	129-00-0	4 U	4 U	4 U
Benzo(a)Anthracene	56-55-3	4 U	4 U	4 U
Chrysene	218-01-9	4 U	4 U	4 U
Benzo(b)fluoranthene	205-99-2	4 U	4 U	4 U
Benzo(k)fluoranthene	207-08-9	4 U	4 U	4 U
Benzo(a)pyrene	50-32-8	4 U	4 U	4 U
Indeno(1,2,3-cd)pyrene	193-39-5	4 U	4 U	4 U
Dibenzo(a,h)anthracene	53-70-3	4 U	4 U	4 U
Carbazole	86-74-8	4 U	4 U	4 U
Benzo(g,h,i)perylene	191-24-2	4 U	4 U	4 U
Surrogates (%recovery)	Limits			
2-Fluorophenol	34 - 92	75%	67%	68%
Phenol-d5	29 - 94	75%	71%	72%
Nitrobenzene-d5	57 - 99	74%	64%	68%
2-Fluorobiphenyl	51 - 99	72%	70%	70%
2,4,6-Tribromophenol	41 - 123	88%	84%	91%
Terphenyl-d14	55 - 141	70%	60%	34%
2-Chlorophenol-d4	54 - 90	77%	68%	72%
1,2-Dichlorobenzene-d4	43 - 81	64%	56%	58%
Date Extracted		10/2/98	10/2/98	10/2/98
Date Analyzed		10/16/98	10/16/98	10/16/98

Approved: Richard Bogar
Telephone (253)924-6521

Date: 10/27/98

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1198

Report
Weyerhaeuser - Snoqualmie Mill - Morbark OOE# 7089771

Client ID		A-4-0998	A-5-0998	SBL4X1_100298
Sample Date and Time		9/25/98 10:50	9/25/98 11:55	
Lab ID		98-1198-004	98-1198-005	SBL4X1_100298
Analyte (ug/L, ppb)	CAS			
Naphthalene	91-20-3	4 U	4 U	4 U
2-Methylnaphthalene	91-57-6	4 U	4 U	4 U
2-Chloronaphthalene	91-58-7	4 U	4 U	4 U
Acenaphthylene	208-96-8	4 U	4 U	4 U
Acenaphthene	83-32-9	4 U	4 U	4 U
Dibenzofuran	132-64-9	4 U	4 U	4 U
Fluorene	86-73-7	4 U	4 U	4 U
Phenanthrene	85-01-8	4 U	4 U	4 U
Anthracene	120-12-7	4 U	4 U	4 U
Fluoranthene	206-44-0	4 U	4 U	4 U
Pyrene	129-00-0	4 U	4 U	4 U
Benzo(a)Anthracene	56-55-3	4 U	4 U	4 U
Chrysene	218-01-9	4 U	4 U	4 U
Benzo(b)fluoranthene	205-99-2	4 U	4 U	4 U
Benzo(k)fluoranthene	207-08-9	4 U	4 U	4 U
Benzo(a)pyrene	50-32-8	4 U	4 U	4 U
Indeno(1,2,3-cd)pyrene	193-39-5	4 U	4 U	4 U
Dibenzo(a,h)anthracene	53-70-3	4 U	4 U	4 U
Carbazole	86-74-8	4 U	4 U	4 U
Benzo(g,h,i)perylene	191-24-2	4 U	4 U	4 U
Surrogates (%recovery)	Limits			
2-Fluorophenol	34 - 92	77%	84%	72%
Phenol-d5	29 - 94	81%	89%	75%
Nitrobenzene-d5	57 - 99	74%	82%	68%
2-Fluorobiphenyl	51 - 99	68%	76%	70%
2,4,6-Tribromophenol	41 - 123	101%	115%	80%
Terphenyl-d14	55 - 141	36%	68%	94%
2-Chlorophenol-d4	54 - 90	81%	89%	75%
1,2-Dichlorobenzene-d4	43 - 81	62%	70%	62%
Date Extracted		10/2/98	10/2/98	10/2/98
Date Analyzed		10/16/98	10/16/98	10/23/98

Approved: Richard Bogar
Telephone (253)924-6521

Date: 10/27/98

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: WEYERHAEUSER Contract:

Lab Code: WEYER Case No.: 98-1198 Method: 8270B SDG No.: 98-1198-001

	EPA SAMPLE NO.	S1 (2FP) #	S2 (PHL) #	S3 (NBZ) #	S4 (FBP) #	S5 (TBP) #	S6 (TPH) #	S7 (2CP) #	S8 (DCB) #
01	A-1-0998	75	75	74	72	88	70	77	64
02	A-2-0998	67	71	64	70	84	60	68	56
03	A-3-0998	68	72	68	70	91	34*	72	58
04	A-4-0998	77	81	74	68	101	36*	81	62
05	A-5-0998	84	89	82	76	115	68	89	70
06	SBL4X1_100298	72	75	68	70	80	94	75	62
07	SLC4X1_100298	76	77	72	74	89	102	80	68
08									
09									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

		QC LIMITS	8270B LIMITS
S1 (2FP)	= 2-Fluorophenol	(34- 92)	(21-100)
S2 (PHL)	= Phenol-d5	(29- 94)	(10- 94)
S3 (NBZ)	= Nitrobenzene-d5	(57- 99)	(35-114)
S4 (FBP)	= 2-Fluorobiphenyl	(51- 99)	(43-116)
S5 (TBP)	= 2,4,6-Tribromophenol	(41-123)	(10-123)
S6 (TPH)	= Terphenyl-d14	(55-141)	(33-141)
S7 (2CP)	= 2-Chlorophenol-d4	(54- 90)	(advisory)
S8 (DCB)	= 1,2-Dichlorobenzene-d4	(43- 81)	(advisory)

Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogate diluted out

WATER SEMIVOLATILE BLANK SPIKE RECOVERY

Lab Name: WEYERHAEUSER Contract:

Lab Code: WEYER Case No.: 98-1198 Method: 8270B SDG No.: 98-1198-001

Matrix Spike - EPA Sample No.: SBL4X1_10029

COMPOUND	SPIKE ADDED (ug/L)	BLANK CONCENTRATION (ug/L)	BS CONCENTRATION (ug/L)	BS % REC #	QC. LIMIT REC.
Phenol	75	0.0	57	76	31- 9
2-Chlorophenol	75	0.0	59	79	39- 9
1,4-Dichlorobenzene	50	0.0	33	66	34- 8
N-Nitrosodinpropylamine	50	0.0	38	76	43-10
1,2,4-Trichlorobenzene	50	0.0	34	68	37-10
4-Chloro-3-Methylphenol	75	0.0	59	79	46-10
Acenaphthene	50	0.0	39	78	48-10
4-Nitrophenol	75	0.0	70	93	29-11
2,4-Dinitrotoluene	50	0.0	41	82	50-10
Pentachlorophenol	75	0.0	67	89	59-12
Pyrene	50	0.0	50	100	46-13

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits
Spike Recovery: 0 out of 11 outside limits

COMMENTS: _____

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1198

Report
Snoqualmie Morbark Site

Client ID	A1-0998	A2-0998	A3-0998
Sample Date and Time	9/25/98 1315	9/25/98 1230	9/25/98 1130
Lab ID	001	002	003
	mg/L	mg/L	mg/L
Analyte			
Diesel Fuel Range	0.72	0.56	0.19
Motor Oil Range	1.3	1	0.18 J
Surrogate (%recovery)			
o-Terphenyl	79%	109%	90%

J: Indicates an estimated value due to the value falling below the quantitation limit.

Method: WTPH-D

Approved: Dennis Catalano
Telephone: (253)-924-6242 Date: 10/27/98

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1198

Report
Snoqualmie Morbark Site

Client ID	A4-0998	A5-0998	Blank
Sample Date and Time	9/25/98 1050	9/25/98 1155	
Lab ID	004	005	Blank
	mg/L	mg/L	mg/L
Analyte			
Diesel Fuel Range	0.19	0.94	< 0.08
Motor Oil Range	0.42	1.2	<0.20
Surrogate (%recovery)	74%	79%	92%

J: Indicates an estimated value due to the value falling below the quantitation limit.

Method: WTPH-D

Approved: Dennis Catalano
Telephone: (253)-924-6242 Date: 10/27/98

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

Service Request 98-1198

Report
Snoqualmie Morbark Site

Client ID	**LCS**
Sample Date and Time	
Lab ID	**LCS**

Analyte	% Recovery
Diesel Fuel Range	77%
Motor Oil Range	--
Surrogate (%recovery)	
o-Terphenyl	93%

J: Indicates an estimated value due to the value falling below the quantitation limit.

Method: WTPH-D

Approved: Dennis Catalano
Telephone: (253)-924-6242 Date: 10/27/98