T-1509-01

Level 1
Environmental Analysis
Weyerhaeuser Snoqualmie
Mill Site

December 1993

Weyerhaeuser Real Estate Company
WRECO, WREI-1
Tacoma, Washington 98477

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December 15, 1993

Weyerhaeuser Real Estate Company
WRECO, WREI-1
Tacoma, Washington 98477

Attn: Mr. George Cook, P.E.

RE: LEVEL 1 ENVIRONMENTAL ANALYSIS, WEYERHAEUSER SNOQUALMIE MILL SITE, SNOQUALMIE, WASHINGTON

Enclosed are eight copies of the above-referenced report (one original and seven copies). Please call me at (206) 632-8020 if you have questions about our analysis.

Sincerely,

SHANNON & WILSON, INC.

Robert Colombo
Associate

RC/jnd

Enclosure: Level 1 Environmental Analysis Report

T1509-01.LT8/T1509-lkd/jnd

T-1509-01

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EXECUTIVE SUMMARY

A Level 1 Environmental Analysis of Weyerhaeuser's Snoqualmie Mill located in Snoqualmie, Washington has been completed through a review of technical reports that pertain to environmental investigations and remedial actions. Technical reports describing conditions at the mill site, as well as present day conditions, have been substantiated with an on-site interview with the mill's Environmental Coordinator. Results of this Level 1 analysis indicates that petroleum-impacted soil and groundwater, to levels which exceed current Model Toxic Control Act (MTCA) Method A Cleanup Levels are present at two locations identified as the former Saw Mill and Area Nos. 1 and 2. Residual PCB-impacted soil, at depth and at the surface, is an issue at the former Plywood Plant in an area identified as T-12. Residual petroleum from the Press Pit within the former plywood production facility is reported to have been remediated to within the current MTCA Method A Cleanup Level of 200 parts per million (ppm); however, groundwater was not addressed at this location during the remedial effort. Roadways with in the mill site have been historically constructed and maintained with methods accepted at that time, which utilized road oil as a binding- and dust-suppressant agent. This may present an issue in the context of current regulations pertaining to the handling and disposal of the roadway material, should this condition occur. The adjacent Log Pond, which receives surface water from the mill-wide drainage system, has been monitored and found to support a thriving fish population. Sediment issues for the Log Pond and the mill-wide ditch drainage system have not been assessed in light of current Sediment Quality Standards. Several additional environmental issues are discussed within this analysis. A conceptual review of applicable remedial alternatives for impacted areas and an accompanying cost estimate for these alternatives is provided, based on information provided in the technical reports supplied by Weyerhaeuser.

LEVEL 1 ENVIRONMENTAL ANALYSIS
WEYERHAEUSER SNOQUALMIE MILL SITE

1.0 INTRODUCTION

This Level 1 Environmental Analysis is being conducted for the Weyerhaeuser Real Estate Company at the Weyerhaeuser Snoqualmie Mill site located in Snoqualmie, Washington. To support this analysis, we have reviewed several technical reports by other consultants supplied to us by Weyerhaeuser, conducted an interview with the on-site Environmental Coordinator for this mill site, and reviewed Shannon & Wilson's technical files for supplemental information to support our historical information and our conceptual cost estimates for applicable remedial actions to meet current regulatory standards.

2.0 AUTHORIZATION

Authorization for this Level 1 Environmental Analysis is by direction of Mr. George E. Cook, P.E., representing the Weyerhaeuser Real Estate Company.

3.0 SNOQUALMIE MILL SITE

The Snoqualmie Mill is located near the town of Snoqualmie at the foot of the Cascade Mountains in King County, Washington. The site is 90 acres in size and is located as follows: Southeast 1/4 of the Southeast 1/4 of the Northwest 1/4, Section 29, Township 24 North, Range 8 East W.M. (24/08-29F). The entire mill is positioned above shallow fill and native alluvial material, which are comprised of clay, peat, silt, sand, and gravel. The Log Pond located on the south side of the mill site is an abandoned meander of the Snoqualmie River. The subsurface is the direct result of deposition and modification by the Snoqualmie River.

The Snoqualmie Mill is subdivided into several areas by operations directly associated with facility production. Subsequently, each area has its own environmental issues, which are discussed in detail for this analysis.

3.1 Former Plywood Plant Operations

Plywood production at this location, within a 160,000-square-foot facility, included the use of electrical equipment, ancillary transformers, capacitor banks, and hydraulic oil-filled production equipment.

3.1.1 Electrical Equipment

Three transformers (abbreviated by "T") were identified at this location as T-12, 16 and 17. In total, the volume of oil housed within this equipment is on the order of 1,178 gallons of Askarel, a polychlorinated biphenyl (PCB)-containing dielectric fluid. During the fire of February 5, 1989, which engulfed the entire plant, no catastrophic failure was noted in the transformer equipment, as reported by HDR Engineering (HDR) in their March 1989 report entitled, "Assessment of PCB Contamination, Weyerhaeuser's Cascade Division, Snoqualmie Falls, Plywood Plant Fire." Actual losses were on the order of 10 to 23 gallons, with latter historical reported losses (in the 1960s) on the order of 200 gallons or more.

Results of this assessment concluded that an unknown volume of PCB oil had escaped from T-12, located on the south side of the plant, and T-17, located on the northeast corner of the plant. Concentrations of PCB were detected in site soil at 84,000 and 3,300 parts per million (ppm), respectively; current federal Toxic Substance Control Act (TSCA) target cleanup levels are 50 ppm, whereas the Model Toxic Control Act (MTCA) limits in soil for PCB are 1.0 ppm for residential and 10 ppm for industrial sites. Residual ash was also analyzed for PCB and found to be in the immediate area of the transformer equipment only and was handled according to applicable regulations, guidelines, and standards.

Subsequent activities at the Plywood Plant site have included a shallow (perched) groundwater investigation completed by HDR in June 1989 with analysis of groundwater for PCB. HDR detected PCB concentrations ranging from 14 parts per billion (ppb) to below detection limits in groundwater. Groundwater was measured at a depth of 2 1/2 to 4 1/2 feet below existing site grade in a perched condition above a native clay horizon of unknown thickness and areal extent in the vicinity of each transformer. The current MTCA Method A Cleanup Level for Groundwater is 0.1 ppb for PCB.

Soil excavation and subsequent shallow groundwater dewatering activities at T-17 were undertaken in June 1989 with closure meeting TSCA guidelines on June 6, 1989. Closure of T-12 was not obtainable due to the presence of elevated concentrations of PCB in

the underlying shallow clay layer, within an area of approximately 25 square feet with possible deeper penetration of Askarel, along avenues provided by the individual wooden pile system that supported the Plywood Mill structure. Remaining concentrations of PCB in soil were on the order of 130 to 40,000 ppm. The area was lined and backfilled at the conclusion of this work.

Additional investigative activities recommend by HDR were implemented by Weyerhaeuser at T-12 and reported in HDR's December 1989 report entitled, "Additional Investigation Report, Snoqualmie Mill T-12 Site." This additional phase of work, completed during September 6 through 14, 1989, was designed to assess subsurface conditions at depth below the T-12 site for modeling of the T-12 spill, to determine the underlying geology and to identify groundwater conditions. The activities indicated that a clay layer is present below T-12 from approximately 5 to 14 feet below existing site grade, and had adsorbed PCBs in sufficient quantities to limit further downward migration into the deeper sand/silt aquifer, which is present beneath most of the entire mill site. A strong odor of chlorinated benzene was noted in soil samples obtained below the clay layer; however, analytical results indicated non-detectable levels of this compound. Groundwater was present in a confined environment with five feet of hydrostatic head above the lower contact of the overlying clay layer.

During October 11 through 13, 1989, additional excavation at the T-12 site was undertaken by Olympus Environmental Inc. (OEI), a Weyerhaeuser contractor, which included 60 cubic yards of soil removal to a terminal depth of 13 feet below existing site grade (eight feet into clay layer). Excavated material was transported to and disposed of at the Chem Security Systems, Inc. Arlington Landfill in Oregon. Final sampling results of the excavation floor indicated PCB concentrations in soil from a low of less than 0.08 ppm to a high of 34,000 ppm. At the completion of this remedial effort, the excavation was backfilled with an imported clay material.

During August 12 through 16, 1991, GeoEngineers, Inc. (GEO) installed four groundwater monitoring wells in the deep zone at the T-12 site. Data is available, but no report is currently available for this event. Groundwater sampling of these wells is presented in the work completed by Dalton, Olmsted and Fugelvand, Inc. during May 1992, summarized below.

A geotextile cover was constructed above the T-12 site in October 1991, and the site remains in this condition today.

Additional work at the T-12 site was performed by the firm of Dalton, Olmsted and Fugelvand, Inc. (DOF), which included the installation and sampling of four additional groundwater monitoring wells in the deep zone below the clay layer, soil analysis of one sample from each boring, and collection of 40 soil samples from a rectangular surface grid located above the T-12 site. These services were completed during May 12 through 26, 1992.

Results of the analysis completed on all wells except GEO-MW-2, located in the center of the T-12 spill, indicated that PCBs were not detected in any of the wells sampled at reported detection limits of 0.1 to 0.2 ppb. However, concentrations of less than 1 ppb were observed for some chlorinated compounds, but were discounted due to their presence in the field blank. A field blank is prepared in the field by the sampler and consists of distilled water which is containerized, handled, shipped and analyzed with all other environmental samples collected from the site, and the data is used to assess the quality of the entire process. The detection of the chlorinated compounds in the field blank indicates that contamination of the field blank may have occurred during any one of the steps detailed previously.

Results of this phase of work concluded that PCB and chlorinated hydrocarbon concentrations in soil samples analyzed from the lower portion of the clayey silt layer above the deep groundwater zone were below detection limits for all locations sampled. Groundwater flow was determined to be southward toward the Log Pond. PCB analysis completed for the 40 surface soils obtained from the T-12 capped area indicated that soils do contain PCBs above 1 ppm in the areas northeast and northwest of the T-12 site. Further cleanup measures would need to be implemented to meet the MTCA Method A Cleanup Level for nonindustrial sites of 1.0 ppm. Soils documented in the subsurface during the remedial actions completed by OEI and HDR during October 1989 currently exceed the MTCA Method A Cleanup Levels for industrial and nonindustrial soils.

3.1.2 Press Pit Equipment

The plywood plant contained a hydraulically operated "Press Pit," which was destroyed during the fire of February 5, 1989. The Press Pit site was assessed by HDR in July 1989. The concrete foundations measured 27 by 18 by 14 feet deep. Petroleum hydrocarbons, mainly heavy oil(s), were associated with the hydraulic press pit equipment, were found in the soil in excess of 200 ppm. The oil plume extended northward approximately 30 to 60 feet and 30 feet in the east-west direction from the Press Pit

location. Remedial action involved extensive excavation and analytical testing during July 1989. A cleanup objective of 200 ppm in soil was identified in accordance with current Washington State Department of Ecology (Ecology) petroleum hydrocarbon cleanup guidelines and was achieved in the Press Pit area and also in an adjacent diesel fuel underground storage tank (UST) located in the southern portion of the former plywood plant. Demolition debris from the press pit foundations was buried in the resulting excavation and covered with a fill material. No groundwater analysis was completed during this work.

3.2 Sawmill Operations

The Weyerhaeuser Company's Mill No. 1 at the Snoqualmie Falls Branch was built in 1916 as part of the original Snoqualmie Falls Lumber Company complex, and the sawmill is approximately three acres in plan view. The sawmill was designed and constructed to manufacture lumber from large-sized cedar and fir logs. The sawmill served this purpose until changes in available resources forced its closure in early 1989 and was demolished in the summer of 1989.

During November 1989, four areas were identified within the mill operations that utilized lubricant and hydraulic grade oil(s). These areas were assessed by HDR and OEI, as summarized in HDR's report entitled, "Petroleum Hydrocarbon Assessment, Subsurface Soil and Groundwater Investigation," dated April 1990. Results of the assessment indicated that two areas contained petroleum residue in soil in excess of the 200 MTCA Method A Cleanup Level: 1) the Sash Gang, located in the northern part of the saw mill, and 2) the Log Haul, situated in the southern portion of the saw mill north of the log pond and east of the powerhouse.

Source removal efforts were conducted in early January 1990. Approximately 300 cubic yards of petroleum-impacted soil were removed from the Sash Gang area, and approximately 700 cubic yards were excavated from the Log Haul area under the direction of OEI. Excavated material was transported to and disposed of at the Cedar Hills Regional Landfill. The upper three to five feet of the mill site contained a heterogeneous mixture of soil and demolition debris.

Further excavation efforts were hampered by the uncertainty of the actual volume of petroleum residue at each location. Specific details suggest that the dispersion of oil(s) at each location is controlled by macropores, remains of plant root systems that provide a tubular channel after decay of the randomly oriented rhizomes. Additional factors of dispersion include mixture of the upper soil at the site with construction equipment during

demolition and activities associated with the burial of demolition debris.

In response to these conditions, soil excavation activities were halted and a preliminary subsurface soil and groundwater quality investigation was initiated by HDR during late January and early February 1990, consisting of 16 soil borings and subsequent analyses. The results of the analyses suggested that approximately 25,000 cubic yards of soil were impacted above the 200 ppm MTCA Method A Cleanup Level. Groundwater quality was assessed by installing and sampling three permanent groundwater monitoring wells. The analytical results reported for groundwater indicated concentrations less than the reporting limit of 5 ppm.

In July 1990, in order to refine the estimates of impacted soil at the site and to further assess groundwater conditions, HDR implemented their "Remediation Plan," dated May 1990. An additional area was added to the scope-of-work, which was identified at the Southwest Powerhouse Corner. This area had housed an electrical transformer identified as T-7, and soil in this area was documented to contain petroleum residue in excess of 200 ppm; PCBs were not detected above 1.9 ppm.

The July 1990 subsurface investigation of the Sawmill and Powerhouse area included 20 individual soil borings, collection and analysis of 128 soil samples, and analysis of groundwater from four additional permanent monitoring well installations. Results of the soil assessment indicated that approximately 3,600 to 4,100 cubic yards of soil remain impacted above the 200 ppm MTCA Method A Cleanup Level. These individual area volumes ranged between 2,121 cubic yards (2,700 tons) to 1691 cubic yards (2,100 tons) in the Sash Gang subarea, between 1,815 cubic yards (2,300 tons) to 1,675 cubic yards (2,100 tons) in the Log Haul subarea, and approximately 200 cubic yards (260 tons) of impacted soil within the T-7 general area. Groundwater in five of the seven monitoring wells at this location exceed the current 1.0 ppm MTCA Method A Cleanup Level.

The existing conditions, both in soil and groundwater quality, exceed both industrial and nonindustrial MTCA Method A Cleanup Levels. To achieve compliance with current Method A Cleanup Levels for Soil and Groundwater, a remedial effort would need to be devised and implemented that would consider a treatment process responsive to cost, soil conditions, and the type of petroleum residue present. The effort would also need to consider a groundwater treatment process capable of phase-separated oil recovery and remediation of the dissolved fraction of oil in groundwater. The degree to which these remedial approaches are implemented is a function of Weyerhaeuser's future development

needs, cost, and regulatory acceptance of any program that would increase the MTCA Method A Cleanup Levels.

3.3 Former UST Fueling Cluster and Aboveground Road Oil Storage Facility

Weyerhaeuser Company (WEYCO) issued a Request for Proposal on September 21, 1989, for assistance with permanent closure of the Snoqualmie Mill UST Facility, identified as Area No. 1, located on the north side of the Maintenance Shop. HDR and OEI were selected for initial remedial efforts identified by Weyerhaeuser personnel during UST removal operations in January 1989 (excavation and storage of 300 cubic yards of petroleum-impacted soil by WEYCO) and subsequent sampling activities by WEYCO in August 1989. Remedial actions implemented by HDR and OEI during November 1989 included test pit excavations within the former UST cluster area, preliminary field screening of soil and groundwater, and excavation of an additional 700 cubic yards of petroleum-impacted soil. All impacted soils were temporarily stored at the proposed Land Treatment Unit (LTU) located at an upland location in the Snoqualmie Tree Farm. The LTU site is located as follows: Southwest 1/4 of Southwest 1/4 of Section 11, Township 24 North, Range 8 East W.M. (24/08 -11N) and is commonly referred to as Pit 3600, which is an active borrow source for WEYCO operations. Soils were documented to contain a range of hydrocarbons consisting of leaded gasoline, diesel fuel, and lubrication-grade oil(s). Although WEYCO determined that soil within the former UST cluster was impacted above the current regulatory levels, excavation was not considered, due to groundwater infiltration and the unknown extent and volume of these materials, which would impact an appropriate remediation scenario.

An adjacent aboveground road oil storage tank, identified as Area No. 2, was also added to the scope of services. Soil sampling, analysis, and excavation were also performed at this location, with an estimated 600 cubic yards of material excavated and stored at the LTU site for further analysis and bioremediation. Physical constraints prohibited complete excavation of these materials at this location. Road oil, a complex mixture of used oil products, was analyzed for a variety of compounds and determined to be nonhazardous under the 1989 regulatory guidelines.

Upon completion of a biological treatability study, an LTU was constructed for degradation of these soils in June 1990. The design, construction and operation of the LTU has been in conformance with applicable Ecology guidelines, which were available during this time. A siting study was completed prior to design, and numerous conversations with Ecology

personnel were conducted and documented in order to obtain guidance on the requirements of the LTU. Design and construction is well-documented. The LTU meets minimum functional standards of current Ecology guidelines as presented in Ecology's publication entitled, "Guidance for Remediation of Releases from USTs," dated July 1991.

The operation of the LTU facility occurred from June 1990 to 1993, with final disposition of these soils to within current regulatory guidelines as a Class 3 soil and stockpiled at the LTU site for eventual reuse as road fill material.

To address current federal and state regulatory release reporting requirements, WEYCO initiated a subsurface soil and groundwater investigation at Area Nos. 1 and 2 in March 1990. Thirteen soil borings were advanced and sampled in Area Nos. 1 and 10 in Area No. 2. Four permanent groundwater monitoring wells were constructed at both areas in the upper reaches of the first aquifer at this location; the stratigraphy was consistent with observations recorded at the T-12 and Sawmill locations.

HDR determined that petroleum-impacted soil above regulatory limits, which remained within the Area No. 1 excavation after UST removal and backfilling activities, was sparsely distributed and decreased in concentration with depth. This distribution was consistent with encountered soil type, groundwater elevation, and gradient, which have largely restrained the distribution of petroleum in Area No. 1. Groundwater movement was determined to be in a southeasterly direction toward the Log Pond with a 1.5 percent gradient. A single downgradient well, located close to the former gasoline USTs, contained indicator compounds, consisting of benzene, toluene, ethylbenzene and xylene (BTEX) in excess of current standards.

Area No. 2 subsurface soil and groundwater conditions were also assessed during this phase of work in March 1990. Soil impacted above the regulatory standard of 200 ppm was found to be segregated to the southern portion of the site near the new aboveground oil storage facility. Subsurface soil and groundwater conditions were similar to those encountered in Area No. 1. At that time, no regulated substances were found to be above current regulatory standards.

At WEYCO's request, three additional groundwater monitoring wells were installed in a downgradient position from Area No. 1 to assess the extent of impacted groundwater discussed above. Concentrations of BTEX were found to be below current regulatory standards within these additional wells.

Four groundwater monitoring events were conducted at Area Nos. 1 and 2 from July 1991 to April 1993 by Shannon & Wilson, Inc. (S&W). A summary of these events is contained in total in S&W's Technical Memorandum 14 entitled, "Groundwater Quality Data, Fourth Biannual Sampling Event," dated June 1993. A summary of conditions over this two-year period indicates that BTEX concentrations are only exceeded in one well, identified as MW3, at Area No. 1. This condition would be expected at this location due to its proximity to documented release of the gasoline USTs. Concentration of benzene, an indicator compound, is on the order of 160 ppb to 1,300 ppb, which is in excess of the current 5 ppb MTCA Method A Cleanup Level.

Higher boiling point hydrocarbons, referred to as Total Extractable Petroleum Hydrocarbon (TEPH), which include lubrication and hydraulic grade oil(s), is exceeded in the three wells situated in the southern portion of Area No. 1. Concentrations range from 1.1 to 4.3 ppm, which is above the current 1 ppm MTCA Method A Cleanup Level. A portion of this area is utilized for temporary storage of the Vehicle Maintenance Shop's scrap steel. Soil samples from this scrap steel storage location, which were collected and analyzed as part of the installation of these wells, contain concentrations of TEPH in excess of the 200 ppm MTCA Method A Cleanup Level.

Area No. 2 wells were found not to contain BTEX during the two-year sampling period. TEPH was detected in MW3 within this area during the most recent sampling event at a concentration of 1.1 ppm.

Concentrations of lead were found to be elevated in a majority of the wells sampled, and is attributed to background conditions that are not related to the operations in the areas being assessed.

In order to achieve current MTCA Groundwater Cleanup Levels for the petroleum constituents detected, a single remedial scheme, consisting of three independent systems working in tandem, can be applied for groundwater and soil treatment at Area Nos. 1 and 2. Soil Vapor Extraction (SVE) and Air Sparging (AS) are independent remedial technologies that provide the capability to remove BTEX compounds from unsaturated soil and groundwater by vapor extraction and defusing processes. SVE is applicable to unsaturated soil containing volatile BTEX compounds. SVE is commonly used to enhance the efficiency of an AS system, which promotes volatilization of BTEX compounds from impacted groundwater by injection of air below the groundwater table. This configuration promotes separation of BTEX from groundwater into the vapor phase for collection by the SVE

system. To promote degradation of nonvolatile components of diesel fuel and lubrication oil(s), the site has been demonstrated to exhibit a healthy and thriving population of indigenous microorganisms capable of complete hydrocarbon digestion. To encourage biological degradation of these compounds, bioventing techniques, which supply oxygen to the subsurface environment via SVE and AS operations, can be implemented to reach current MTCA Method A Cleanup Levels given the favorable subsurface conditions at this location.

3.4 Powerhouse and Hog Fuel Operations

Environmental issues at the Powerhouse include the ongoing removal of asbestos-containing material, investigation of petroleum residue at the T-7 location, and hog fuel (boiler fuel) ash disposal. The mill is currently involved in an ongoing asbestos abatement program that includes the Powerhouse. The T-7 location was assessed by HDR during their remedial investigation of the Sawmill, and the area was documented to contain residual hydrocarbons in excess of the 200 ppm MTCA Method A Cleanup Level. HDR estimated an approximate volume on the order of 200 cubic yards (260 tons) of impacted soil within the T-7 general area. An aboveground fuel storage tank is located on-site in a concrete secondary containment system and has had no reported release incidents.

During the operation of the Powerhouse, which provides steam to the kilns for lumber curing and process steam for the Silva Cell, hog fuel ash was disposed of in a landfill located north of the site and to the east of the Snoqualmie Sand and Gravel operation. The site was reported by WEYCO to Ecology during late 1990 to early 1991 as an industrial waste disposal area. Subsequent analysis of the ash indicated that the residue would not be classified as a hazardous material under current regulations. Current actions being implemented by WEYCO for this residue include screening of all hog fuel supply for undesirable wood waste byproducts removal, temporary storage on-site at the Powerhouse of all ash, and reuse of the stockpiled material at the landfill for recycling as an inert soil amendment. A final report is being prepared by the Mill's Environmental Coordinator for submittal to Ecology on these actions.

3.5 Silva Cell Operations

The Silva Cell operation produces two products derived from raw lumber at this location. The products include mulch for hydroseeding operations and fruit juice filtration substrate.

Silva Cell operations at the facility include the use of chemical compounds, which include a caustic mixture of glacial acetic acid and dye (pH of 2 to 3.5). This is not considered to be a Resource Conservation and Recovery Act (RCRA) issue.

Glacial acetic acid is managed by Best Management Practices (BMPs), which include interior storage within a concrete secondary containment with bermed perimeters, individual containerization of the material at approximate volumes of 300- to 400-gallon capacities, and an in-place system for spill containment, abatement, and reporting.

Diesel fuel is stored in an aboveground, double-wall tank constructed of steel, located on the northeast corner of the building's exterior. The fuel facility was noted to be maintained to acceptable industrial standards.

Small incidents occurring at this facility have been managed accordingly.

3.6 Log Sort Yard Operations

The Log Sort Yard, located to the north and west of the former Plywood Mill, has been used for the storage of logs prior to assimilation into the lumber manufacturing process. This area has been recently renovated by contouring the land surface to promote surface drainage and has been cultivated with indigenous species of trees and grasses for erosion control. Residual log debris has been relocated to the perimeter of the yard and is now used as berm material.

There have been no reported environmental issues at this location.

3.7 Kiln/Lumber Finishing/Shipping Operations

On-site lumber finishing operations at the Snoqualmie Mill include kiln drying of cut lumber product as well as planning and shipping operations.

There have been no reported environmental issues at these locations.

3.8 Log Pond

A Log Pond, located in the southern portion of the mill site, has undergone restoration activities in past years. Activities have included debris and log removal projects and control of the quality of stormwater runoff that enters into the pond through an extensive mill-wide ditch drainage system.

Recent bioassay testing of Log Pond water indicates a 100 percent survivability rate. This is in support of the observed thriving fish population in the Log Pond. No sediment sampling has been conducted to date and is recommended to ensure compliance with MTCA Sediment Quality Standards.

3.9 Snoqualmie Mill Site Roadway Surfaces

Roadway surfaces within the mill have historically been maintained with the application of road oil(s). The quality of the chemical components within the road oil(s), which were used in this application, their potential impact to the environment, and their regulatory status are unknown.

3.10 Hazardous Material Storage

Small quantities of hazardous materials utilized in the day-to-day operation of the mill are currently handled with BMPs within the Utility Storage Bay.

There have been no reported environmental issues at this location.

3.11 Herbicide Storage

The mill operations consume small quantities of commercial obtainable herbicides and store these utilizing BMPs in a small, prefabricated building located on the northern portion of the mill site.

There have been no reported environmental issues at this location.

3.12 Bulk Oil Storage Facilities

There are several bulk oil storage and fuel-dispensing operations located within the mill. Each of the operations was observed to practice BMPs applicable to the fluids stored. Distressed surficial vegetation was not observed in these areas and only small, surficial oil-stained areas were observed.

A reportable spill of chain saw fuel, a mixture consisting of oil and gasoline, occurred during the flooding event in late 1990. No apparent environmental impacts were observed by mill personnel from this incident.

3.13 Asbestos Abatement Program

The mill has been involved in a proactive asbestos abatement program for an extended period of time. Presently, potential asbestos-containing material has been identified in the roofing material at the Planner Building.

3.14 PCB Transformer Abatement Program

The mill has been involved in a proactive transformer abatement program for several years and has conducted this program with diligence. The outcome of this program has lead to a PCB "free" transformer inventory at the mill.

3.15 Rail Spur Abandonment

A rail spur, located on the east side of the mill, has been abandoned and removed. During removal activities, no noticeable impacted soil was observed. Confirmation soil testing should only be conducted if regulated materials were transported over this spur.

3.16 Mill-wide Ditch Drainage System

The mill site, which is relatively flat, is drained of surface water generated during rainfall events by a system of earthen drainage ditches. This ditch system is graded toward the Log Pond and exhibits a healthy fauna of indigenous plant and small trees. Sediment quality issues may need to been addressed for these areas.

4.0 ANALYSIS OF ENVIRONMENTAL ISSUES

4.1 Mill-wide Overview

Environmental issues identified at this mill site location have been managed in accordance with applicable regulatory guidelines in an "industrial" setting. Appropriate focused remedial actions have been implemented to identify and quantify potentially hazardous compounds in soil and groundwater in order to limit their potential impact to the surrounding environment.

At the present time, each of the known impacted locations at the mill site are in a mode of long-term monitoring with varying degrees of engineering controls in place, which offer site stabilization. Regulatory community involvement and reporting has been implemented to comply with release reporting requirements, as specified in each situation.

Present operations at the mill site utilize up-to-date BMPs for the handling and use of regulated chemicals, mixtures, herbicides, and petroleum products. Underground storage facilities have been abandoned and replaced with acceptable industrial technology, which includes covered facilities, aboveground storage units, secondary containment in the form of double-wall tanks and bermed concrete floors, spill prevention and countermeasure plans, spill abatement equipment, and the discontinued use of adverse chemical products with substitution of biologically degradable commodities.

4.2 Specific Area Issues

A discussion is provided for the major environmental issues identified at this location, as documented in material available to Shannon & Wilson and through our on-site interview with the mill's Environmental Coordinator.

4.2.1 Former Plywood Mill T-12 Site

The T-12 site has undergone several corrective action projects, which include two source removal efforts; investigations for groundwater quality and hydrogeological properties; construction of an engineering control designed to limit stormwater infiltration; and implementation of a monitoring program to establish baseline conditions of PCBs and accessory chlorinated hydrocarbon concentrations in groundwater at this location. Results from other consultants' work suggest that the quantity of PCB that remains at depth within the T-12 location is on the order of 71 pounds (approximately 17.3 gallons) and is contained within a clay horizon, which acts as a semi-impermeable boundary above the confined aquifer at the mill site.

Existing concentrations of PCB in soil, which remain at depth within the former excavation, is limited in areal extent and is present at concentrations that exceed both the current MTCA Method A Cleanup Level (for) Industrial Soil of 10 ppm and the Method A Cleanup Level (for) Residential Soil of 1 ppm. Previous work at the T-12 site has also determined that a limited areal extent of surface soil contain PCB at concentrations in excess of 1 ppm.

Groundwater was determined not to contain PCB in excess of the MTCA Method A Cleanup Level (for) Groundwater of 1 ppb at the locations sampled. However, selected chlorinated hydrocarbons were detected in groundwater samples, but the validity of the data is questionable because the chlorinated compounds were also detected in the field blank; the failure of the field blank's integrity provides a basis for questioning the validity of the

chlorinated hydrocarbon analysis.

Groundwater directly beneath the T-12 site was not analyzed during previous events. A monitoring well is constructed and operable at this location beneath T-12 and should be analyzed in order to develop a complete opinion of the actual conditions in groundwater at the T-12 location.

4.2.2 Former Saw Mill Site

The former Saw Mill site is documented to contain between 4,511 to 5,232 tons (3,566 to 4,136 cubic yards, respectively) of petroleum-impacted soil. Impacted soil was noted to be contained within two distinct portions of the mill site. The type of petroleum residue present in site soil contained high boiling point (HBP) petroleum constituents in the lubrication and hydraulic oil ranges. Impacted soil in the general area of T-7, located at the southwest Powerhouse corner, contained medium boiling point (MBP) petroleum constituents, which were determined to be in the diesel fuel range.

Selected soil samples from the three subareas in the Saw Mill site were submitted for TCLP and Ecology Dangerous Waste Criteria analysis, as described in HDR's report of October 5, 1990, Table 4, 5, and 6. Six highly saturated samples, two from each sub-area, were submitted for analysis. They did not contain TCLP-listed compounds in excess of current 1990 levels; each sample was determined to be an Ecology nondesignated waste.

If the provided analysis were subject to current levels and standards, there would be no net change in the designation of these materials.

Groundwater samples obtained from perimeter wells was noted to contain HBP constituents, from a low of less than 1 ppm to a high of 10 ppm, in excess of the current MTCA Method A Cleanup Level for Groundwater of 1.0 ppm (1,000 ppb). Semivolatile compounds were also detected in groundwater at this location, and no further work has been conducted to explain this occurrence.

During excavation activities of January 1990 and also during investigative activities of July 1990, phase-separated product, existing as free oil, was observed in soil samples and floating on groundwater that had accumulated during excavation activities at the Sash Gang subarea.

4.2.3 Former UST Fueling Cluster and Aboveground Road Oil Tank Areas

The former UST cluster and aboveground road oil tank locations, designated Area Nos. 1 and 2, respectively, have been documented to contain petroleum residue in soil and groundwater at levels exceeding the current MTCA Method A Cleanup Levels:

Constituent	Method A -Soil, Industrial	Method A - Soil, Non-Industrial	Method A - Groundwater
Benzene	500 ppb	500 ppb	5.0 ppb
Toluene	40,000 ppb	40,000 ppb	40 ppb
Ethylbenzene	20,000 ppb	20,000 ppb	30 ppb
Xylenes	20,000 ppb	20,000 ppb	20 ppb
Total Petroleum Hydrocarbon - Gasoline	100 ppm	100 ppm	1000 ppb
Total Petroleum Hydrocarbon - Diesel	200 ppm	200 ppm	1000 ppb
Total Petroleum Hydrocarbon - Other	200 ppm	200 ppm	1000 ppb

Groundwater in Area No. 1 at a single downgradient location (identified as A1-3), which is close to the former gasoline USTs, consistently contains BTEX at levels exceeding current Method A Cleanup Level regulatory standards. Total Petroleum Hydrocarbons are exceeded in four wells in Area No. 1, which include A1-3 and A1-5 and -6, which are situated downgradient of A1-3 and close to the Vehicle Maintenance Shop and scrap steel area. Area No. 2 contains a single well (identified as A2-3), which contains TEPH at a concentration of 1.1 ppm in excess of current Method A Cleanup Levels.

4.3 Conceptual Remedial Alternatives and Cost Analysis

Conceptual remedial alternatives and a cost analysis for each listed technology are provided in Table 1 entitled, "Conceptual Cost Analysis, Snoqualmie Mill."

4.3.1 Polychlorinated Biphenyls (PCB)

Proven technologies for solidification/fixation with subsequent excavation and disposal of PCB in soil are available to meet Ecology's Method A Cleanup Level of 10 ppm for industrial locations or 1 ppm for nonindustrial locations. PCB, which remains at the T-12 location, can be removed and disposed of if circumstances require. Concerns for mobilization of PCB during the excavation process can be addressed with sheet piling as a temporary containment system.

Surficial soil at the T-12 site that contain PCB in excess of 1 ppm can also be removed. PCB soil, with no free liquids of any kind, can be accepted at Chemical Waste Management's Arlington, Oregon facility.

4.3.2 Petroleum-Impacted Soil

Petroleum-impacted soil at the former Saw Mill subareas and Area Nos. 1 and 2 can be addressed by three alternatives, which will meet regulatory standards and include:

- **Thermal Desorption.** Thermal desorption of these non-fuel oil(s) can be achieved on- or off-site. The advantage of the on-site process is that remediated soil can be returned to the excavation and trucking costs for delivery to an off-site fixed unit would be eliminated; however, the duration of the project would be extended due to the lower daily capacity of the on-site unit. Additional costs would include permitting and mobilization.

- **Bioremediation.** Bioremediation of these materials in an aboveground Land Treatment Unit (LTU) can be accomplished. However, due to the resilience of the oil(s) involved and soil type, the operation would have to be contemplated over an extended period of time to be cost-effective, which may be on the order of five to ten years. This process could be accomplished on a larger scale but in a similar fashion to the LTU constructed within the Snoqualmie Tree Farm for the remediation of soil from Area Nos. 1 and 2. Additional costs would include permitting, fill material, transportation costs of soil to the LTU, LTU capital costs, and operation and maintenance expenditures.

- **Landfill.** Off-site disposal at a landfill is an alternative. Additional costs would include fill material and transportation costs of soil to the landfill.

4.3.3 Petroleum-Impacted Groundwater

Groundwater at Area No. 1 can be remediated to below current MTCA Method A Cleanup Levels with air sparging and vapor extraction technology combined with the biological availability present at these locations. Groundwater remediation at the former Saw Mill location is ill-defined for remedial assessment, but is known to contain phase-separated product and semivolatile compounds in unknown quantities, which will substantially complicate the remedial approach for this media.

This combined air sparging/vapor extraction technology is well-suited for subsurface and compound-specific conditions at these locations. The technology is designed for volatile compound removal and the capability to promote in situ biological degradation of the medium to high boiling point compounds. Given the restricted extent of impacted groundwater at Area Nos. 1 and 2, a realistic time frame for remediation would be on the order of one to three years with continued source removal of impacted soil.

5.0 CLOSURE

The findings we have presented within this Level 1 Environmental Analysis are based on information provided to Shannon & Wilson by Weyerhaeuser and on limited research at the facility. They should not be construed as a definite statement regarding reported conditions. Shannon and Wilson, Inc. performed this analysis within our best judgement to adequately describe the known and anticipated conditions at the facility.

The data presented in this Level 1 Environmental Analysis should be considered representative at the time of our observations. Changes in the conditions of the property can occur with time from both natural processes and human activities. In addition, changes in governmental codes, regulations, or law may occur. Due to such changes, our observations at this facility may need to be revised wholly or in part, due to changes beyond our control.

This technical memorandum was prepared for the use of Weyerhaeuser and its representatives in the assessment of their Snoqualmie Mill in Snoqualmie, Washington, and in no way guarantees that an agency or its staff will reach the same conclusions as Shannon and Wilson, Inc.

If you have any questions or comments regarding this material, please contact me at (206) 632-8020.

SHANNON & WILSON, INC.

Robert Colombo
Associate

6.0 REFERENCES

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T1509-01.RPT/T1509-lkd/jnd

Table 1 - Conceptual Cost Analysis, Snoqualmie Mill

Shannon & Wilson, Inc. T-1509-1
Date: 12/13/93

TO BE USED IN CONJUNCTION WITH SUPPLIED TEXT OF ASSUMPTIONS; BASED ON CURRENT LITERATURE RESEARCH AND QUANTITIES AS ESTIMATED BY OTHERS

(a) No professional engineering or analytical testing fees.

Petroleum Impacted Soil

Landfill Disposal Option	Item	Unit Costs	Unit Type		Tonnage Range 4511		5232
	Disposal Fee FOB Seattle	$44	per ton		$198,484		$230,208
	Shipping	$6	per ton		$27,066		$31,392
	Excavation	$5	per ton		$22,555		$26,160
	Backfill - material only	$4	per ton		$18,044		$20,928
				Sub-Total (a)	$266,149	to	$308,688

Off-site Thermal Desorption Disposal Option					Tonnage Range 4511		5232
	Disposal Fee FOB Seattle	$45	per ton		$202,995		$235,440
	Shipping	$6	per ton		$27,066		$31,392
	Excavation	$5	per ton		$22,555		$26,160
	Screening	$3	per ton		$13,533		$15,696
	Backfill - material only	$4	per ton		$18,044		$20,928
				Sub-Total (a)	$284,193	to	$329,616

On-site Thermal Desorption Disposal Option					Tonnage Range 4511		5232
	Process Fee	$45	per ton		$202,995		$235,440
	Excavation	$5	per ton		$22,555		$26,160
	Screening	$3	per ton		$13,533		$15,696
	Backfill - material only	$4	per ton		$18,044		$20,928
				Sub-Total (a)	$257,127	to	$298,224

LTU Bioremediation					Tonnage Range 4511		5232
	LTU Construction	$16	per ton		$72,176		$83,712
	Excavation	$5	per ton		$22,555		$26,160
	Shipping	$3	per ton		$13,533		$15,696
	Backfill - material only	$4	per ton		$18,044		$20,928
	Treatment	$12	per ton		$54,132		$62,784
	Capital Equipment Costs				$100,000		$100,000
				Sub-Total (a)	$288,440	to	$309,280

PCB Impacted Media

					Tonnage Range 300		500
	Sheet Piling Containment	$30	per sq. ft	5000	$150,000		$150,000
	In-situ Stabilization	$225	per ton		$67,500		$112,500
	Disposal at Landfill	$300	per ton		$90,000		$150,000
	Transportation	$62	per ton		$18,600		$31,000
				Sub-Total (a)	$326,100	to	$443,500

Petroleum Impacted Groundwater Area No. 1 and No. 2

	System Engineering				$12,000		$18,000
	Capital Costs				$40,000		$55,000
	O&M Costs - 3 years				$30,000		$45,000
				Sub-Total	$82,000	to	$118,000

APPENDIX

IMPORTANT INFORMATION ABOUT YOUR SUBSURFACE WASTE MANAGEMENT (REMEDIATION) REPORT