DRAFT
Remedial Investigation Report
for
Former Mill E/Koppers Facility
Everett, Washington

Volume 2 (Appendices A - F)

Prepared for

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APPENDIX A

SITE INVESTIGATION

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A.1 Introduction

The site remedial investigation began on July 15, 1992, and was completed in August 1993. Groundwater monitoring was conducted on a quarterly basis through August 1993, and is now being conducted on a semiannual basis (February/August). A supplemental remedial investigation (SRI) was completed in August 1993 to provide additional information to estimate the volume of contaminated soil. The investigation followed the procedures described in the Work Plan and its appended Sampling and Analysis Plan, henceforth referred to as the "SAP." Some modifications were required to collect additional or alternative information at certain locations. Where the modifications were significant, the conditions and rationale for these modifications were addressed in Sampling Alteration Checklists. The checklists are presented in Attachment 1. A summary of the field activities follows with a discussion of modifications to the SAP.

A.2 Existing Well Assessment and Development

Existing Well Assessment. Existing groundwater monitoring wells, i.e., those installed prior to this remedial investigation, were assessed on July 14 and 15, 1992 following the procedures described in the SAP. The records of the assessment are on file with EMCON Northwest, Inc.

Existing Well Development. The existing wells were developed from August 10 to 13, 1992, following the procedures described in the SAP. The well development records are on file with EMCON Northwest, Inc.

A.3 Surface and Subsurface Soil Investigation

Surface and subsurface soil samples were collected during shallow trench and pit excavation and drilling activities. Sample locations are presented on Drawing No. 1 (in pocket). Samples were collected for chemical analysis and physical testing. A matrix of sample location, name, and analyses is presented in Table A-1. Sampling methodology, labeling and handling, and equipment decontamination followed those procedures described in the SAP, except in the case of modifications listed in the Sample Alteration Checklists.

A.3.1 Surface Soil Sampling

Surface soil samples were collected at seven locations in the upper 3 inches of soil. The samples were collected for chemical analysis only. One of the seven samples (SS-1) was collected in a shallow trench adjacent to underground piping next to the former wood treatment building. The remainder were collected at various locations across the site. The sampling locations are shown on Drawing No. 1.

Four additional surface soil samples were collected at four locations in the upper 1 inch of soil. The samples were collected for analysis of particle size distribution and metals.

A.3.2 Subsurface Soil Sampling

Hand Augering. Two borings were advanced to a depth of 3.5 feet using a clean, stainless steel, 3-inch-diameter hand auger. Two soil samples were collected from each boring for total arsenic analysis. The hand auger locations (HA-1 and HA-2) are presented on Drawing No. 1.

Shallow Trenching. Shallow, 2-foot-wide trenches were dug along existing underground piping east of the former wood treatment building. Figure A-1 presents the locations and the type and size of piping encountered. Two soil samples were collected for chemical analysis (TR-1-1 and TR-1-2). The piping depths ranged from 2 to 4 feet. The total length of trenching was 250 feet. The trenches were backfilled with excavated material following soil description and sampling.

Five additional shallow trenches (labeled TR-2 through TR-4B) were dug to the south of the building to investigate shallow soils below former railroad spur lines. The trenches were dug to the water table (about 5 feet) and ranged in length from 5 to 10 feet. Soil samples from all trenches were collected for chemical analysis. The trenches were backfilled with excavated material following soil description and sampling. The trench locations are presented on Drawing No. 1.

Test Pits. Thirteen shallow test pits were dug near the former wood treatment building and along former rail lines. Four test pits were dug on Weyerhaeuser property to the west of the site. Soil samples from the pits were collected for chemical analysis. The test pits were dug to the water table (about 1 to 5 feet bgs) and ranged in length from 4 to 8 feet. The test pits were backfilled with excavated material following soil description and sampling. The test pit locations are presented on Drawing No. 1. Test pit logs are presented in Attachment 2.

Hollow Stem Auger Drilling. Forty borings were completed with a Mobile B-61 hollow stem auger rig owned and operated by Tacoma Pump and Drilling, Graham, Washington. The rig used 4-inch and 6-inch I.D. auger flights. Soil samples were collected continuously (except for SRI-related borings) with 3-inch split barrel samplers. Soil samples were collected for chemical and physical analysis, and soil description. Two Shelby tube samples were collected for vertical hydraulic conductivity testing by Hong West Inc., of Edmonds, Washington. All drilling activities were observed, and all soil sampling and logging were completed by EMCON personnel. Boring logs are presented in Attachment 4. The boring locations are presented in Drawing No. 1. The soil borings were completed as either monitoring wells or piezometers (labeled with the prefix "MW-" or "P-," respectively) or abandoned by backfilling with hydrated bentonite chips (labeled with the prefix "SB-"). Soil boring details are presented in Table A-2.

Cable Tool Drilling. Seven deep borings were completed with a Fairbanks cable tool drilling rig owned and operated by Ramlo Drilling of Graham, Washington. The borings were advanced initially with 10-inch steel casing to an average depth of 10 feet and completed with 6-inch steel casing to depths ranging from 13 to 99 feet bgs. The casing reduction method was used to minimize downward migration of contaminants and groundwater during drilling activities. Soil samples were collected with 3-inch split barrel samplers at intervals described in the SAP. Soil samples were collected for physical analysis and soil description. All drilling activities were observed, and all soil sampling and logging was completed by EMCON personnel. Boring logs are presented in Attachment 4. The boring locations are presented in Drawing No. 1. The borings were completed as monitoring wells (labeled with the prefix "MW-"). One additional shallow boring was completed as a shallow pumping (test) well (TW-1). Soil boring details are presented in Table A-2. Summaries and evaluation of the geologic and hydrogeologic conditions of the site are presented in Section 2.

Soil Sampling Procedures. Soil sampling procedures followed those described in the SAP. Analytical results for chemical and physical characteristics are discussed in Section 3.

Modification from the SAP. The rationale for boring location and soil sample collection/analysis as described in the Work Plan did not change during the investigation. Site conditions were similar to those reported in previous investigations (Hart Crowser 1989a, 1989b, 1990). However, some modifications to boring locations, sample depths, sample number, and sample analysis were made to accommodate specific site conditions. These modifications are presented in Sample Alteration Checklists in Attachment 1. Additional modifications are discussed in Section 3.

A.3.3 Additional Sampling for Dioxins/Furans

Ten shallow soil samples were collected after the analytical results of shallow subsurface soil samples were received. The samples were collected to further define the extent of dioxin/furan concentrations in the unsaturated upper sand unit. The sample locations were based on analytical results of dioxin/furan and pentachlorophenol in soil. The samples were collected along the perimeter of the apparent extent of pentachlorophenol contamination (Figure A-2). All samples were collected approximately 6 to 12 inches above the water table. The samples were labeled "D-#-1192," according to sample location.

Three samples were collected at D-1, D-3, and D-4 on November 16, 1992, by hand augering to the water table. The remaining samples were collected on November 30, 1992, with the use of a backhoe. Shallow test pits were dug to the water table. The pit face was scraped with a clean stainless steel spoon to remove 3 to 6 inches of soil. Another clean spoon was used to collect and place soil into sample containers. One duplicate soil sample was collected and was prepared by mixing the soil in a clean stainless steel bowl and placing equal portions into blind-labeled sample containers. A rinsate sample was taken by pouring distilled water over decontaminated spoons and the bowl, and then collecting the water in a sample container.

Samples were handled according to procedures described in the SAP.

A.3.4 Supplemental Remedial Investigation

A supplemental remedial investigation (SRI) was performed in August 1993 (EMCON, 1993). Five additional hollow stem auger and two hand auger borings were drilled, and fifteen test pits were excavated, for collection of 39 soil samples. The samples were analyzed for arsenic, PAHs, TPH, and pentachlorophenol. The results were used in the feasibility study to better estimate volumes of contaminated soil at the periphery of impacted areas and at the base of the upper sand unit.

A.4 Groundwater

A.4.1 Well Installation

All 15 monitoring wells installed during this investigation were constructed as described in the SAP. The well locations are presented on Drawing No. 1 and labeled with the prefix "MW-." Six monitoring wells and two piezometers were installed using the hollow stem auger drilling rig; they were completed with 5 to 10 feet of 2-inch-diameter 0.020-inch machine-slotted PVC screen. The wells were installed at maximum depths ranging from 7 to 13 feet bgs. Six monitoring wells were installed with the cable tool drilling rig using 10-foot-long, 2-inch-diameter, 0.020-inch, machine-slotted PVC

screens. The wells were installed at maximum depths ranging from 22 to 76 feet bgs. A single test well (TW-1) was installed with the cable tool rig and completed to a depth of 12 feet bgs using a 5-foot length of 6-inch-diameter stainless steel wire-wrap screen with 0.040-inch slots, a 9.5-foot length of steel riser, and an 8 by 12 Colorado Silica Sand filter pack. Well completion details of all new wells on site are presented in boring logs in Attachment 2 and summarized in Table A-3.

A.4.2 Water Elevation Measurements

Groundwater elevations were measured in existing wells on July 14, 1992, in all new and existing wells at monthly intervals from August through May 1993, and in quarterly intervals to February 1994. Water elevation measurements are discussed in Section 3 and data are presented in Attachment 3.

A.4.3 Hydraulic Conductivity Testing

All new wells (nine total) except P-1, P-2, TW-1, MW-31, and MW-33 were evaluated by in situ slug testing for hydraulic conductivity of the screened zone of the aquifer following procedures described in the SAP. Monitoring wells MW-31 and MW-33 were not evaluated due to insufficient water volume in the well. Results of the testing are presented in Attachment 4 and discussed in Section 3.

A.4.4 Tidal Study

The tidal study was completed between July 28 and November 9, 1992. Eleven monitoring wells (HC-9, MW-9D, HC-11, HC-11D, MW-11D2, HC-15, HC-15D, MW-23, HC-23D, MW-23D2, and MW-30D) and the Snohomish River were monitored during the study. Results of the study are presented in Attachment 5 and discussed in Section 2.

A.4.5 Aquifer Pumping Test

The aquifer pumping test was performed according to the procedures described in the SAP with a few minor modifications. The aquifer pumping test was completed from September 22 to 25, 1992. Test well TW-1 was pumped with a Standard 3-inch-diameter electric submersible pump at 9 gallons per minute (gpm) and a Grundfos 4-inch-diameter electric submersible pump at 15 to 35 gpm. A total of 9,600 gallons of groundwater was extracted from TW-1.

Electric pressure transducers were placed in wells TW-1, HC-15, HC-15D, HC-13, HC-16, piezometers P-1 and P-2, and in a temporary well point (TWP) located 14.5 feet upgradient (west) of the test well. TWP was constructed of a 3-foot length of stainless steel wire-wrap screen installed in the upper 3 feet of the saturated aquifer. The

transducers were connected to AquiStar electric dataloggers, and continuous recordings of water elevations were made before, during, and after all groundwater pumping and recovery tests.

The pumping test initially began with the 4-inch pump. The pump was lowered to within 1 foot of the bottom of the well, then tested to determine maximum (40 gpm) and minimum (15 gpm) sustainable constant discharge rates. The discharge rate was monitored with an in-line flowmeter and controlled with a gate valve. The well was initially pumped for 27 minutes at 35 gpm, until excessive drawdown (4.5 feet) was indicated. The well was allowed to recover and then was pumped for 37 minutes at 15 gpm, then increased to 25 gpm for 40 minutes. The well was allowed to recover overnight. The well was then pumped at 15 gpm for 35 minutes until excessive drawdown for a continuous test (2.5 feet) was indicated. The well was allowed to recover, and the 3-inch pump was installed. The well was then pumped at 9 gpm for 760 minutes, followed by a 12-hour recovery period.

Groundwater response to pumping rates was noted in all wells except HC-15, HC-15D, and HC-16. Hydrographs of all wells monitored during the test are presented in Attachment 6. Calculations of hydraulic conductivity and transmissivity of the upper sand aquifer are also presented in Attachment 6.

A.4.6 Groundwater Sampling

All new and existing monitoring wells (except HC-24, HC-25, and HC-26) were sampled between August 18 and 24, 1992, following procedures described in the SAP. All new and existing monitoring wells except HC-26 were sampled again between November 16 and 24, 1992. Sampling parameters were slightly modified for selected wells. After review of analytical results of the first two sampling events, the groundwater sampling and analysis plan was modified to reduce the number of wells and parameters for subsequent sample collection and analysis. Groundwater samples were collected from selected monitoring wells in February, May, and August 1993. A groundwater sampling matrix is presented on Table A-4. Modifications of the SAP are discussed in Section 3.

A.5 Surface Water

Surface water samples were collected from the Snohomish River and from seeps and piping systems discharging to the Snohomish River. Sample locations are presented on Figure A-3. Samples were analyzed for chemical and physical parameters. Sampling methodology, labeling and handling, and equipment decontamination followed procedures described in the SAP, except in the case of modifications described in the Sampling Alteration Checklists.

A.5.1 Snohomish River

Surface water samples were collected from seven locations in the Snohomish River. Samples were collected according to procedures presented in the SAP and were labeled with an "RW" prefix. Sample locations were not surveyed. Previously located and surveyed sediment sampling locations were used to fix surface water sampling locations. Two upgradient samples (upriver to the south), two downgradient samples, and three samples adjacent to the site were collected for the analysis of chemical parameters.

A.5.2 Seeps

Seven surface water seep samples were collected from locations in the Snohomish River adjacent to the site where water was observed discharging through seepage or from pipes penetrating the bulkhead. The samples were collected in conjunction with sediment samples. Labels were assigned an "SR" prefix to denote the sampling location and an "SW" suffix to denote a seep water sample. Two alterations were made to SAP sampling procedures. These included laboratory rather than field analysis of conductivity, due to concentrations exceeding field instrument calibration range, and collection of samples directly into sample containers rather than into a collection pan, due to beach slope and sediment characteristics. Seep samples were analyzed for chemical parameters and total suspended solids.

A.5.3 Storm Water and Storm Drain Sediments

Storm water runoff surveys were conducted on 3 days during three separate storm events. The first storm water survey was conducted on August 6, 1992, from 1400 to 1630 hours. During the 24-hour period ending at midnight, August 6, a trace of rain was recorded at the Everett Wastewater Treatment Plan (WWTP). Due to intermittent rainfall, no attempt was made to collect samples. The second storm water survey was conducted on November 16, 1992, from 0945 hours until sampling was completed at 1500 hours. During the 24-hour period ending at midnight, October 6, 0.58 inches of rain were recorded at the Everett WWTP. The final storm water runoff survey was conducted on January 19, 1993, from 1030 hours to 1230 hours. A total of 0.05 inches of rain was recorded at the Everett WWTP for the 24-hour period ending at midnight, January 19, 1993. Observations regarding storm water runoff are presented in Section 2.3.3.

Two storm water and two drainage system sediment samples were collected from point-source storm water runoff locations. During the sampling event, the elevation of the discharge pipes was below the elevation of the Snohomish River because of a high tide. The relative elevation of river water in comparison to storm drain piping prevented collection of a composite sample. The storm water and storm drain sediment samples were analyzed for chemical parameters.

A.6 Sediment

Surface sediment and subsurface sediment (core) samples were collected from the Snohomish River during two phases of sediment sampling. Sample locations are presented on Figure A-4. Samples were analyzed for chemical and physical parameters. Sample location, number, depth, and analyses were consistent with the SAP. Sampling methodology, labeling and handling, and equipment decontamination followed procedures described in the SAP except in the case of modifications listed in the Sampling Alteration Checklists.

A.6.1 Review of Existing Data

Prior to sampling, existing physical and chemical data for sediment and potential upgradient contaminant sources for the Snohomish River were reviewed to aid in determining sediment sampling locations. A summary of the data reviewed is presented in Section 2.8.

A.6.2 Phase I Sediment Sampling

Phase I sediment sampling, conducted in July 1992, focused on sediments deposited close to the west shore of the site that are exposed at low tide. Surface sediment samples were collected at 15 locations, including one background location. Sediment core samples were collected at depths ranging from the surface to 2.25 feet below the surface at ten locations. Sediment core samples were composited over 1-foot intervals to provide resolution of the vertical extent of contamination, while surface sediment samples were collected from the top 2 centimeters (0.06 ft) of sediment to provide information on recently deposited sediment. The background sediment sampling location was upstream, approximately 0.5 mile, and on the opposite (east) bank of the Snohomish River, approximately 200 yards downstream from Langus Park. All samples were submitted for chemical analysis. Select samples were also tested for grain size.

A.6.3 Phase II Sediment Sampling

In August 1992, surface sediment samples were collected from 16 locations, and sediment core (subsurface) samples were collected from 11 locations to evaluate sediments further out in the river channel. A background location was also sampled during Phase II sediment sampling. Two locations sampled during Phase I were also revisited, and surface sediment samples were collected for toxicity characteristic and sulfide analyses. All Phase II sediment samples were subjected to chemical analyses, and select samples were also analyzed for grain size.

A.7 Air Evaluation

Potential airborne contaminant concentrations were evaluated for select receptor locations on and off of the site, as described in the Work Plan. The results were used in the baseline risk assessment and were compared against Acceptable Source Impact Levels (ASIL), Permissible Exposure Limits (PEL), and Threshold Limit Values (TLV). The air evaluation analysis was performed relative to existing conditions at the site. The site has no dust emitting operations or air entrainment from truck traffic. The site was modeled as an area source. Potential air pathways were investigated for contaminants adhered to wind-generated fugitive dust particles and contaminants volatilizing from the soil and groundwater.

Potential air contaminant pathways include the suspension of metals and VOCs adhered to particles, and volatilization of VOCs from the unsaturated soil and the upper sand aquifer. Air contaminant concentrations were determined from analyses of soil and groundwater contaminant concentrations, soil particle distribution, VOC chemical characteristics, site parameters, and emission models. Calculated emission rates were input into an air dispersion model to establish ambient air concentrations at the receptor locations. Site emissions were assumed to be fugitive, resulting from area-wide sources, including wind-entrained particles and volatilized organic compounds. Source data included site-specific information on the nature and extent of soil and groundwater contamination.

A.7.1 Site Conditions

Mean contaminant concentrations in samples collected at the site were used in the air analysis (excluding August 1993 SRI results). Sampling data included that collected from surface soil, grade and mixed fill soil units, the upper sand unit, and the upper sand aquifer. Surface soil characteristics included particle size and density. Soil concentrations from the grade and mixed fill soil units were used to represent compounds adhered to potential soil particle (fugitive dust) emissions. VOC soil concentrations from the grade and mixed fill unit and upper sand unit were used to model VOC emissions from the unsaturated soil. Groundwater contaminant concentrations detected in the upper sand aquifer were used to calculate volatilization and transfer of these contaminants through the overlying soil layers to the ambient air.

Soil and groundwater constituents for the air evaluation were selected according to MTCA specifications for potential air impacts on and off site. The air particle analysis included arsenic, naphthalene, pentachlorophenol, and polycyclic aromatic hydrocarbons (PAHs). The analysis of volatilization from unsaturated soil included naphthalene, pentachlorophenol, PAHs, dioxin, and styrene. The analysis of volatilization from the upper sand aquifer included benzene, toluene, ethylbenzene, and total xylenes. Rationale for the selection of these compounds for the air evaluation is discussed in Section 3.

The site was modeled to represent existing conditions. Following standard procedures, the site was subjected to worst-case assumptions to reveal the most conservative results. Default meteorologic data were used to determine worst-case ambient air concentrations. Combinations of wind speed, mixing height, and stability class were modelled with constant wind direction along the length of the site. The resulting one-hour concentrations were used in determining the basis for the worst-case, time-weighted averages associated with corresponding ambient air standards.

A.7.2 Model Information

The air evaluation for particles and VOCs included calculation of emission rates and the use of an air dispersion model to predict airborne concentrations at specified receptor locations. The emission rate for particles was determined from the Wind Erosion Equation (Woodruff and Siddoway, 1965). VOC emissions were determined from the computerized Chemdat7 model (USEPA, 1989). VOC emissions from the unsaturated soil were predicted using the "Open Landfill" option. VOC emissions from the upper sand aquifer and through the overlying soil were estimated by the "Closed Landfill" option. The determination of potential airborne contaminant concentrations were estimated using the Fugitive Dust Model (Winges, 1992). This model was run separately for particles and VOC concentrations.

A.7.2.1 Particle Emissions

The Wind Erosion Equation was developed for dust emissions from land areas such as agricultural fields. The equation is a function of soil and knoll erodibility, soil ridge roughness, local wind erosion climactic factors, field length, and vegetative cover. The equation parameters include a step-by-step process of numeric and graphical solutions.

A.7.2.2 Volatilization Emission Rate

Chemdat7 is a computer spreadsheet that includes analytical models originally developed by USEPA for estimating VOC emissions from treatment, storage, and disposal facility processes under user-specified input parameters. Chemdat7 contains a data base of component-specific properties used to generate internally the inputs for the environmental fate models of waste disposal practices. Area source emission models include: aerated and nonaerated impoundments, lagoons, land treatment, landfills, and waste piles. Chemical properties not included within the spreadsheet were obtained from Chem7: Compound Property Processor spreadsheet, which contains a database of 878 chemicals and their component-specific properties. Missing chemical properties can be substituted by computer default values or input by the user.

Volatilization occurs when molecules of a dissolved substance convert to a gas phase. The principle driving force is molecular diffusion. The rate of volatilization at a soil-air

interface is a function of the chemical properties and concentration, soil properties, and properties of the air at ground level.

Volatilization from Unsaturated Soil. The Chemdat7 model assumes waste is in an open landfill. The following site and waste parameters for model input includes waste loading, chemical concentrations, depth of waste in soil, total soil porosity, air porosity, molecular weight of waste, waste type, temperature, wind speed, and area.

- Waste loading is the amount of waste per unit volume of soil. The waste loading of the site is unknown; therefore, the waste loading for modelling purposes is assumed to be the summation of the soil constituents of concern within the modeled area and depth of soil.

- The chemical concentrations in the soil are input into the model spreadsheet associated with each constituent. The mean soil concentration from the unsaturated soil (grade and mixed fill unit and the upper sand unit) is used.

- The depth of waste within the soil is assumed to be 4 feet throughout the site. The depth of the unsaturated soil varies seasonally with groundwater elevation, ranging from approximately 3 to 5 feet bgs.

- The total soil porosity is the ratio of the volume of void spaces to the total soil volume. For a silty sand and gravel, literature values range from 46 percent for loose to 12 percent for dense soil (Holtz & Kovacs, 1981). The soil porosity for the compacted grade and mixed fill unit is assumed to be 25 percent. The unsaturated soil profile is assumed to be uniform over the site, consisting 2 feet bgs of the grade and mixed fill unit, overlying 2 feet of the upper sand unit. Due to the compacted nature of the grade and mixed fill unit at the surface, it is assumed that this will be the controlling soil porosity for the transport of gas phase constituents.

- The air porosity is assumed to equal total soil porosity for this modelling event. This is a conservative approach since air porosity typically varies seasonally as the soil dries out and when moisture is added by precipitation.

- The molecular weight of the waste constituents ranges from 128 to 278. The combined molecular weight of the waste is assumed to be 250.

- The waste type is oil-based, not aqueous.

- The soil temperature is assumed to approximate the mean annual air temperature. For the Puget Sound Area, the mean annual temperature is 50.5°F, or 11 Celsius.

- Wind speed measured at 10 meters above the surface is a default value of 10 mph, or 4.47 m/s, and is consistent with the Puget Sound annual wind speed.

- The rectangular area source is assumed to be 405 feet by 680 feet, which converts to 25,623 m^2.

Volatilization from Upper Sand Aquifer. This model assumes the waste is placed in a closed landfill which is vented to the atmosphere. The escape of the constituent of interest is assumed to be by diffusion through the cap and by convective loss from barometric pumping. Due to the nature of the waste, no biodegradation is assumed to occur. The parameters for model input include landfill soil cap parameters, waste characteristics, and climatological factors within the landfill.

- Landfill soil cap parameters include soil thickness and porosity for the diffusion of the gas-phase constituents. The unsaturated soil above the upper sand aquifer is assumed to average 4 feet in thickness. For purpose of this analysis, the soil profile was assumed to consist of approximately 2 feet of grade and mixed fill unit over 2 feet of upper sand unit. The total soil porosity of the compacted grade and mixed fill unit is assumed to be 25 percent, and for this analysis, the controlling total soil porosity. The air porosity is conservatively assumed to equal the total porosity at 25 percent.

- The waste characteristics influence the volatilization within the closed landfill. The weight fraction of each constituent is based on the measured concentration in the upper sand aquifer. The density of the aqueous solution is assumed to equal water. The depth of the waste within the upper sand aquifer is assumed to be 4 feet. The total soil porosity within the upper sand unit is approximately 40 percent. The air porosity at the unsaturated-saturated soil interface is conservatively estimated to be 30 percent.

- Climatological factors within the landfill represent the driving force of the VOCs from the upper sand aquifer to the soil surface. The temperature within the landfill is assumed to equal the mean annual air temperature of 50.5°F (NOAA, 1974). Barometric "pumping" occurs from changes in atmospheric pressure. As the barometric pressure decreases, the gas-phase compounds tend to migrate toward the surface. An average daily pressure change of 4 mbar is used to represent the diurnal barometric pressure fluctuation. The baseline pressure within the landfill is assumed to equal the annual average barometric pressure in the United States of 1013 mbar (USEPA, 1987).

A.7.2.3 Air Concentration

The Fugitive Dust Model (FDM) is a computerized air quality model designed for computing concentration and deposition impacts from fugitive dust sources. Particle concentrations are determined based on the particle size distribution of the surface soil. The FDM model is also suitable for computing impacts from gaseous contaminants, such as VOCs. The model cannot compute the impacts of buoyant point sources, such as from stacks with thermal buoyancy from heating or burning, since it does not contain a plume-rise algorithm. Plume rise sources were not present at the site. The model options include default meteorological data to determine 1-hour concentrations. A standard multiplier converts this concentration to annual, 24-hour, and 8-hour averages.

The FDM input file contains information on the receptors, sources, and various model switches and options. Default meteorological data are expressed as a series of 1-hour episodes. The model assumes each meteorological entry represents an hourly average of the meteorological conditions.

The receptors for this modeling event include on-site, fence line, and adjacent property locations. The on-site receptor is located in the proximity of the existing building and former Mill E. The north boundary of the former wood treating facility is the fence line receptor location. The adjacent property location consists of two points at the existing training center. Due to the length of this building, the adjacent property receptors are positioned at 50 and 100 feet from the north boundary.

The emissions are assumed to be uniform over the entire area of the site. The model recognizes area sources in terms of rectangular shapes. Area sources are specified with a center point, an x-dimension, a y-dimension, and various emission parameters. The mill site is represented by a rectangle with dimensions of 405 by 680 feet, as seen in Figure A-5. For this site, the center point of the area source and each receptor is in line with the model wind direction from the south.

Particle size class for total suspended particulate concentration was determined from four samples collected from 0 to 3 inches bgs at the site. The fraction less than the No. 200 sieve was input into the model for the particle analysis. To model gas-phase emissions, the VO option has no particle size associated with the airborne concentration.

Default Meteorology. Default meteorology was used to determine the highest concentration. The worst-case combination of wind speed, wind direction, atmospheric stability, temperature, and mixing height for the site was found by trial air model parameters.

- Wind speed is used directly to determine the concentration. Values of 1, 2.5, 5, 7.5, and 10 m/s were input into the model as a trial basis. In general, low wind speeds will limit dispersion and give higher ambient air concentrations.

- Wind direction is used to determine the location of the receptors with respect to the center point of the source. Since the site has the greatest length in the north-south direction, the receptors are in line with the center point of the modelled area. The wind direction is entered as the number of degrees clockwise from north from which the wind is coming, or 180 degrees.

- Atmospheric stability determines the horizontal and vertical plume dimensions. It is specified as one of six possible stability classes, as defined by the Turner Classification scheme. Input variables range from one to six.

- Ambient air temperature is 11 Celsius (50.5°F) or 284 Kelvin.

- Mixing height for fugitive dust emissions released at ground level is relevant only at far distances from the source or at elevated receptors. The mixing height is determined to be 500m and is kept constant throughout the trial runs.

To yield the highest concentration, the results of the 30 trial combinations of 1-hour meteorological data reveal a wind speed of 2.5 m/s and an atmospheric stability of 6 for a constant wind direction of 180 degrees, temperature of 284 Kelvin and a mixing height of 500 m.

The FDM computer model was run for both particle and VOC analysis. A default emission rate of 1 g/m^2*s was input to determine the maximum one-hour concentration at the specified receptors. The default emission and the resulting concentration are in direct proportion to the actual emission rate and the maximum 1-hour concentration.

The maximum 1-hour concentration was found using the highest 1-hour default meteorology. For averaging times greater than 1-hour, the maximum concentration will generally be less than this value. To estimate the maximum concentration for longer averaging times, a multiplying factor is used:

- A standard multiplier of 0.15 converts the 1-hour results to obtain annual averages.

- A multiplier of 0.4 converts the 1-hour concentration to a 24-hour, time-weighted average.

- For 8-hour, time-weighted averages, a multiplier of 0.7 is used.

The use of the multiplier assumes emissions are constant, with no terrain or downwash problems. A degree of conservatism is implied in the factors to reasonably assure that the maximum concentration for the longer averaging times will not be underestimated (USEPA, 1977 and Puget Sound Air Pollution Control Agency, Reg.III).

A.7.3 Air Standards

The modeled ambient air concentrations are the source of data to evaluate the inhalation pathway. Ambient air concentrations were compared with ASILs established by the Puget Sound Air Pollution Control Agency (PSAPCA) Regulation III, *Guidelines for Evaluating Sources of Toxic Air Contaminants* and chapter 173-460 WAC, *Controls for New Sources of Toxic Air Pollutants*. The ASILs are based on annual averages for carcinogenic compounds and 24-hour averages for noncarcinogenic compounds. The modeled air contaminant concentrations were also compared with their associated 8-hour average for the National Institute of Occupational Safety and Health (NIOSH) PEL for workers, and the American Conference of Governmental Industrial Hygienists (ACGIH) TLV.

A.8 Upgradient Arsenic Assessment

The former ASARCO Everett smelter was located to the west of the site across the BNRR. A remedial investigation/feasibility study (RI/FS) is being performed on the smelter site by ASARCO under an enforcement order issued by Ecology. The RI was in progress at the time of the Former Mill E/Koppers Facility remedial investigation.

Public records from Ecology investigations and the ASARCO RI/FS, including work plans, site histories, and analytical results, were reviewed to estimate local background metal concentrations in soil and groundwater. The scope of the ASARCO RI/FS included collection and analysis of surface and subsurface soil samples and groundwater samples in the former smelter location, at known and suspected slag piles, and in the surrounding area of north Everett. The available data are currently under review for assessment of the impact of smelter operations on Weyerhaeuser property.

An area to the west of the Former Mill E/Koppers site was selected to represent upgradient soil arsenic concentrations and to further assess impacts from the smelter (Figure A-6).

Public records, including work plans and results of soil sampling in the former ASARCO surface and smelter area, were reviewed to estimate local background metal concentrations. Subsurface soil samples have been collected in the former smelter location, at known and suspected slag piles, and in the surrounding area of north Everett by public agencies and private consulting firms. The data collected by SAIC for Ecology (SAIC, 1991) were selected to represent local background trace metal concentrations.

An area to the west of the site was selected to represent upgradient soil arsenic concentrations (Figure A-6). Twenty-two shallow soil samples at twenty locations and one sample of railroad ballast from the adjacent BNRR were collected by EMCON for total and TCLP arsenic analysis to characterize background arsenic concentrations in soil.

Samples were collected to define an area background concentration in accordance with WAC 173-340-708(11).

Sample locations were determined by laying a uniform 20-cell grid over a map of the area, then randomly selecting a sample location point within the cell. Surface pavement, structures, and ditches prevented sampling within each cell. Six cells were selected for collection of two samples within the cell. The cell and sample locations are presented on Figure A-6. One railroad ballast sample was collected from three locations along the western Weyerhaeuser property boundary. Four ballast chips were collected from each location and composited into one sample.

Two duplicate samples were collected at two sampling locations, and two field rinsate blanks were collected during the sampling. The sample labeling and handling and equipment decontamination procedures followed the procedures described in the SAP.

The soil in the sample area was uniform in composition and texture, closely resembling shallow soil at the site. The water table surface was found at the ground surface as ponded water, or at up to 1 foot bgs. Therefore, the soil samples contained both saturated and unsaturated soil.

The soil samples were collected with a hand auger from 0.5 to 2 feet bgs. The upper few inches of topsoil were first removed with a shovel to expose undisturbed inorganic soil. The auger was then advanced to approximately 2 feet bgs. The soil was placed in a clean stainless steel bowl. The sample was mixed with a clean stainless steel spoon, then placed into sample jars.

Additional soil samples were collected from test pits excavated during the SRI. The SRI test pits were excavated for collection of additional soil samples and for observation of possible slag or cinders deposited in the sand fill. These additional sampling locations are identified on Figure A-6. The area to the east of the former smelter area across from the BNRR on Weyerhaeuser property was observed on a site walk on October 19, 1993, for evidence of slag or cinders deposited within the shallow fill. Small fragments of slag or cinders were observed approximately 400 feet from the slag outcrop. Slag or cinders were also observed on the surface in the upgradient arsenic area at the time of the site walk.

Groundwater samples were collected from seven wells located upgradient of the site to evaluate upgradient arsenic concentrations (HC-4, HC-11, HC-17, HC-24, HC-25, HC-26, and WP-1). The samples were collected following procedures described in the SAP. The samples were analyzed for total arsenic, dissolved arsenic, and total suspended solids.

A.9 Building Inventory

The former wood treatment building was assessed for visible contamination on September 22, 1992. Staining was noted primarily on the lower 3 feet and bases of vertical structural supports along the southeast and southwest walls. The lower corrugated sheet metal panels in these areas apparently have been replaced. The upper sheet metal panels of the walls appear to be original and are slightly to moderately weathered. The northeast and northwest walls have been covered with painted plywood.

The garage area addition contained some oil/grease stains along vertical supports and the lower 3 to 5 feet of the walls. The floor, bench, and siding of the battery/eyewash room were stained black with an unidentified substance. The building exterior showed visible staining only in the southeast corner where a fueling/lubrication area formerly existed.

Tables

Figures

Table A-1

Soil Sample Details

Sample No.	Date Collected	Depth (ft)	Geologic Unit	Analyses				Dioxin/ Furan	Total		TCLP			Air	Att Lim	CEC	Vert Hydric Conductivity	TOC	Grain Size	pH	Remarks
				VOC	SVOC	TPH	PCB		Met	As	Met	VOC	SVOC								
Soil Borings																					
SB-1-3	07/15/92	1.5-3	Upper Sand	x	x	x			x												
SB-2-2	07/15/92	2.5-3.5	Upper Sand	x	x	x			x												
SB-3-0-APA	08/07/92	0-0.1	Grade Fill											x							
SB-3-4	07/15/92	2.3-3.5	Upper Sand	x	x	x			x												
SB-3-4AS	07/15/92	2.5-3	Upper Sand							x											
SB-3-7B-AS	07/15/92	7-7.2	Silt							x											
SB-4-1	07/16/92	2-2.5	Grade Fill	x	x	x			x												Bottom of Grade Fill
SB-4-2-AS	07/16/92	2.5-3	Upper Sand							x											
SB-4-3	07/16/92	3-4.5	Upper Sand	x	x	x			x		x		x								Saturated sand
SB-4-5A-AS	07/16/92	6.5-7	Silt							x											
SB-5-1	07/17/92	1-2	Upper Sand	x	x	x			x												
SB-6-2	07/20/92	2-3.5	Upper Sand	x	x	x			x												Faint HC-like odor
SB-6-2-AS	07/20/92	2-3.5	Upper Sand							x											
SB-6-4-AS	07/20/92	5-6.5	Silt							x											
SB-6-6-CAR	07/20/92	8-9.5	Silt	x	x	x			x												Sand lens in silt
SB-7-0	07/17/92	0-0.25	Grade Fill	x	x	x			x												Top of Grade Fill
SB-7-3	07/17/92	3.5-5	Upper Sand	x	x	x			x												
SB-8-2	07/22/92	2-3.5	Upper Sand	x	x	x			x		x		x								
SB-8-3	07/22/92	3.5-5	Upper Sand													x		x		x	Saturated Sand
SB-9-0	07/16/92	0-0.25	Grade Fill	x	x	x			x												Top of Grade Fill
SB-9-1	07/16/92	2-3.5	Upper Sand	x	x	x			x												
SB-9-1-AS	07/16/92	2-3.5	Upper Sand							x											
SB-9-4-AS	07/16/92	6.5-8	Silt							x											HC-like odor
SB-10-3	07/21/92	3-4.5	Upper Sand	x	x	x			x			x	x			x		x		x	Creosote-like odor
SB-10-4	07/21/92	6-7.5	Silt												x	x		x		x	Top of Upper Silt
SB-11-0	07/24/92	0-0.25	Grade Fill	x	x	x			x												Top of Grade Fill
SB-11B-1	07/24/92	1.5-3	Upper Sand	x	x	x			x							x		x		x	

Table A-1

Soil Sample Details

Sample No.	Date Collected	Depth (ft)	Geologic Unit	Analyses				Dioxin/ Furan	Total		TCLP			Air	Att Lim	CEC	Vert Hydrlc Conductivity	TOC	Grain Size	pH	Remarks
				VOC	SVOC	TPH	PCB		Met	As	Met	VOC	SVOC								
SB-11B-2	07/24/92	3-4.5	Upper Sand					x			x	x	x								
SB-12-0	07/22/92	0-0.25	Grade Fill	x	x	x			x												Top of Grade Fill
SB-12-1	07/22/92	1.5-3	Upper Sand	x	x	x			x							x		x		x	Creosote-like odor
SB-12-3	07/22/92	4.5-6	Silt												x	x		x		x	Top of Upper Silt
SB-12-3-AS	07/22/92	4.5-6	Silt							x											
SB-12-4	07/22/92	6-8	Silt														x				Shelby tube sample
SB-13-1	07/27/92	2.5-3.5	Upper Sand	x	x	x			x												Creosote-like odor
SB-13-1G	07/27/92	2-2.5	Grade Fill	x	x	x			x												Base of Grade Fill
SB-13-2	07/27/92	3.5-5	Upper Sand					x			x										Creosote-like odor
SB-14-0-APA	08/07/92	0-0.1	Grade Fill											x							
SB-14-1	07/21/92	3.5-5	Upper Sand	x	x	x			x		x										
SB-15-2	07/27/92	2.5-4	Upper Sand	x	x	x		x	x		x	x									Creosote-like odor
SB-16-0	07/16/92	0-0.25	Grade Fill	x	x	x			x												Top of Grade Fill
SB-16-0-APA	08/07/92	0-0.1	Grade Fill											x							
SB-16-1	07/16/92	1.5-3	Upper Sand	x	x	x			x		x										HC-like odor
SB-17-1	07/21/92	1.5-2	Grade Fill	x	x	x			x												Creosote-like odor
SB-17-2	07/21/92	2-3.5	Upper Sand	x	x	x			x			x	x								Saturated sand
SB-18-2	07/22/92	2-3.5	Fill	x	x	x			x												Base of Grade Fill
SB-18-3	07/22/92	3.5-5	Upper Sand	x	x	x			x			x	x								Creosote-like odor
SB-19-1	07/29/92	2	Fill		x				x		x										
SB-19-1VOC	07/29/92	2	Fill	x		x															
SB-20-1	07/29/92	1	Fill	x	x	x	x		x												
SB-21-1	07/17/92	1-2.5	Upper Sand	x	x	x	x		x												
SB-21-5	07/17/92	7-8.5	Silt												x			x			Top of Upper Silt
SB-22-1	07/24/92	1.5-3	Grade Fill	x	x	x			x												Base of Grade Fill
SB-22-2	07/24/92	3-4.5	Upper Sand	x	x	x			x												
SB-22-2B	07/24/92	3-4.5	Upper Sand				x	x				x									
SB-23-2	07/23/92	3.5-5	Upper Sand	x	x	x		x	x			x									

Table A-1

Soil Sample Details

Sample No.	Date Collected	Depth (ft)	Geologic Unit	Analyses				Dioxin/ Furan	Total		TCLP			Air	Att Lim	CEC	Vert Hydrlc Conductivity	TOC	Grain Size	pH	Remarks
				VOC	SVOC	TPH	PCB		Met	As	Met	VOC	SVOC								
SB-24-1	07/20/92	0-2	Fill	x	x	x			x												Base of Grade Fill
SB-24-3-AR	07/20/92	3.5-5	Upper Sand	x	x	x			x												Saturated sand
SB-25-2	07/20/92	2-3.5	Upper Sand	x	x	x			x												Creosote-like odor
SB-25-3CAR	07/20/92	3.5-5	Upper Sand		x	x			x												Base of Upper Sand
SB-26-1	08/10/92	2-3	Upper Sand				x														
SB-26-4	08/10/92	6-7	Upper Sand		x																Base of Upper Sand
SB-26-5	08/10/92	7-9	Silt														x				Shelby tube sample
SB-36-1.5	10/15/93	1.5	Grade Fill			x	x			x											
SB-36-4	10/15/93	4	Upper Sand			x	x			x											Residual product
SB-36-9	10/15/93	9	Upper Sand			x	x			x											Iridescent sheen, strong creosote-odor (saturated)
SB-37-1	10/15/93	1	Grade Fill			x	x			x											
SB-37-3	10/15/93	3	Upper Sand			x	x			x											Strong gasoline odor
SB-37-7	10/15/93	7	Upper Sand			x	x			x											Strong gasoline odor (saturated)
SB-38-11.5	10/15/93	11.5	Upper Sand			x	x			x											Iridescent stain, creosote-odor (saturated)
SB-39-7	10/15/93	7	Upper Sand			x	x			x											Faint creosote odor (saturated)
SB-40-6	10/15/93	6	Upper Sand			x	x			x											Product, creosote odor (saturated)
Monitoring Well Borings																					
MW-9D-4	08/04/92	20-21	Lower Sand																x		
HC-11-SB-AS	08/10/92	2	Upper Sand							x											
MW-11D2-1A	07/15/92	10.5	Silt							x											
MW-23-0	07/29/92	0-0.25	Grade Fill	x	x	x			x					x							
MW-23-3	07/29/92	4.5-6	Upper Sand	x	x	x	x		x			x									
HC-23D-0-APA	08/07/92	0-0.1	Grade Fill											x							
MW-23D2-10	07/23/92	10	Silt															x			
MW-23D2-11G	07/23/92	18-19	Lower Sand																x		

Table A-1

Soil Sample Details

Sample No.	Date Collected	Depth (ft)	Geologic Unit	Analyses				Dioxin/ Furan	Total		TCLP			Air	Att Lim	CEC	Vert Hydric Conductivity	TOC	Grain Size	pH	Remarks
				VOC	SVOC	TPH	PCB		Met	As	Met	VOC	SVOC								
MW-27-2	07/29/92	2.5-4	Upper Sand	x	x	x	x		x												
MW-28-B-1	07/29/92	3	Upper Sand	x	x	x	x	x	x			x	x								
MW-30-1	07/28/92	1.5-3	Grade Fill	x	x	x			x												
MW-30-1-AS	07/28/92	1.5-3	Upper Sand							x											
MW-30-2	07/28/92	3-4.5	Upper Sand	x	x	x			x												
MW-30-3	07/28/92	4.5-6	Upper Sand										x								
MW-30D-5	08/03/92	17-18	Lower Sand																x		
MW-30D-6	08/03/92	20-21	Lower Sand													x		x		x	
MW-31-1-AS	07/23/92	2-3.5	Upper Sand							x											
MW-31-2	07/23/92	3-5.5	Upper Sand	x	x	x			x												
MW-31D-S2-AS	07/29/92	9	Silt							x											
MW-32-1AS	07/23/92	1.5-3	Upper Sand							x											
MW-32-2	07/23/92	3-4.5	Upper Sand	x	x	x			x												
MW-32-4-AS	07/23/92	6-7.5	Silt							x											
MW-33-2-AS	07/27/92	2-3.5	Upper Sand							x											
MW-33-3	07/27/92	3.5-5	Upper Sand		x	x			x			x	x								
MW-33-3-VOA	07/27/92	3.5-5	Upper Sand	x																	
MW-34-2	07/29/92	2.5-3	Upper Sand	x	x	x			x												
Surface Soil																					
SS-1	08/07/92	0-0.5	Fill	x	x	x			x												
Test Pits and Trenches																					
TP-16-S-2	08/13/92	2.5	Upper Sand		x	x															Test pit, west of building
TP-17-S-2	08/13/92	2.5	Upper Sand		x	x															Test pit, west of building
TP-18-1	10/18/93	1																			
TP-18-3	10/18/93	3																			
TP-19-1	10/18/93	1																			
TP-19-3	10/18/93	3																			

Table A-1

Soil Sample Details

Sample No.	Date Collected	Depth (ft)	Geologic Unit	Analyses				Dioxin/ Furan	Total		TCLP			Air	Att Lim	CEC	Vert Hydric Conductivity	TOC	Grain Size	pH	Remarks
				VOC	SVOC	TPH	PCB		Met	As	Met	VOC	SVOC								
TP-20-1	10/18/93	1																			
TP-20-3	10/18/93	3																			
TP-21-1	10/18/93	1																			
TP-21-3	10/18/93	3																			
TP-22-1	10/18/93	1																			
TP-22-3	10/18/93	2																			
TP-23-1	10/18/93	1	Grade Fill		x					x											
TP-23-3	10/18/93	3	Upper Sand		x					x											
TP-24-1	10/18/93	1	Grade Fill		x					x											
TP-24-3	10/18/93	3	Upper Sand		x					x											
TP-25-1	10/18/93	1	Grade Fill		x					x											
TP-25-3	10/18/93	3	Upper Sand		x					x											
TP-26-1	10/18/93	1	Grade Fill		x					x											
TP-26-3	10/18/93	3	Upper Sand		x					x											
TP-27-1	10/18/93	1	Grade Fill		x					x											
TP-27-3	10/18/93	3	Upper Sand		x					x											Saturated
TP-28-2	10/18/93	2	Upper Sand							x											
TP-29-2	10/18/93	2	Upper Sand							x											Saturated
TP-30-2	10/18/93	2	Upper Sand							x											
TP-31-3	10/18/93	3	Upper Sand							x											
TP-32-1	10/18/93	1	Grade Fill		x	x				x											Strong creosote odor
TP-32-3	10/18/93	3	Upper Sand		x	x				x											Trench east of building
TR-1-1	08/14/92	2-2.5	Upper Sand		x	x															Trench east of building
TR-1-2	08/14/92	2-2.5	Upper Sand		x	x															Trench south of building
TR-2-2	08/14/92	4-4.2	Upper Sand		x	x															Trench south of building
TR-3B-1	08/14/92	2-2.5	Upper Sand		x																Trench south of building
TR-4-A-1	08/14/92	2	Grade Fill?		x	x															
D2A-1192	11/30/92	3.5	Upper Sand					x													

Table A-1

Soil Sample Details

Sample No.	Date Collected	Depth (ft)	Geologic Unit	Analyses				Dioxin/ Furan	Total		TCLP			Air	Att Lim	CEC	Vert Hydrlc Conductivity	TOC	Grain Size	pH	Remarks
				VOC	SVOC	TPH	PCB		Met	As	Met	VOC	SVOC								
D5-1192	11/30/92	2.5	Upper Sand					x													
D6-1192	11/30/92	2	Upper Sand					x													
D7-1192	11/30/92	3.5						x													Creosote odor
D8-1192	11/30/92	3.5						x													
D9-1192	11/30/92	2.5						x													
D10-1192	11/30/92	3						x													
Hand Auger Borings																					
HA-1-1	10/15/93		Grade Fill							x											Asphalt paving
HA-1-3	10/15/93		Upper Sand							x											
HA-2-1	10/15/93		Grade Fill							x											Asphalt paving
HA-2-3	10/15/93		Upper Sand							x											
D1-1192	11/16/92	3	Upper Sand					x													
D3-1192	11/16/92	3	Upper Sand					x													
D4-1192	11/16/92	2.5	Upper Sand					x													
Duplicate Soil Samples																					
SB-60-1	07/22/92	1.5-3	Upper Sand	x	x	x			x												Dup soil (SB-12-1)
MW-61-3	07/28/92	4.5-6	Upper Sand		x	x			x												Dup soil (MW-30-3)
MW-61-3VOA	07/28/92	4.5-6	Upper Sand	x																	Dup soil (MW-30-3)
SB-62-2	07/28/92	3-4.5	Upper Sand	x	x	x			x												Dup soil (MW-30-2)
D11	11/30/92	3.5	Upper Sand					x													Dup of D2A
SB-33-1	10/18/93	1	Grade Fill		x	x				x											Dup of TP-21-1
SB-33-4	10/18/93	3	Upper Sand		x	x				x											Dup of TP-21-3
SB-34-1	10/18/93	1	Grade Fill		x	x				x											Dup of TP-32-1
SB-34-3	10/18/93	3	Upper Sand		x	x				x											Dup of TP-32-3
Water Quality and Field Blank Samples																					
MW-11D2-HYD	07/17/92	—	—	x	x	x			x												Potable water source
Trip Blank	07/22/92	—	—	x																	

Table A-1

Soil Sample Details

Sample No.	Date Collected	Depth (ft)	Geologic Unit	Analyses				Dioxin/ Furan	Total		TCLP			Air	Att Lim	CEC	Vert Hydrlc Conductivity	TOC	Grain Size	pH	Remarks
				VOC	SVOC	TPH	PCB		Met	As	Met	VOC	SVOC								
Trip Blank	07/30/92	—	—	x																	
FB-1-0792	07/20/92	—	—	x	x	x			x												Field Decon blank
FB-2-0792	07/23/92	—	—	x	x	x			x												Field Decon blank
FB-3-0792	07/30/92	—	—	x	x	x			x												Field Decon blank

NOTE: Air = Air particulate analysis.
Att Lim = Atterberg limit.
CEC = Cation exchange capacity.
Met = Metals — As, Cr, Cu, Pb, Hg.
PCB = Polychlorinated biphenyls.
SVOC = Semivolatile organic compounds (8270).
TOC = Total organic carbon.
TPH = Total petroleum hydrocarbon (WTPH-G, WTPH-D).
VOC = Volatile organic compounds (8240).

Table A-2

Summary of Soil Boring Details

Soil Boring	Date Drilled	Surface Elevation[a]	Total Depth
SB-1	7/15/92	8.6	13.5
SB-2	7/15/92	8.0	16.0
SB-3	7/15/92	8.2	14.0
SB-4	7/16/92	7.5	21.0
SB-5	7/16/92	7.5	20.0
SB-6	7/20/92	7.9	17.0
SB-7	7/17/92	8.5[b]	15.0
SB-8	7/22/92	8.5	8.0
SB-9	7/16/92	8.5	8.75
SB-10	7/21/92	7.9	13.0
SB-11	7/24/92	8.3	8.5
SB-12	7/22/92	7.9	13.5
SB-13	7/27/92	8.2[b]	11.0
SB-14	7/21/92	8.2	15.0
SB-15	7/27/92	7.9	9.5
SB-16	7/16/92	7.0	9.5
SB-17	7/21/92	6.7	23.0
SB-18	7/22/92	8.3	20.0
SB-19	7/27/92	8.7	3.5
SB-20	7/27/92	8.7	3.0
SB-21	7/17/92	7.8	19.0
SB-22	7/24/92	8.7	7.5
SB-23	7/23/92	8.0	12.5
SB-24	7/20/92	7.5	18.5
SB-25	7/20/92	8.5	6.5
SB-26	8/10/92	7.9	9.5
SB-36	10/15/93	8.3	9.0
SB-37	10/15/93	7.1	7.0
SB-38	10/15/93	8.6	8.5
SB-39	10/15/93	8.5	7.0
SB-40	10/15/93	7.9	5.0
MW-28	7/28/92	8.6	6.5
MW-34	7/29/92	7.5	5.0

[a] Elevations rounded to nearest 0.1 feet (above mean sea level).
[b] Estimated from adjacent monitoring well.

Table A-3

Summary of Well Details

Well	Date Drilled	Elevation Top of Casing (ft msl)	Stickup (ft)	Total Depth (ft bgs)	Filter Pack (ft bgs)	Well Screen (ft bgs)
MW-6D	8/5/92	8.32	-0.4	23.5	12.0 - 23.5	13.0 - 23.0
MW-9D	8/24/92	10.18	1.7	23.0	11.0 - 22.0	11.5 - 21.1
MW-11D2	7/21/92	8.84	1.85	76.5	58.0 - 73.2	62.5 - 73.0
MW-23D2B	8/12/92	11.09	2.3	67.0	53.0 - 66.0	55.0 - 64.5
MW-23	7/29/92	11.16	2.2	13.5	3.0 - 13.5	4.0 - 11.0
MW-27	7/29/92	9.46	2.65	16.0	1.0 - 13.5	2.0 - 12.0
MW-30	7/28/92	10.66	2.7	9.5	2.5 - 9.5	3.6 - 8.9
MW-30D	8/3/92	10.38	2.3	23.3	11.0 - 23.3	13.1 - 22.7
MW-31	7/22/92	10.34	2.5	9.5	1.5 - 9.5	2.6 - 7.6
MW-31D	7/29/92	10.03	2.0	22.0	11.0 - 22.0	12.0 - 21.5
MW-32	7/23/92	10.67	2.0	8.0	2.0 - 8.0	3.0 - 7.0
MW-33	7/28/92	11.06	2.5	9.5	2.0 - 9.5	2.8 - 9.4
MW-35	7/29/92	6.58		8.0	1.5 - 7.0	2.0 - 7.0
P-1	8/10/92	10.86	2.1	10.0	2.5 - 9.0	3.0 - 9.0
P-2	8/10/92	10.47	2.4	13.0	2.5 - 12.0	3.0 - 12.0
TW-1	8/7/92	10.83	2.8	13.5	4.0 - 12.5	7.0 - 12.0

NOTE: ft msl = feet mean sea level.
ft bgs = feet below ground surface.

Table A-4

Groundwater Sampling Details

Monitoring Well	Number of Sampling Events and Type of Analysis Performed							
	VOCs (8240)	SVOCs (8270)	WTPH-G,D, Other	Metals[a] As, Cr, Cu, Pb	TSS	TDS	Hardness	Cr (VI)
HC-1	5	5	5	5	5			
HC-1D	3	3	3	3	3			
HC-2	5	5	5	5	5			
HC-3	2	2	2	2	2			
HC-4	5	5	5	5	5			
HC-5	2	2	2	2	2			
HC-6	5	5	5	5	5			
MW-6D[b]	5	5	5	5	5			
HC-7	5	5	5	5	5	(4)		
HC-9	5	5	5	5	5	(3)	(4)	(3)
MW-9D	5	5	5	5	5	(3)		
HC-10	5	5	5	5	5	(4)		
HC-10D	5	5	5	5	5	(4)		
HC-11	5	5	5	5	5		(3)	(3)
HC-11D	5	5	5	5	5			
MW-11D2	5	5	5	5	5	(3)		
HC-12	3	3	3	3	3			
HC-13	5	5	5	5	5			
HC-14	2	2	2	2	2			
HC-15	5	5	5	5	5	(3)		(3)
HC-15D	5	5	5	5	5	(3)		(3)
HC-16	5	5	5	5	5			
HC-17[c]	2	2	2	5	5			
HC-18	2	2	2	2	2			
HC-19	2	2	2	2	2			
HC-20	2	2	2	2	2			

Table A-4

Groundwater Sampling Details

Monitoring Well	Number of Sampling Events and Type of Analysis Performed							
	VOCs (8240)	SVOCs (8270)	WTPH-G,D, Other	Metals[a] As, Cr, Cu, Pb	TSS	TDS	Hardness	Cr (VI)
HC-21	2	2	2	2	2			
HC-22	5	5	5	5	5			
MW-23	5	5	5	5	5			(3)
HC-23D	5	5	5	5	5			
MW-23D2	5	5	5	5	5	(4)		
HC-24[c]	(2)	(2)	(2)	5	5			
HC-25[c]	(2)	(2)	(2)	5	5	(3)		
HC-26[c]	(2)	(2)	(2)	5	5			
MW-27	5	5	5	5	5	(3)		(3)
MW-30	5	5	5	5	5		(3)	
MW-30D	5	5	5	5	5	(4)	(3)	
MW-31	5	5	5	5	5		(4)	
MW-31D	5	5	5	5	5	(4)	(4)	
MW-32	5	5	5	5	5			
MW-33	5	5	5	5	5			
MW-35[c]	2	2	2	5	5			

NOTE: 2 = Samples collected 1st and 2nd quarters only.
3 = Samples collected 1st, 2nd, and 3rd quarters.
5 = Samples collected all 5 quarters.
Parenthesis indicates analyses performed for single round only

Dates of Sample Collection

1st Quarter - August 1992
2nd Quarter - November 1992
3rd Quarter - February 1993
4th Quarter - May 1993
5th Quarter - August 1993

[a] Total and dissolved metals in rounds 1 and 2.
[b] Sample not collected in round 3.
[c] Analysis for arsenic, copper, and lead.

ATTACHMENT 1

SAMPLING ALTERATION CHECKLISTS

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: _____

Measurement variable: _____

Standard procedure for analysis: _____

_____

Reference: _____

_____

_____

Variation from standard procedure: A stilling tube was not placed in TW-1 during the aquifer test.

_____

_____

_____

_____

Reason for variation: Insufficient space in the well riser and screen for the pump discharge line, electrical line and well probe. The tube would have been 1½" diameter to accommodate the transducer.

_____

_____

Resultant change in field sample procedure: _____

_____

_____

_____

Special equipment, material, or personnel required: _____

_____

_____

_____

Author's name: Nelson

Date: 9-20-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: Soil

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Each group of sample containers from a single sample interval submitted for chemical analysis was placed in a sealed polyethylene bag before shipment. Each sample jar was tightly sealed and wiped clean with a paper towel before shipment

Reason for variation: Higher level of sample security, minimize cross contamination, reduce sample volatilization, contain sample if breakage occurs

Resultant change in field sample procedure: _____

Special equipment, material, or personnel required: _____

Author's name: Nelson Date: 7-16-92

Approval: _____ Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: Grade Fill

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Collect additional sample from base of Grade Fill

Reason for variation: Grade Fill appeared contaminated by petroleum hydrocarbons at SB-18

Resultant change in field sample procedure: Additional sample collected

Special equipment, material, or personnel required: _____

Author's name: Nelson

Date: 7-22-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: —

Material to be sampled: Silt

Measurement variable: —

Standard procedure for analysis: —

Reference: —

Variation from standard procedure: Borings SB-8, SB-9, SB-11, SB-13, SB-15, SB-16, SB-22 and SB-23 were completed only to the top of the Upper Silt unit

Reason for variation: Base of Upper Soil appeared highly contaminated; Boring not advanced deeper to avoid drag down through the aquitard. Some borings may have contained sinking product at base.

Resultant change in field sample procedure: Boring not advanced to base of Upper Silt

Special equipment, material, or personnel required: —

Author's name: Nelson

Date: 7-29-91

Approval: —

Title: —

Date: —

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification:

Material to be sampled:

Measurement variable:

Standard procedure for analysis:

Reference:

Variation from standard procedure: Soil sample collected below water table at SL-9

Reason for variation: No recovery of sample in unsaturated zone

Resultant change in field sample procedure: Saturated soil sample collected
Note: No PID response in samples collected above or below water table

Special equipment, material, or personnel required:

Author's name: Nelson

Date: 7-16-92

Approval:

Title:

Date:

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: Sand lens in Upper Silt

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Additional sample collected in sand stringer below top of Upper Silt at SB-6

Reason for variation: Sand lens had strong hydrocarbon-like odor

Resultant change in field sample procedure: Additional sample collected

Special equipment, material, or personnel required: _____

Author's name: S. Nelson

Date: 7-20-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: Upper Soil

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Additional sample collected below water table at SB-8

Reason for variation: Saturated sample appeared highly contaminated. Sample collected for characterization of saturated zone

Resultant change in field sample procedure: Additional sample collected

Special equipment, material, or personnel required: _____

Author's name: Nelson Date: 7-22-92

Approval: _____ Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: Upper Sand

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Sample collected below water table at SB-17

Reason for variation: Grade fill extended to water table. Upper Sand was completely saturated

Resultant change in field sample procedure: Sample collected below water table

Special equipment, material, or personnel required: _____

Author's name: Nelson

Date: 7-21-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: Upper Sand

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Fill below building at SB-19 and SB-20 was sampled. Boring met refusal (concrete slab) at 1.5 feet.

Reason for variation: _____

Resultant change in field sample procedure: Fill, not Upper Sand was sampled

Special equipment, material, or personnel required: _____

Author's name: Nelson

Date: 7-29-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: _____

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Relocation of MW-31 + MW-31D and MW-32D (renamed MW-9D)

Reason for variation: The wells were relocated from original position to adjust spacing of wells for contaminant plume monitoring. Discussed with Haldeman

Resultant change in field sample procedure: MW-31, MW-31D where relocated 50' to SW. MW-32D was renamed MW-9D and relocated 70' NE

Special equipment, material, or personnel required: _____

Author's name: Nelson

Date: 7-23-92 / 8-4-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: _____

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Relocation of MW-29D

Reason for variation: MW-29D was relocated to avoid penetration of silt close to building and to monitor potentially contaminated ground water to NE of HC-6. MW-29D was re-named MW-6D discussion with Sagstad + Haldeman

Resultant change in field sample procedure: _____

Special equipment, material, or personnel required: _____

Author's name: Steve Nelson Date: 8-5-92

Approval: _____ Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: _____

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Monitoring well MW-29 relocation

Reason for variation: MW-29 was relocated and renamed as MW-23, adjacent to MW-23D. Presence of silt and easterly ground water flow at HC-5 eliminated need for MW-29. Absence of saturated sand at HC-8 determined relocation of well

Resultant change in field sample procedure: MW-23 replaced MW-29 following discussion with Haldeman + Sagstad

Special equipment, material, or personnel required: _____

Author's name: S. Nelson

Date: 7-29-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: Upper Sand and Silt

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Additional boring SB-26 was installed to collect soil samples near building

Reason for variation: MW-29 was relocated to MW-23. Soil samples for PCB (Upper Sand) and vertical hydraulic conductivity (Upper Silt) analysis were collected

Resultant change in field sample procedure: Additional ~~soil samples~~ boring, but no new samples added to work scope

Special equipment, material, or personnel required: _____

Author's name: S. Nelson

Date: 8-10-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: _____

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: Test well TW-1 was located near HC-13 in an area of known ground water contamination

Reason for variation: The area near HC-13 has the thickest portion of saturated thickness of Upper Sand (7 feet), all other areas had 5 feet or less, considered insufficient for aquifer testing. The ground water extracted during the test would require similar handling, ~~or~~ treatment, and disposal as would a ground water recovery system. The treatability

Resultant change in field sample procedure: test would ~~accurately~~ more closely represent actual conditions, costs & requirements for ground water extraction & treatment

Special equipment, material, or personnel required: Additional treatment & disposal costs are expected

Author's name: Nelson Date: 8-7-92

Approval: _____ Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: Top of Upper Silt

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: No Samples were collected at the top of the upper Silt at MW-30D or MW-33 due to poor Sample recovery

Reason for variation: Poor sample recovery

Resultant change in field sample procedure: Top of silt sample for total arsenic was not collected

Special equipment, material, or personnel required: _____

Author's name: Nelson

Date: 7-27-92 / 8-3-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: _____

Measurement variable: _____

Standard procedure for analysis: _____

_____

Reference: _____

_____

_____

Variation from standard procedure: Duplicate samples of soil were collected at a frequency of 6% instead of 10% (3/54)

Reason for variation: Miscommunication between project geologist and staff geologist

Resultant change in field sample procedure: None

Special equipment, material, or personnel required: _____

_____

_____

Author's name: Nelson

Date: 8-15-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: _____

Measurement variable: _____

Standard procedure for analysis: _____

_____

Reference: _____

_____

_____

Variation from standard procedure: Trip Blanks and Field decon blanks were collected at the rate of 1 per week instead of 1 per day

_____

_____

_____

_____

_____

Reason for variation: Miscommunication between project geologist and staff geologist

_____

_____

_____

_____

Resultant change in field sample procedure: -

_____

_____

_____

_____

Special equipment, material, or personnel required: _____

_____

_____

_____

Author's name: Nelson

Date: 8-15-92

Approval: _____

Title: _____

Date: _____

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: _____

Material to be sampled: Soil

Measurement variable: _____

Standard procedure for analysis: _____

Reference: _____

Variation from standard procedure: MS/MSD samples were not labled as such on chain of custody forms

Reason for variation: Sample recovery was insufficient to fill enough (Dana) containers for separate MS-MSD analysis. Discussion with the lab determined that the original sample containers from fully recovered samples would be adequate for analysis. The lab would select those samples with sufficient

Resultant change in field sample procedure: volume for MS/MSD analysis (From discussion with Dana + Bonnie at WTC lab, 7-92)

Special equipment, material, or personnel required: _____

Author's name: Nelson Date: 10-14-92

Approval: _____ Title: _____

Date: _____

SAMPLING ALTERATION CHECKLIST

Sample program identification: Wayco Everett Storm water run off / storm drain sediments

Material to be sampled: storm water

Measurement variable: all

Standard procedure for analysis: collect samples as composites

Reference: SAP

Variation from standard procedure: no composite samples collected

Reason for variation: tide height greater than piping system elevations

Resultant change in field sample procedure: waited for tide to drop, collected grab samples only

Special equipment, material, or personnel required:

Author's name: John Virgin

Approval: [signature]

Date: 11/18/92

Date: 11/17/92

Title: QA Coordinator

Figure 3-7

SAMPLING ALTERATION CHECKLIST

Sample program identification: WeyCo Everett - Koppers

Material to be sampled: Storm water - Samples SWR-016, SWR-026

Measurement variable: total metals

Standard procedure for analysis: collect into HDPE bottle with HNO_3

Reference: SAP

Variation from standard procedure: samples collected into 1-L glass bottle, no preservative on 11/16/92. Contacted lab on 11/17/92, Dana & B. Chappel - They will pull 500 mL from the 1-L TSS sample, preserve with HNO_3 for total metals analysis. This will lead to potentially elevated TSS detection limits (depending on suspended solids concs).

Reason for variation: mistake in SAP analyses specified for storm water

Resultant change in field sample procedure: HNO_3 not added to samples immediately, HDPE vs glass container (may cause adsorption, low metals)

Special equipment, material, or personnel required: none

Author's name: John Vigi

Approval: JJV

Date: 11/17/92

Date: 11/17/92

Title: Project QA Coordinator

SAMPLING ALTERATION CHECKLIST

Sample program identification: Weyerhaeuser Everett - Koppers Sediment Sampling

Material to be sampled: Sediments - Phase II

Measurement variable: VOCs

Standard procedure for analysis:

Reference: SAP

Variation from standard procedure: No VOC analysis for samples SR-31-01, SR-32-01, SR-33-04, SR-27-01, SR-29-01

Reason for variation: Sampling locations unlikely to show VOCs due to dynamic environment

Resultant change in field sample procedure: No sample collected or submitted for VOC analysis

Special equipment, material, or personnel required:

Author's name: John Virgin

Date: 8/27/92

Approval: John Virgin

Title: QA Coordinator

Date: 8/27/92

SAMPLING ALTERATION CHECKLIST

Sample program identification: WenCo Everett

Material to be sampled: Surface water - Snohomish River

Measurement variable: station location

Standard procedure for analysis: EDMI

Reference: SAP

Variation from standard procedure: Tape measure and phase I sediment location, used for reference

Reason for variation: Ease of operation, Sediment sampling locations were at potential source locations, no additional survey effort required

Resultant change in field sample procedure: tape measure used where required to measure to fixed point already surveyed

Special equipment, material, or personnel required: none

Author's name: John Virgin

Approval:

Date: 8/20/92

Date: 8/20/92

Title: QA Coordinator

SAMPLING ALTERATION CHECKLIST

Sample program identification: Wenco Everett

Material to be sampled: Seep water

Measurement variable: conductivity

Standard procedure for analysis: - Field, pH/cond/temp probe

Reference: SAP

Variation from standard procedure: Conductivity analyzed at lab

Reason for variation: conductivity exceeded calibration range for some samples: SR-13-SW, SR-09-SW, SR-06-SW, SR-05-SW, SR-01-SW, SR-14-SW, ~~SR-07~~ JW 8/14/92

Resultant change in field sample procedure: none - requested analyses from lab

Special equipment, material, or personnel required: none

Author's name: John Virgin **Date:** 8/14/92

Approval: John V. **Title:** QA Coordinator

Date: 8/14/92

SAMPLING ALTERATION CHECKLIST

Sample program identification: Weyerhaeuser Everett - Kappes

Material to be sampled: Seeps (water)

Measurement variable: VOCs, PAH, Phenols, metals, TSS

Standard procedure for analysis: SAP called for use of stainless steel pans to collect samples

Reference: SAP

Variation from standard procedure: Pans were not used because of gravel, beach slope, and washout of sediments. These three factors prevented effective collection of H_2O into the pans. Water was collected directly into the sample bottles.

Reason for variation: Procedure for water collection specified in SAP was not effective

Resultant change in field sample procedure: Collected sample directly into sample containers

Special equipment, material, or personnel required: NA

Author's name: John Virgin

Approval:

Date: 8/3/92

Date: 7/31/92

Title: Env Scientist/Proj Qk Coordinator

ATTACHMENT 2

TEST PIT LOGS, SOIL BORING LOGS, AND MONITORING WELL COMPLETION DETAILS

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB- 1
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.63'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	13.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/15/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB	4	30-34-50					**0 to 2.5 feet: SANDY GRAVEL (GP)**, brown, angular to subrounded, medium to coarse gravel, medium sand, some organic matter, wood debris, dense, moist. Creosote-like odor at 1.5 to 2.5 feet. (GRADE FILL)
SB-1-1	25	43-50/4" 50/4"					
SB-1-2	3.4	32-100/1.5"					**2.5 to 4.5 feet: SAND (SP)**, gray to black, medium, some wood fragments, some orange mottles, very dense, moist. (UPPER SAND - DREDGE FILL)
SB-1-3	10	19-36-40	▽ 7-15-92	5			**4.5 to 8.5 feet: SAND (SP)**, gray to black, medium to coarse, some fine to medium subangular to subrounded gravel, trace wood fragments, medium dense, wet. (UPPER SAND - DREDGE FILL)
SB-1-4		12-11-7					
SB-1-5	25	4-4-14					
SB-1-6		4-4-18					**8.5 to 9.0 feet: SILT (ML)**, dark brown, trace fine sand, some organic matter, few rootlets, stiff, wet. (UPPER SILT - ESTUARINE)
				10			**9.0 to 12.0 feet: SILT (ML)**, gray brown, trace organic matter, stiff, wet; interbedded with medium to coarse sand lenses 0.1- to 0.5-feet thick. (UPPER SILT - ESTUARINE)
SB-1-7		3-8-10					
		3-7-16					**12.0 to 13.0 feet: SILTY SAND (SM)**, dark gray, medium to coarse, medium dense, wet. (LOWER SAND - FLUVIAL)
							13.0 to 13.5 feet: SAND (SW), brown to black, medium to coarse, trace fines, trace wood fragments, medium dense, wet. (LOWER SAND - FLUVIAL)
				15			Boring completed at 13.5 feet. Boring abandoned with Volclay coarse bentonite chips.
				20			

REMARKS

(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB- 2
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.02'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	16.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/15/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-2-1	<1	30-50/0"					**0 to 2.0 feet: SANDY GRAVEL (GP),** brown, medium to coarse, some cobbles up to 12-inches in diameter, abundant wood fragments, dense, moist. (GRADE FILL)
							@ 0.5 feet: met refusal, drilled through.
SB-2-2	<1	44-50-60					**2.0 to 3.5 feet: SAND (SP),** gray to black, fine to medium, trace silt, some wood fragments, few fine gravel, dense, damp to moist. (UPPER SAND - DREDGE FILL)
SB-2-3	<1	19-35-34	▽ 7-15-92				
SB-2-4	<1	10-16-12		5			**3.5 to 4.0 feet: SAND (SP),** dark gray, medium to coarse, some wood fragments, dense, wet. (UPPER SAND - DREDGE FILL)
SB-2-5	<1	5-5-8					**4.0 to 7.5 feet: SAND (SP),** dark gray, fine to medium, trace coarse sand, trace wood fragments, medium dense, wet. (UPPER SAND - DREDGE FILL)
SB-2-6	<1	3-5-6					**7.5 to 15.0 feet: SILT (ML),** brown, non-plastic, trace fine sand, some wood fragments, abundant rootlets, wet. Interbedded lenses of gray, medium sand 0.1- to 0.2-feet thick. (UPPER SILT - ESTUARINE)
SB-2-7	<1	4-8-10		10			
SB-2-8	<1	3-4-6					
SB-2-9	<1	5-4-6					
SB-2-10	<1	15-20-23		15			**15.0 to 16.0 feet: SAND (SW),** gray, medium to coarse, dense, wet. (LOWER SAND - FLUVIAL)
							Boring completed at 16.0 feet on 7-15-92. Boring abandoned with Volclay Coarse Bentonite Chips.
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB- 3
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.24'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	14.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/15/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-3-1	1.0	75-50/4"					**0 to 2.5 feet: SANDY GRAVEL (GP)**, gray to gray brown, medium to coarse, some large cobbles, angular to subrounded, some organic matter, some fine to medium sand, abundant wood debris, very dense, dry. (GRADE FILL)
SB-3-2	2.4	82-100/4.5"					
SB-3-3	2.0	17-32					
SB-3-4	4.0	44	▽				**2.5 to 3.5 feet: SAND (SP)**, dark gray, fine to medium, very dense, moist. (UPPER SAND - DREDGE FILL)
SB-3-5	<1	19-16-60	7-15-92				**3.5 to 7.0 feet: SAND (SP)**, gray brown, medium to coarse, trace fine sand, loose to dense, wet. (UPPER SAND - DREDGE FILL)
SB-3-6	2.0	5-5-7		5			
SB-3-7A		4					
SB-3-7B		8-8					**7.0 to 12.5 feet: SILT (ML)**, dark gray, abundant wood fragments, firm to stiff, wet, with fine to medium sand lenses 0.05- to 0.1-foot thick. (UPPER SILT - ESTUARINE)
SB-3-8	2.4	4-6-8					
SB-3-9	3.0	2-1-3		10			
SB-3-10	<1	4-4-4					
SB-3-11	<1	4-6-6					**12.5 to 14.0 feet: SAND (SP)**, dark gray, medium, loose, wet. (LOWER SAND - FLUVIAL)
				15			Boring completed at 14.0 feet on 7-15-92. Boring abandoned with Volclay Coarse Bentonite Chips.
				20			

REMARKS

(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB- 4
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.53'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	21.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/16/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-4-0-APH	<1						**0 to 2.5 feet: SANDY GRAVEL (GP)**, gray to brown, fine to coarse, abundant cobbles, angular to subrounded, some medium sand, some wood fragments, very dense, dry. (GRADE FILL)
SB-4-1							
SB-4-2	<1	34-50/4"					
SB-4-3	<1	38-64-65	▽ 7-16-92				**2.5 to 6.5 feet: SAND (SP)**, brown to gray, medium to coarse, trace fine sand, very dense, moist to wet. (UPPER SAND - DREDGE FILL)
SB-4-4	<1	20-30-39		5			@ 2.75 feet: hard drilling
SB-4-5	<1	3-49-22					
SB-4-6	<1	3-8-8					**6.5 to 9.0 feet: SILT (ML)**, brown to black, some wood fragments, abundant rootlets, firm, wet. Medium to coarse sand lenses 0.1- to 0.2-foot thick. (UPPER SILT - ESTUARINE)
SB-4-7	<1	6-11-28					@ 7.5 to 8.0 feet: brown, medium to coarse sand lens.
SB-4-8	1.3	13-14-10		10			**9.0 to 15.0 feet: SANDY SILT (ML)**, gray brown, fine sand, abundant wood particles, hard, wet. Fine sand lens at 12.0 to 13.0 feet. (UPPER SILT - ESTUARINE)
SB-4-9	<1	6-12-13					
SB-4-10	<1	14-23-28					
SB-4-11	<1	10-15-18		15			**15.0 to 19.5 feet: SILT (ML)**, gray, low plasticity, abundant wood fragments and organic matter, very stiff, wet. Interbedded fine gray sand lenses 0.1- to 0.2-feet thick. (UPPER SILT - ESTUARINE)
SB-4-12	<1	9-10-10					
SB-4-13	<1	6-10-15					
SB-4-14	<1	23-34-40		20			

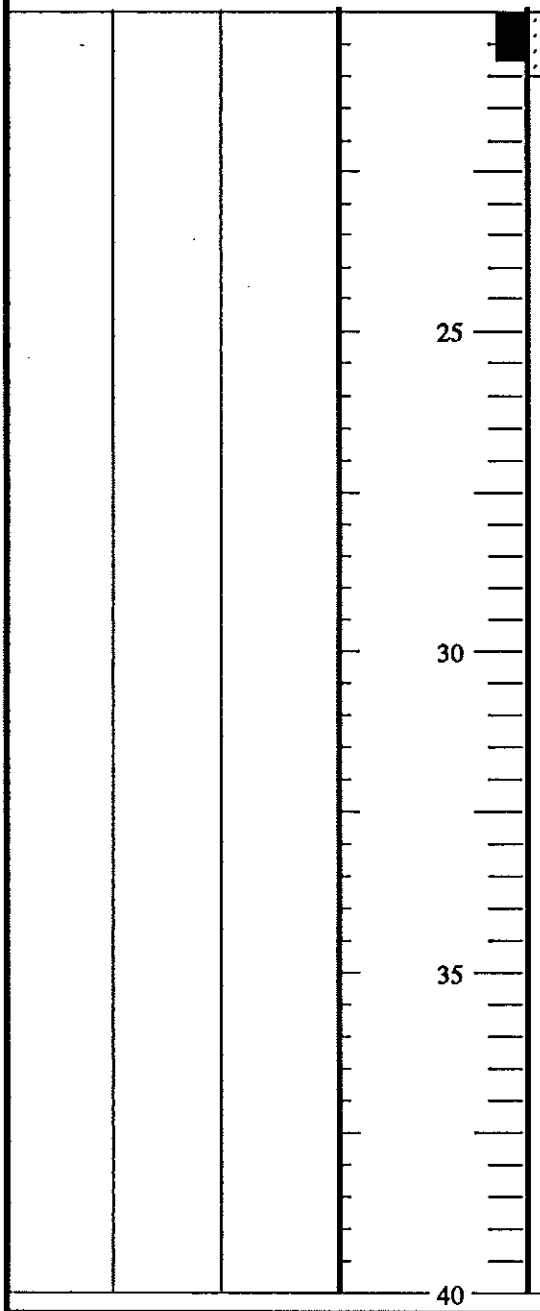
REMARKS

(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB- 4
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.53'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	21.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/16/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							19.5 to 21.0 feet: SAND (SP), dark gray to black, fine to coarse, very dense, wet. (LOWER SAND - FLUVIAL)
							Boring completed at 21.0 feet on 7-16-92.
							Boring abandoned with Volclay Coarse Bentonite Chips.



REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB- 5A
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.50'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	8.50'
LOGGED BY	Nelson	DATE COMPLETED	07/17/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 3-inches: ASPHALT.
SB-5B-1	<1	14-18-21					**3-inches to 1.0 foot: SANDY GRAVEL (GP),** dark gray, medium to coarse gravel, subrounded, fine to medium sand, dense, dry to moist. (MIXED FILL)
SB-5A-2	<1	12-15-26					**1.0 to 2.5 feet: SAND (SP),** olive brown, fine to medium, trace fine gravel, some gray mottling, dense, moist. (FILL)
SB-5A-3	<1	8-9-9	▽ 7-17-92				**2.5 to 4.0 feet: SAND (SP),** olive brown with gray black streaks, fine to medium, some coarse lenses, dense, moist to wet. (UPPER SAND - DREDGE FILL)
SB-5A-4	<1	6-8-10		5			**4.0 to 7.0 feet: SAND (SP),** olive brown, fine to medium, hydrogen sulfide odor, medium dense, wet. (UPPER SAND - DREDGE FILL)
SB-5A-5	<1	22-100/0"					**7.0 to 8.5 feet: SAND (SP),** olive brown, fine to medium, hydrogen sulfide odor, very dense, wet. (UPPER SAND - DREDGE FILL)
							@ 8.5 feet: wood, met refusal.
				10			Boring completed at 8.5 feet on 7-17-92.
							Boring abandoned with Volclay Coarse Bentonite Chips to 1.0 foot below ground surface and concrete to the surface.
				15			
				20			

REMARKS

(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB- 5B
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.50'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	20.00'
LOGGED BY	Nelson/Carl	DATE COMPLETED	07/17/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 3-inches: ASPHALT.
							3-inches to 1.0 foot: SANDY GRAVEL (GP), dark gray, medium to coarse gravel, subrounded, fine to medium sand, dense, dry to moist. (MIXED FILL)
							1.0 to 10.2 feet: SAND (SP), olive brown, fine to medium, trace coarse sand, dense, moist to wet. (UPPER SAND - DREDGE FILL)
			7-17-92	5			
SB-5B-1				10			**10.2 to 19.3 feet: SILT (ML)**, dark gray, abundant wood fragments and organic debris, stiff, wet. Interbedded dark gray fine sand in 0.1-foot lenses and wood debris at 10.5 to 11.0 feet. (UPPER SILT - ESTUARINE)
SB-5B-2		16-16-35					
SB-5B-3		8-16-13					
SB-5B-4	<1	21-40-25		15			@ 15.5 to 17.0 feet: drier, crumbly, non-plastic.
SB-5B-5	<1	26-34-50					
SB-5B-6	<1	20-31-40					
SB-5B-7	<1	18-31-40					
				20			**19.3 to 20.0 feet: SAND (SP)**, gray, fine to medium,

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LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB- 5B
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.50'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	20.00'
LOGGED BY	Nelson/Carl	DATE COMPLETED	07/17/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							trace coarse sand, dense, wet. (LOWER SAND - FLUVIAL)
							Boring completed at 20.0 feet on 7-17-92.
							Boring abandoned with Volclay Coarse Bentonite Chips to 1.0 foot below ground surface and concrete to the surface.
				25			
				30			
				35			
				40			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser, Everett	BORING NO.	SB- 6
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.96'
DRILL METHOD	HSA	TOTAL DEPTH	17.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/20/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 0.5 foot: ASPHALT.
SB-6-1	3	17-144-60					**0.5 to 2.0 feet: SANDY GRAVEL (GP)**, brown to black, medium to coarse gravel, angular to subrounded, medium sand, some wood fragments, dense, dry. (MIXED FILL)
SB-6-2	3	20-25-36					**2.0 to 4.5 feet: SAND (SP)**, brown, fine to medium, trace coarse sand, trace fine gravel, dense, moist to wet. (UPPER SAND - DREDGE FILL)
SB-6-3	9	12-25-25	▽				
SB-6-3B			7-20-92				@ 2.2 to 2.4 feet: black sand, slight odor.
SB-6-4	37	12-10-8		5			**4.5 to 6.0 feet: SAND (SP)**, gray, medium to coarse, strong napthalene-like odor, medium dense, wet. (UPPER SAND-DREDGE FILL)
SB-6-5	33	5-5-5					**6.0 to 14.5 feet: SILT (ML)**, gray, low plasticity, abundant organic matter; with several interbedded sand lenses 0.1 to 1.0-foot thick, stiff, wet. (UPPER SILT - ESTUARINE)
SB-6-6	14	3-5-17					
SB-6-7	12	4-15-24		10			
SB-6-8	13	16-34-70					
SB-6-9	19	17-32-40					
SB-6-10	16	23-40-65		15			**14.5 to 17.0 feet: SAND (SP)**, gray, medium to coarse, trace fine gravel, dense, wet. (LOWER SAND - FLUVIAL)
SB-6-11	25	60-41-60					
							Boring completed at 17.0 feet on 7-20-92. Boring abandoned with bentonite chips to 1.0 foot below ground surface, and concrete to the surface.
				20			

REMARKS
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LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser, Everett	BORING NO.	SB- 7
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.52'
DRILL METHOD	HSA	TOTAL DEPTH	15.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/17/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-7-0							**0 to 1.5 feet: SANDY GRAVEL (GP)**, brown to gray, coarse gravel to cobble, abundant wood fragments, dense, dry to moist. (GRADE FILL)
SB-7-1	<1	78-43-37					
SB-7-2	<1	20-23-40					**1.5 to 5.5 feet: SAND (SP)**, dark gray, medium to coarse, trace fine gravel, dense, damp. (UPPER SAND - DREDGE FILL)
SB-7-3	<1	13-29-29					
SB-7-4	<1	22-28-26	▽ 7-17-92	5			
SB-7-5	<1	18-23-18					**5.5 to 7.0 feet: SAND (SP)**, dark gray, fine to medium, trace coarse sand, dense, wet. (UPPER SAND - DREDGE FILL)
SB-7-6	<1	6-11-25					**7.0 to 9.0 feet: SAND (SP)**, dark gray to black, medium to coarse, trace organic matter, slight hydrogen sulfide odor, dense, wet. (UPPER SAND - DREDGE FILL)
SB-7-7	<1	10-18-14		10			**9.0 to 12.5 feet: SILT (ML)**, dark gray, non-plastic, stiff, wet, with lenses of fine to medium sand 0.1 to 0.2 feet thick, abundant organic matter at 9.0 to 9.5 feet. (UPPER SILT - ESTUARINE)
SB-7-8	6.5	12-16-28					
SB-7-9	1	12-21-22					**12.5 to 13.0 feet: SANDY SILT (ML)**, dark gray brown, fine to medium sand, wet. (UPPER SILT - ESTUARINE)
SB-7-10	3	8-17		15			**13.0 to 15.0 feet: SAND (SP)**, dark gray, medium, trace coarse sand, medium dense, wet. (LOWER SAND - FLUVIAL)
							Boring completed at 15.0 feet on 7-17-92. Boring abandoned with bentonite chips to the surface.
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser, Everett	BORING NO.	SB- 8
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.49'
DRILL METHOD	HSA	TOTAL DEPTH	8.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/22/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-8-1	3	28-100/4"					**0 to 2.5 feet: SANDY GRAVEL (GP)**, brown, medium to coarse gravel to cobbles, fine to medium sand, abundant wood fragments, dense, dry to damp. (GRADE FILL)
SB-8-2	2	34-84-85					
SB-8-3	3	33-46-45	▽ 7-22-92				**2.5 to 3.5 feet: SAND (SP)**, gray brown, medium, very dense, moist. (UPPER SAND - DREDGE FILL)
SB-8-4	30	7-24-16		5			**3.5 to 7.0 feet: SAND (SP)**, gray brown, medium, very dense, wet. Napthalene-like odor. (UPPER SAND - DREDGE FILL)
SB-8-5	20	5-5-7					**7.0 to 8.0 feet: SILT (ML)**, gray, non-plastic, some organic matter, stiff, wet. Napthalene-like odor. (UPPER SILT - ESTUARINE)
				10			Boring completed at 8.0 feet on 7-22-92. Boring abandoned with bentonite chips to the surface.
				15			
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser, Everett	BORING NO.	SB- 9
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.49'
DRILL METHOD	HSA	TOTAL DEPTH	8.75'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/16/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-9-0		50/1"					**0 to 2.5 feet: SANDY GRAVEL (GP),** brown, coarse gravel to cobble, medium sand, abundant wood fragments, rootlets, very dense, dry to moist. (GRADE FILL)
SB-9-1	3.7	40-45-51					
SB-9-2	49	27-35-46	▽ 7-16-92				**2.5 to 4.0 feet: SAND (SP),** gray to dark gray, medium, very dense, moist. (UPPER SAND - DREDGE FILL)
SB-9-3	93	11-9-8		5			**4.0 to 7.0 feet: SAND (SP),** dark gray to black, medium, trace coarse sand, strong hydrocarbon-like odor, iridescent, medium to very dense, wet. (UPPER SAND - DREDGE FILL)
SB-9-4	4.8	3-6-9					
SB-9-5	11	13-5/2.5"					**7.0 to 8.75 feet: SILT (ML),** brown to black, non-plastic, some wood fragments, firm, wet. Few medium sand lenses 0.05 to 0.1-foot thick, strong odor.
				10			Boring completed at 8.75 feet on 7-16-92. Boring abandoned with bentonite chips to the surface.
				15			
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

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LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-10
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.88'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	13.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-10-1	9	38-164-154					**0 to 3.0 feet: SANDY GRAVEL (GP),** brown to dark brown, medium to coarse sand with medium to coarse gravel to cobbles, abundant organic matter and wood fragments, very dense, dry. (GRADE FILL)
SB-10-2	89 157	97-85-37					@ base of Grade Fill - strong creosote-like odor.
SB-10-3	135	76-104	▽ 7-21-92	5			**3.0 to 6.5 feet: SAND (SP),** black, fine to medium sand, very dense, moist to wet. Strong creosote-like odor, visible product. (UPPER SAND - DREDGE FILL) @ 4.5 to 6.0 feet: wood debris, no sample collected.
SB-10-4	15 12	3-2-1					**6.5 to 7.5 feet: SILT (ML),** dark gray to black, non-plastic, abundant wood fragments, soft, wet. (UPPER SILT - ESTUARINE)
SB-10-5	26	6-9-11					**7.5 to 13.0 feet: SAND (SP),** dark brown to black, medium to coarse, with abundant wood fragments and organic matter, medium dense, wet; iridescent sheen on water and soil; strong odor. Sandy silt lenses at 10.0 to 10.5 and 11.0 and 11.5 feet. (LOWER SAND - FLUVIAL)
SB-10-7	9	4-4-10		10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-10
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.88'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	13.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-10-8	11	5-11-12					@ 10.5 to 11.0 feet: fine to medium sand interbed.
							@ 11.0 feet: silt lens has an iridescent sheen.
SB-10-9	13	7-11					
				15			Boring completed at 13.0 feet on 7-21-92. Boring abandoned with Volclay coarse bentonite chips to the surface.
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-11
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.29'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	8.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/24/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-11-0							**0 to 1.0 foot: SANDY GRAVEL (GP),** brown, medium to coarse gravel with cobbles up to 12 inches in diameter, medium to coarse sand, abundant wood fragments and organic matter, very dense, dry. (GRADE FILL)
SB-11-1	59	108-100/2"-50/0"					**1.0 to 2.0 feet: SANDY GRAVEL (GP),** gray, medium sand, fine gravel, strong odor, very dense, dry. (GRADE FILL) @ 2.0 to 4.0 feet: no recovery.
							2.0 to 4.0 feet: SAND (SP), black, fine to medium sand, trace coarse sand, moist, orange and black mottles, iridescent sheen, very dense, wet below 4.0 feet, strong creosote-like odor. (UPPER SAND - DREDGE FILL)
SB-11-2	462	95-60-72	▽ 7-24-92				**4.0 to 8.25 feet: SAND (SP),** dark gray to brown with black mottling, medium sand, very dense, wet, with strong creosote-like odor. Iridescent sheen and strong creosote-like odor at 8.0 feet. (UPPER SAND - DREDGE FILL)
				5			
SB-11-3	321	22-50-50					**8.25 to 8.5 feet: SILT (ML),** dark brown to black, non-plastic to low-plasticity, firm, wet. Strong creosote-like odor. (UPPER SILT - ESTUARINE)
SB-11-4	121						Boring completed at 8.5 feet on 7-29-92. Boring abandoned with Volclay coarse bentonite chips to the surface.
				10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-11B
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.29'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	4.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/24/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-11B-1	291	49-60-69					**0 to 2.0 feet: SANDY GRAVEL (GP),** brown to dark brown, medium to coarse sand, medium to coarse gravel, cobbles, abundant wood fragments and organic matter, dense, dry. (GRADE FILL)
SB-11B-2	61	26-60-55	▽ 7-24-92	5			**2.0 to 4.5 feet: SAND (SP),** black, fine to medium sand, trace coarse sand, moist, orange and black mottles, very dense, wet below 4.0 feet. Iridescent sheen, strong creosote-like odor. (UPPER SAND - DREDGE FILL) @ 3.5 feet: fine to medium sand with a few coarse sand interbeds 0.05- feet thick, damp to wet.
				10			Boring completed at 4.5 feet on 7-24-92. Boring abandoned with Volclay coarse bentonite chips to the surface.

REMARKS

(1) Due to no recovery from 2 to 4 feet in SB-11, SB-11B was drilled adjacent to SB-11 in order to sample the unsaturated zone of the Upper Sand. (2) Blow counts do not represent SPT results. (3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-12
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.91'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	13.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/22/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-12-0							**0 to 2.0 feet: SANDY GRAVEL (GP),** brown to dark brown, medium to coarse gravel and cobbles, medium to coarse sand, abundant wood fragments and organic matter, dense, dry. (GRADE FILL)
SB-12-1 SB-60-1	<1	35-65-88					
SB-12-2	--	28-33-30	▽				**2.0 to 5.5 feet: SAND (SP),** gray, with black mottling, medium sand, trace organic matter, very dense, wet below 4.0 feet. Coarse sand, creosote-like odor at 4.0 to 4.5 feet. (UPPER SAND - DREDGE FILL)
SB-12-3	14	13-9-11		5			**5.5 to 11.0 feet: SILT (ML),** dark gray to black, low plasticity, abundant wood fragments and organic matter, firm, wet. (UPPER SILT - ESTUARINE)
SB-12-4 Shelby Tube	--						
SB-12-5	4	5-12-16		10			

REMARKS

(1) Sample SB-60-1 is a duplicate. (2) Blow counts do not represent SPT results. (3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-12
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.91'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	13.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/22/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-12-6	8	4-9-15					**11.0 to 13.5 feet: SAND (SP),** gray to dark gray, medium sand, trace coarse sand, medium dense, wet, creosote-like odor. (LOWER SAND - FLUVIAL)
SB-12-7	7	6-17					@ 12.5 feet: strong creosote-like odor.
				15			Boring completed at 17.5 feet on 7-22-92. Boring abandoned with Volclay coarse bentonite chips to the surface.
				20			

REMARKS
(1) Sample SB-60-1 is a duplicate. (2) Blow counts do not represent SPT results. (3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-13
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.17'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	11.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/27/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-13-0	27	120-100/3"					**0 to 2.5 feet: SANDY GRAVEL (GP),** brown to dark brown, medium to coarse gravel and cobbles, medium to coarse sand, abundant wood fragments and organic material, very dense, dry. Abundant 2-inch pebbles at 2.0 to 2.5 feet. (GRADE FILL)
SB-13-1	131	39-53-55					
SB-13-2	220	22-37-33					**2.5 to 10.0 feet: SAND (SP),** dark brown to black, fine to medium sand, trace coarse sand, trace organic matter, dense, wet. Strong creosote-like odor. (UPPER SAND - DREDGE FILL) @ 4.0 to 4.5 feet: strong creosote-like odor (free product?).
SB-13-3	1094	10-24-29	▽ 7-27-92	5			
SB-13-4	34	11-19-21					@ 7.0 feet: color change to dark gray, medium to coarse sand, wet.
SB-13-5	23	8-9-8					
SB-13-6	106	3-3-4		10			

REMARKS

(1) Sampling spoon highly discolored gold-brown at 4.0 to 5.0 feet. (2) Blow counts do not represent SPT results.
(3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-13
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.17'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	11.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/27/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							10.0 to 11.0 feet: SILT (ML), dark gray to black, low plasticity, some wood fragments and organic matter, firm, wet. Strong creosote-like odor. (UPPER SILT - ESTUARINE)
							Boring completed at 11.0 feet on 7-27-97.
							Boring abandoned with Volclay coarse bentonite chips to the surface.
				15			
				20			

REMARKS

(1) Sampling spoon highly discolored gold-brown at 4.0 to 5.0 feet. (2) Blow counts do not represent SPT results.
(3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-14
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.19'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	15.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
		120-100/1"					**0 to 3.5 feet: SANDY GRAVEL (GP),** brown to dark brown, medium to coarse gravel and cobbles, medium to coarse sand, abundant wood fragments and organic matter, very dense, dry. (GRADE FILL)
SB-14-1	2	35-81-80					**3.5 to 7.25 feet: SAND (SP),** gray brown to black, fine to medium sand, trace coarse sand, trace organic matter, very dense, wet below 5.0 feet. (UPPER SAND - DREDGE FILL)
SB-14-2	<1	26-23-18	▽ 7-21-92	5			
SB-14-3	6.8	3-8-14					
SB-14-4	2	3-9-10					**7.25 to 12.5 feet: SILT (ML),** dark gray to black, low plasticity, abundant wood fragments, firm, wet, (UPPER SILT - ESTUARINE). Interbedded with layers of dark gray fine to coarse sand.
SB-14-5	3	4-17-12		10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-14
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.19'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	15.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-14-6	<1	14-42-52					
SB-14-7	<1	5-12-14					**12.5 to 15.0 feet: SAND (SP)**, gray to dark gray, medium sand, trace coarse sand, some rootlets, medium dense, wet. (LOWER SAND - FLUVIAL)
SB-14-8	1.3	9-13					
				15			Boring completed at 15.0 feet. Boring abandoned with Volclay coarse bentonite chips to the surface.
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Weyerhaeuser - Everett**	BORING NO.	**SB-15**
LOCATION	**Former Mill E/Koppers**	PAGE	**1 OF 2**
DRILLED BY	**Tacoma Pump & Drill.**	REFERENCE ELEV.	**7.89'**
DRILL METHOD	**Hollow Stem Auger**	TOTAL DEPTH	**9.50'**
LOGGED BY	**Burkett/Carl**	DATE COMPLETED	**07/27/92**

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-15-1	20	31-100-110					**0 to 2.75 feet: SANDY GRAVEL (GP),** brown to dark brown, medium to coarse gravel and cobbles, medium to coarse sand, abundant wood fragments and organic matter, demolition debris (i.e. concrete, metal), very dense,. dry. Light gray color change at 1.5 feet. (GRADE FILL)
SB-15-2	401	7-19-25					**2.75 to 9.0 feet: SAND (SP),** gray brown to black, fine to medium sand, trace coarse sand, trace organic matter, medium dense, wet. (UPPER SAND - DREDGE FILL)
			▽ 7-27-92	5			
SB-15-3	269	10-12-18					
SB-15-4	128	7-10-10					
SB-15-5	180	4-4-5					@ 8.0 feet: iridescence and strong creosote-like odor.
				10			**9.0 to 9.5 feet: SILT (ML),** dark gray to black, low plasticity, abundant wood fragments, firm, wet. (UPPER SILT - ESTUARINE)

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-15
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.89'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	9.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/27/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				15			Boring completed at 9.5 feet on 7-27-92. Boring abandoned with Volclay coarse bentonite chips to the surface.
				20			

REMARKS

(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-16
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.04'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	9.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/16/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-16-0							**0 to 2.0 feet: SANDY GRAVEL (GP),** brown to dark brown, medium to coarse angular gravel and cobbles, fine to medium sand, abundant wood and organic debris, very dense, dry. (GRADE FILL)
SB-16-1	142	38-43-40					**2.0 to 5.75 feet: SAND (SP),** black, fine to medium sand, trace coarse sand, trace organic matter, dense, wet below 3.0 feet. Strong hydrocarbon-like odor. Several thin (<0.05 feet) layers of dark gray silt with some wood fragments at 3.0 feet. (UPPER SAND - DREDGE FILL)
SB-16-2	213	12-21-38	▽ 7-16-92				
SB-16-3	128	7-4		5			
SB-16-4	227	4-3					**5.75 to 9.5 feet: SILT (ML),** dark brown with orange-brown mottles, low plasticity, abundant wood fragments, rootlets, plant matter, firm, wet. Sandy interbed at 6.5 to 7.0 feet, dark gray to black, fine to medium sand, trace coarse sand, strong hydrocarbon-like odor, iridescent sheen. (UPPER SILT - ESTUARINE)
SB-16-5	211	3-2-3					@ 7.0 to 9.5 feet: silt. Thin (<0.1 foot thick) sand interbeds below 7.0 feet, dark gray to black, medium sand, strong hydrocarbon-like odor.
SB-16-6	311	4-2-3					Boring completed at 9.5 feet on 7-16-92. Boring abandoned with Volclay coarse bentonite chips to the surface.
				10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-17
LOCATION	Former Mill E/Koppers	PAGE	1 OF 3
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	6.68'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	23.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-17-1	396						**0 to 2.5 feet: SANDY GRAVEL (GP),** brown to dark brown, medium to coarse angular gravel and cobbles, medium to coarse sand, abundant wood fragments and organic matter, very dense, dry, wet below 2.5 feet (color changes to dark gray to black). Strong creosote-like odor at 1.5 feet. (GRADE FILL)
SB-17-2	726	21-39-60	▽ 7-21-92				**2.5 to 4.5 feet: SAND (SP),** gray brown, medium sand, trace coarse sand, medium to dense, wet. Creosote-like odor, iridescent sheen. (UPPER SAND - DREDGE FILL)
SB-17-3	261	6-6-9					
SB-17-4	137	4-6-7		5			**4.5 to 21.5 feet: SILT (ML),** dark gray to black silt with abundant wood fragments, low plasticity, firm to stiff, wet. Interbedded zones of silt and sandy silt and sand; layers up to 1 inch in thickness, sand gray to black, fine sand with trace organic matter. Faint creosote-like odor at 4.5 feet. (UPPER SILT - ESTUARINE)
SB-17-5	48	3-3-14					
SB-17-6	20	1-2-4					
SB-17-7	10	2-3-5		10			

REMARKS

(1) Soil sample for chemical analysis was collected from saturated zone at top of Upper Sand from 2.5 to 3.5 feet. (2) Blow counts do not represent SPT results. (3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-17
LOCATION	Former Mill E/Koppers	PAGE	2 OF 3
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	6.68'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	23.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							@ 10.0 to 11.0 feet: interbedded silt and sandy silt, 0.05 foot thick layers.
SB-17-8	5	11-9-12					
SB-17-9	3	4-5-7					
SB-17-10	<1	3-6-8					
				15			
SB-17-11	1	4-6-11					
SB-17-12	6	9-12-21					@ 17.5 to 18.8 feet: silty sand, dark gray fine sand, some organic matter.
SB-17-13	2	12-15-19					@ 19.0 to 20.0 feet: interbedded silty sand and sandy silt, brown to gray brown fine to medium sand in layers <0.1 foot thick. Some wood fragments.
				20			

REMARKS

(1) Soil sample for chemical analysis was collected from saturated zone at top of Upper Sand from 2.5 to 3.5 feet. (2) Blow counts do not represent SPT results. (3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-17
LOCATION	Former Mill E/Koppers	PAGE	3 OF 3
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	6.68'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	23.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-17-14		6-9-11					
SB-17-15		9-9-18					**21.5 to 23.0 feet: SAND (SP)**, gray to dark gray, medium sand, trace coarse sand, medium dense, wet. (LOWER SAND - FLUVIAL)
				25			Boring completed at 23.0 feet on 7-21-92. Boring abandoned with Volclay coarse bentonite chips to the surface.
				30			

REMARKS

(1) Soil sample for chemical analysis was collected from saturated zone at top of Upper Sand from 2.5 to 3.5 feet. (2) Blow counts do not represent SPT results. (3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-18
LOCATION	Former Mill E/Koppers	PAGE	1 OF 3
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.33'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	20.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/22/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 6.0 inches: CONCRETE
SB-18-1	730	22-56-70					**6.0 inches to 3.5 feet: SANDY GRAVEL (GP),** dark brown black, angular, medium gravel, medium to coarse sand, very dense, dry. Iridescent, strong hydrocarbon-like odor, and visible product at 6-inches to 2.0 feet. (MIXED FILL)
SB-18-2	>1000	15-16-9					
SB-18-3	415	11-13-12	▽ 7-22-92				**3.5 to 7.0 feet: SAND (SP),** brown to black, medium sand, medium dense, wet below 4.0 feet. Strong hydrocarbon-like odor. (UPPER SAND - DREDGE FILL)
SB-18-4	1087	7-12-20		5			@ 5.0 feet: iridescent sheen on sand.
SB-18-5	195	6-8-6					@ 6.5 to 7.0 feet: dark gray, medium to coarse sand, trace gravel.
SB-18-6	7	1-4-6					**7.0 to 19.5 feet: SILT (ML),** dark gray to black, low plasticity, abundant wood fragments, firm to very stiff, wet. Strong hydrocarbon-like odor at 7.0 to 10.0 feet. (UPPER SILT - ESTUARINE)
							@ 8.5 feet: interbedded silt and sandy silt, layers approximately 0.05 feet thick, fine to medium sand.
SB-18-7	32	2-3-7		10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-18
LOCATION	Former Mill E/Koppers	PAGE	2 OF 3
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.33'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	20.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/22/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							@ 10.0 feet: hydrogen sulfide odor, iridescent sheen on silt.
SB-18-8	39	4-6-12					@ 11.0 feet: sandy silt, fine to medium sand, no odor.
SB-18-9	9	4-12-12					
							@ 13.0 feet: interbedded silt and sandy silt.
SB-18-10	14	8-11-15					
				15			
SB-18-11	6	10-14-11					
SB-18-12	5	6-8-9					
SB-18-13	16						
							19.5 to 20.0 feet: SAND (SP), gray to dark gray,
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-18
LOCATION	Former Mill E/Koppers	PAGE	3 OF 3
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.33'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	20.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/22/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							medium to coarse sand, medium dense, wet. (LOWER SAND - FLUVIAL)
							Boring completed at 20.0 feet on 7-22-92.
							Boring abandoned with Volclay coarse bentonite chips to 0.5 feet bgs, and concrete to the surface.
				25			
				30			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-11D2
LOCATION	Former Mill E/Koppers	PAGE	1 OF 4
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.84'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	76.50'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-1		40-40-30						**0 to 3.0 feet: SANDY GRAVEL (GP)**, gray to brown, angular gravel to cobbles, fine to medium sand, some organic silt, abundant wood debris, very dense, dry. (GRADE FILL)
SB-2		10-20-30						**3.0 to 5.0 feet: SAND (SP)**, gray to brown, fine to medium, trace coarse, dense, wet below 4.0 feet. (UPPER SAND - DREDGE FILL)
SB-3		3-4-5	▽ 7-15-92	5				**5.0 to 11.3 feet: SILT (ML)**, gray to brown, low to medium plasticity, trace fine sand, wood debris, firm to stiff, wet. Sand and silt interbeds to 2-inches thick below 10.5 feet. (UPPER SILT - ESTUARINE)
SB-4		4-7-7						
SB-5		2-8-10						
SB-6		4-7-9		10				
SB-7		10-9-12						**11.3 to 74.5 feet: SAND (SP)**, gray, fine to medium, loose to medium dense, wet. Gravelly zone 15.0 to 20.0 feet. Silty zone 25.0 to 30.0 feet. Fining below 40.0 feet. (LOWER SAND - FLUVIAL)
SB-8		4-6-6		15				
SB-9		3-3-10						
				20				

REMARKS

Boring initially advanced to 8.0 feet bgs. with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Reference elevation is top of casing. Blow counts do not represent SPT results.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-11D2
LOCATION	Former Mill E/Koppers	PAGE	2 OF 4
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.84'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	76.50'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-10		4-12-16						
SB-11		4-4-5						
SB-12		7-9-10		25				
SB-13		5-6-8						
SB-14		7-6-7		30				
SB-15		4-4-8						
SB-16		5-7-8		35				
SB-17		5-7-9						
				40				

REMARKS

Boring initially advanced to 8.0 feet bgs. with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Reference elevation is top of casing. Blow counts do not represent SPT results.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-11D2
LOCATION	Former Mill E/Koppers	PAGE	3 OF 4
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.84'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	76.50'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-18		10-30-35						
SB-19		20-28-37						
SB-20		15-20-40		45				
SB-21		25-32-37						
SB-22		20-20-40		50				
SB-23		100"						
SB-24		100"		55				
SB-25		100"						
				60				

REMARKS

Boring initially advanced to 8.0 feet bgs. with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Reference elevation is top of casing. Blow counts do not represent SPT results.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-11D2
LOCATION	Former Mill E/Koppers	PAGE	4 OF 4
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.84'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	76.50'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/21/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-26		100"						
SB-27		100"		65				
SB-28		100"		70				
SB-29		10-20-20		75				
				80				

WELL COMPLETION DETAILS:

+2 to 62.5 foot: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe.

62.5 to 73.0 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots.

73.0 to 73.5 feet: 2-inch-diameter threaded end cap.

0 to 1.0 foot: Concrete.

1.0 to 3.0 feet: Medium bentonite chips hydrated with potable water.

3.0 to 56.0 feet: Volclay grout.

56.0 to 58.0 feet: Medium bentonite chips.

58.0 to 73.2 feet: 10 - 20 Colorado Silica Sand.

73.2 to 74.5 feet: Bentonite chips hydrated with potable water.

74.5 to 76.5 feet: Native sand and silt.

74.5 to 76.5 feet: SILTY CLAY/CLAYEY SILT (ML-CL), gray, medium plasticity, wood debris, soft, wet. Faint hydrogen sulfide odor. (LOWER SILT - ESTUARINE/LACUSTRINE?)

Boring completed at 76.5 feet on 7-21-92.

REMARKS

Boring initially advanced to 8.0 feet bgs. with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Reference elevation is top of casing. Blow counts do not represent SPT results.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	11.16'
DRILL METHOD	6" I.D. H.S. Auger	TOTAL DEPTH	13.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/29/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
MW-23-0								**0 to 1.5 feet: SANDY GRAVEL (GP),** gray to brown, medium to coarse gravel to cobbles, medium to coarse sand, abundant wood fragments and organic matter, very dense, dry. (GRADE FILL)
MW-23-1	4	21-54-56						**1.5 to 5.5 feet: SAND (SP),** gray, fine to medium, loose, dry to moist. Few black lenses of silty sand. (UPPER SAND - DREDGE FILL)
MW-23-2	50	21-26-36						@ 3.5 feet: color change to brown, slight hydrocarbon-like odor.
MW-23-3	49	22-32-44		5				
			▽ 7-29-92					**5.5 to 8.5 feet: SAND (SP),** gray brown, medium sand, trace coarse sand, medium dense, wet. Strong hydrocarbon-like odor. (UPPER SAND - DREDGE FILL)
MW-23-4	60	14-22-26						
MW-23-5	95	10-10-11						
MW-23-6	40	3-4						**8.5 to 9.0 feet: SANDY SILT (SM),** gray, non-plastic, fine sand, firm to stiff, wet. (UPPER SILT - ESTUARINE)
				10				**9.0 to 9.5 feet: SAND (SP),** gray, medium, loose, wet. (UPPER SILT - ESTUARINE)

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	11.16'
DRILL METHOD	6" I.D. H.S. Auger	TOTAL DEPTH	13.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/29/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
MW-23-7	31	4-6						**9.5 to 13.5 feet: SILT (ML),** gray, abundant organic matter, wood debris, stiff, wet. Medium sand lenses at 12.8 to 13.0 feet. Strong hydrocarbon-like odor at 11.75 to 12.8 feet.
MW-23-8 -CAR		4-14						
MW-23-9	11	4-5-7						
								Boring completed at 13.5 feet on 7-29-92.
				15				**WELL COMPLETION DETAILS:**
								0 to 0.5 feet: Concrete. 0.5 to 3.0 feet: Volclay coarse bentonite chips. 3.0 to 13.5 feet: 10 - 20 Colorado Silica Sand. 0 to 4.0 feet: 2-inch-diameter, schedule 40 PVC blank riser pipe. 4.0 to 11.0 feet: 2-inch-diameter, schedule 40 PVC well screen with 0.020-inch machined slots. 11.0 to 11.2 feet: 2-inch-diameter, schedule 40 PVC slip cap secured with two stainless-steel screws.
				20				

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23D2
LOCATION	Former Mill E/Koppers	PAGE	1 OF 5
DRILLED BY	Ramlo	REFERENCE ELEV.	
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	99.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/28/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-1		-						**0 to 2.0 feet: SANDY GRAVEL (GP),** brown to black, angular gravel to cobbles, fine to coarse sand, some organic silt, wood debris very dense, dry to moist. Faint hydrocarbon-like odor. (GRADE FILL)
SB-2		-						**2.0 to 7.0 feet: SAND (SP),** gray, fine to medium, trace silt, dense, wet below 4.5 feet. Creosote-like odor below 4.5 feet. (UPPER SAND - DREDGE FILL)
SB-3		-	▽ 7-24-92	5				
SB-4		-						**7.0 to 10.0 feet: SILTY SAND (SM),** gray, fine, dense, wet. Creosote-like odor. (UPPER SILT - ESTUARINE)
SB-5		-						
SB-6		-		10				**10.0 to 12.6 feet: SILT (ML),** gray, non-plastic, trace fine sand, firm, wet. Faint creosote-like odor. Silty sand lenses 0.4 feet thick. (UPPER SILT - ESTUARINE)
SB-7		-						
SB-8		-						**12.6 to 64.0 feet: SAND (SP),** gray, fine to medium, trace silt, trace fine subrounded gravel, trace to few wood fragments, medium to very dense, wet. Faint creosote-like odor to 30.0 feet. Few subrounded gravel 15.0 to 26.0 feet. Sand grades finer below 34.0 feet. Silt increases below 34.0 feet. (LOWER SAND - FLUVIAL)
SB-9		-		15				
SB-10		-						
SB-11		-		20				

REMARKS

G = grab sample. No blow counts recorded. Boring initially advanced to 10 feet bgs with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Excessive grout was noted in well during development. Well was abandoned August 11, 1992 by pumping grout thru screen. Well replaced by drilling new well MW-23D2B 8 feet south.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23D2
LOCATION	Former Mill E/Koppers	PAGE	2 OF 5
DRILLED BY	Ramlo	REFERENCE ELEV.	
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	99.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/28/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-12		-						
SB-13		-						
				25				
SB-14		-						
SB-15		-						
				30				
SB-16		-						
				35				
SB-17		-						
				40				

REMARKS

G = grab sample. No blow counts recorded. Boring initially advanced to 10 feet bgs with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Excessive grout was noted in well during development. Well was abandoned August 11, 1992 by pumping grout thru screen. Well replaced by drilling new well MW-23D2B 8 feet south.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23D2
LOCATION	Former Mill E/Koppers	PAGE	3 OF 5
DRILLED BY	Ramlo	REFERENCE ELEV.	
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	99.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/28/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-18		-						
SB-19		-		45				
SB-20		-		50				
				55				
				60				

REMARKS

G = grab sample. No blow counts recorded. Boring initially advanced to 10 feet bgs with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Excessive grout was noted in well during development. Well was abandoned August 11, 1992 by pumping grout thru screen. Well replaced by drilling new well MW-23D2B 8 feet south.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23D2
LOCATION	Former Mill E/Koppers	PAGE	4 OF 5
DRILLED BY	Ramlo	REFERENCE ELEV.	
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	99.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/28/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-21		-		65				64.0 to 67.0 feet: **SANDY SILT (ML),** gray, non-plastic, fine sand, trace medium sand, trace wood and shell fragments, stiff, wet. Laminated bedding. (LOWER SILT? - ESTUARINE/MARINE)
SB-22		-		70				67.0 to 99.0 feet: **SAND (SP),** gray, fine to medium, trace silt, dense, wet. Sand coarsening and silt decreasing with depth. (LOWER SAND? - FLUVIAL/MARINE)
SB-23		-		75				
SB-24		-						
				80				

REMARKS

G = grab sample. No blow counts recorded. Boring initially advanced to 10 feet bgs with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Excessive grout was noted in well during development. Well was abandoned August 11, 1992 by pumping grout thru screen. Well replaced by drilling new well MW-23D2B 8 feet south.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23D2
LOCATION	Former Mill E/Koppers	PAGE	5 OF 5
DRILLED BY	Ramlo	REFERENCE ELEV.	
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	99.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/28/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G-25		-		85				**WELL COMPLETION DETAILS:** 0 to 54.7 feet: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe. 54.7 to 64.7 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots. 64.7 to 65.1 feet: 2-inch-diameter threaded end cap. 0 to 1 foot: Concrete. 1.0 to 7.0 feet: Medium bentonite chips hydrated with potable water. 7.0 to 46.6 feet: Volclay grout. 46.6 to 65.3 feet: 10 - 20 Colorado Silica Sand. 65.3 to 70.0 feet: Bentonite chips hydrated with potable water. 70.0 to 99.0 feet: Volclay grout.
G-26		-		90				
G-27		-		95				
G-28		-						
				100				Boring completed at 99.0 feet bgs on 7-28-92.

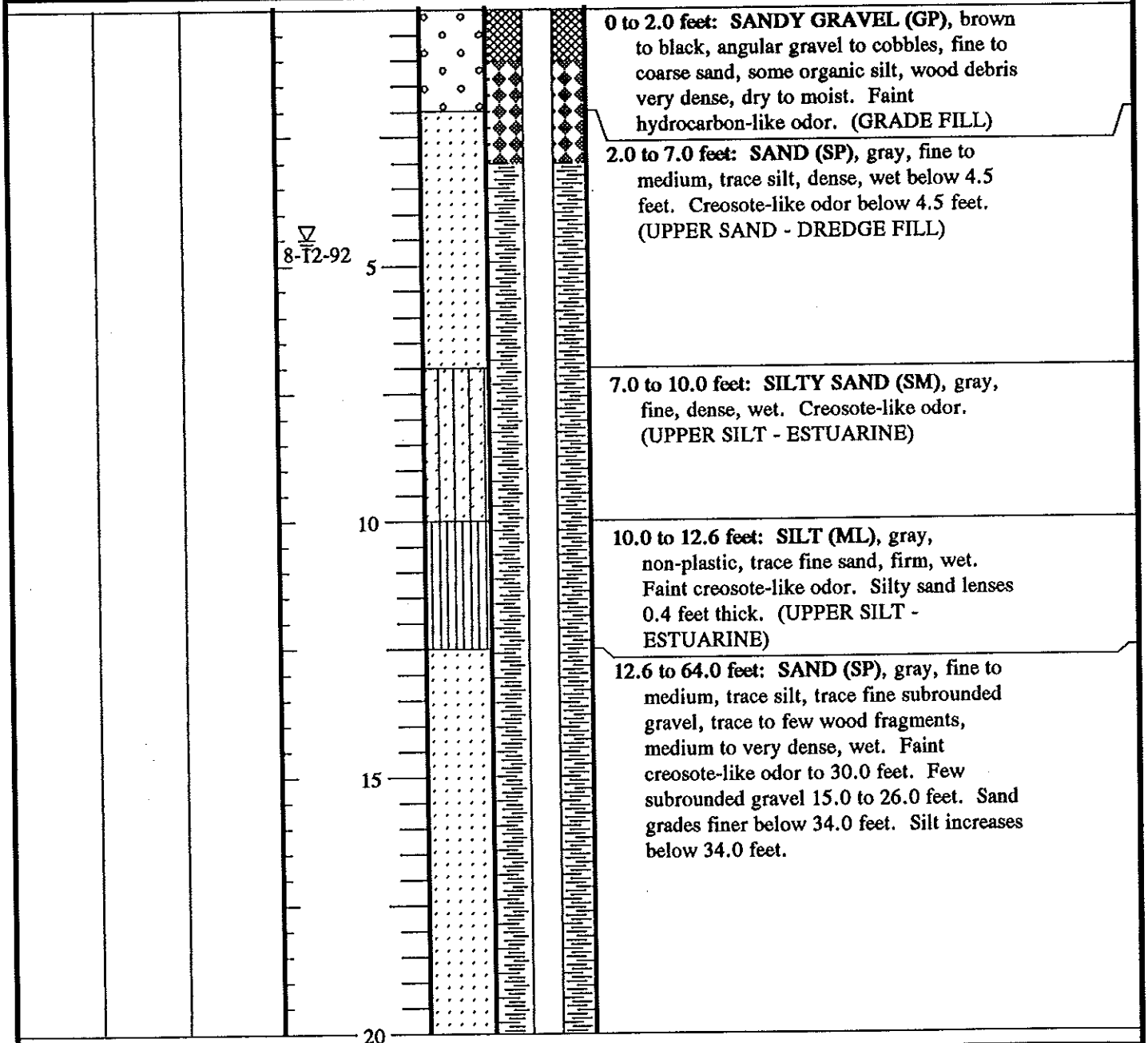
REMARKS

G = grab sample. No blow counts recorded. Boring initially advanced to 10 feet bgs with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Excessive grout was noted in well during development. Well was abandoned August 11, 1992 by pumping grout thru screen. Well replaced by drilling new well MW-23D2B 8 feet south.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23D2B
LOCATION	Former Mill E/Koppers	PAGE	1 OF 4
DRILLED BY	Ramlo	REFERENCE ELEV.	11.09'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	67.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/12/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION



0 to 2.0 feet: SANDY GRAVEL (GP), brown to black, angular gravel to cobbles, fine to coarse sand, some organic silt, wood debris very dense, dry to moist. Faint hydrocarbon-like odor. (GRADE FILL)

2.0 to 7.0 feet: SAND (SP), gray, fine to medium, trace silt, dense, wet below 4.5 feet. Creosote-like odor below 4.5 feet. (UPPER SAND - DREDGE FILL)

7.0 to 10.0 feet: SILTY SAND (SM), gray, fine, dense, wet. Creosote-like odor. (UPPER SILT - ESTUARINE)

10.0 to 12.6 feet: SILT (ML), gray, non-plastic, trace fine sand, firm, wet. Faint creosote-like odor. Silty sand lenses 0.4 feet thick. (UPPER SILT - ESTUARINE)

12.6 to 64.0 feet: SAND (SP), gray, fine to medium, trace silt, trace fine subrounded gravel, trace to few wood fragments, medium to very dense, wet. Faint creosote-like odor to 30.0 feet. Few subrounded gravel 15.0 to 26.0 feet. Sand grades finer below 34.0 feet. Silt increases below 34.0 feet.

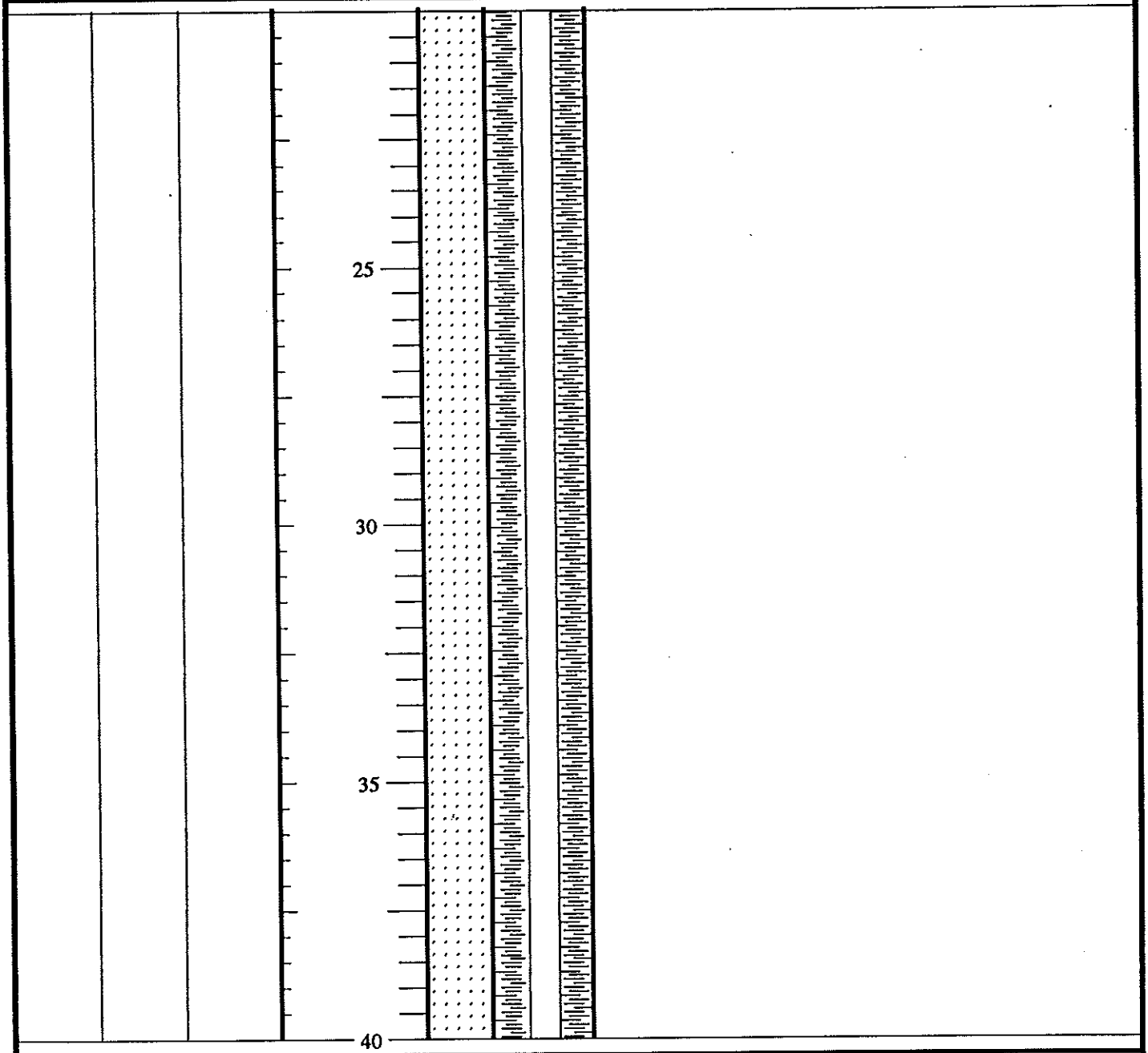
REMARKS

Well and boring replaces MW-23D2. No samples were collected. Well installed 8.0 feet south of MW-23D2.
Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23D2B
LOCATION	Former Mill E/Koppers	PAGE	2 OF 4
DRILLED BY	Ramlo	REFERENCE ELEV.	11.09'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	67.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/12/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION



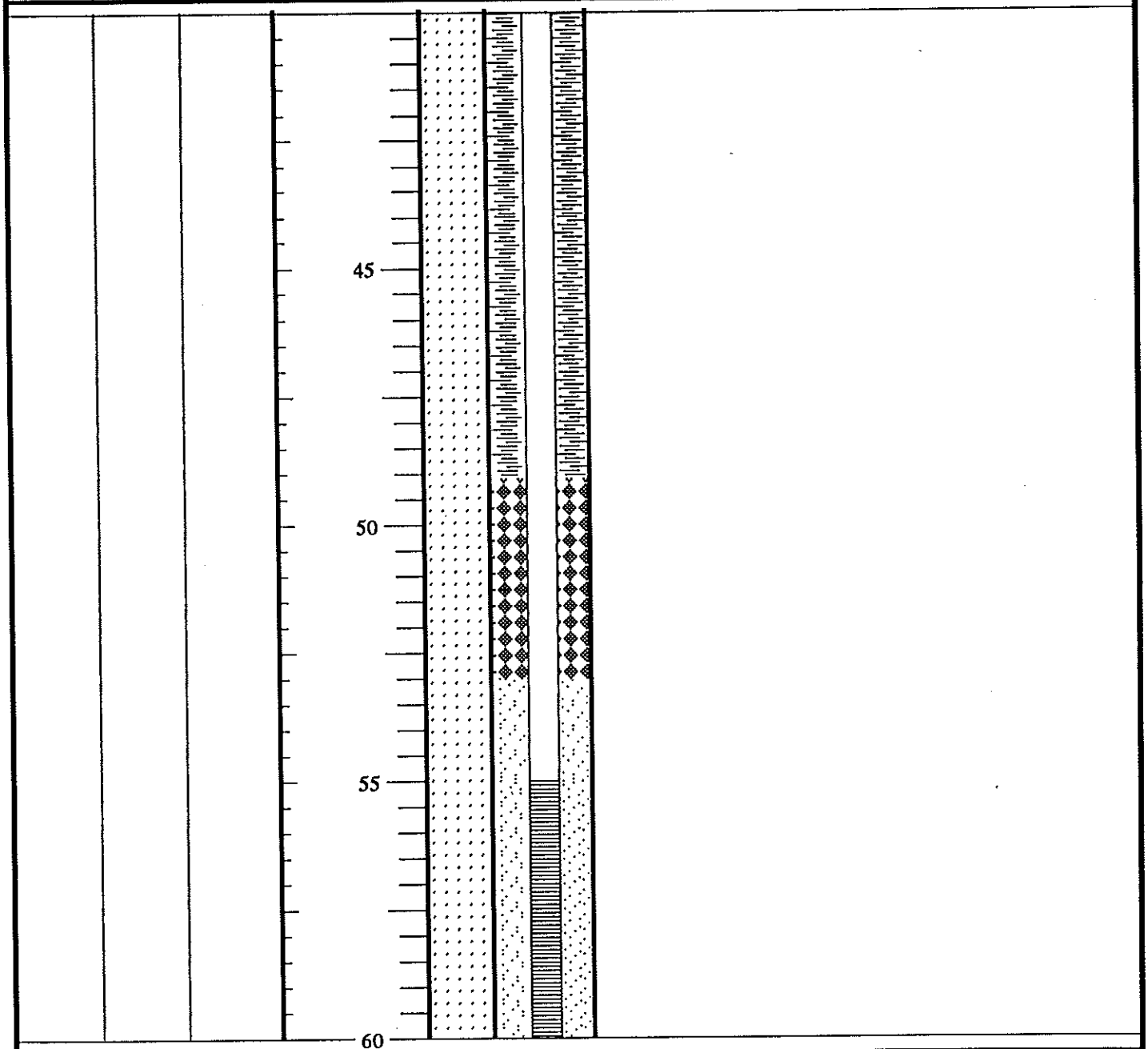
REMARKS

Well and boring replaces MW-23D2. No samples were collected. Well installed 8.0 feet south of MW-23D2.
Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23D2B
LOCATION	Former Mill E/Koppers	PAGE	3 OF 4
DRILLED BY	Ramlo	REFERENCE ELEV.	11.09'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	67.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/12/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION



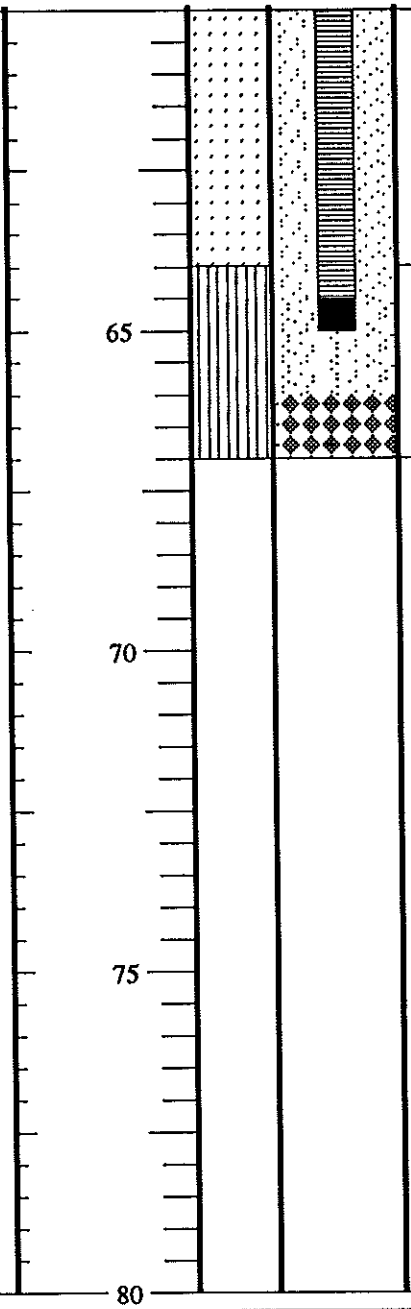
REMARKS

Well and boring replaces MW-23D2. No samples were collected. Well installed 8.0 feet south of MW-23D2.
Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-23D2B
LOCATION	Former Mill E/Koppers	PAGE	4 OF 4
DRILLED BY	Ramlo	REFERENCE ELEV.	11.09'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	67.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/12/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION



64.0 to 67.0 feet: SANDY SILT (ML), gray, non-plastic, fine sand, trace medium sand, trace wood and shell fragments, stiff, wet. Laminated bedding. (LOWER SILT? - ESTUARINE/MARINE)

Boring completed at 67.0 feet bgs on 8-12-92.

WELL COMPLETION DETAILS:

0 to 55.0 feet: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe.
55.0 to 64.5 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots.
64.5 to 65.0 feet: 2-inch-diameter threaded end cap.

0 to 1 foot: Concrete.
1.0 to 3.0 feet: Medium bentonite chips hydrated with potable water.
3.0 to 49.1 feet: Volclay grout.
49.1 to 53.0 feet: Medium bentonite chips hydrated with potable water.
53.0 to 66.0 feet: 10 - 20 Colorado Silica Sand.
66.0 to 67.0 feet: Medium bentonite chips hydrated with potable water.

REMARKS
Well and boring replaces MW-23D2. No samples were collected. Well installed 8.0 feet south of MW-23D2.
Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-27
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	9.46'
DRILL METHOD	6" I.D. H.S. Auger	TOTAL DEPTH	16.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/29/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
								0 to 1.0 feet: CONCRETE
MW-27-1	2	12-10-13						**1.0 to 3.5 feet: SANDY GRAVEL (GP),** gray brown, medium angular to subrounded gravel, medium sand, dry to moist. (GRADE FILL)
MW-27-2		13-8-9	▽					
MW-27-3	297	4-8-8						**3.5 to 4.0 feet: SAND (SP),** gray, medium sand, trace coarse sand, trace gravel, strong hydrocarbon-like odor, loose, wet. (UPPER SAND - DREDGE FILL)
				5				**4.0 to 11.5 feet: SAND (SP),** dark gray, medium to coarse, loose, wet. Hydrocarbon-like odor. (UPPER SAND - DREDGE FILL)
MW-27-4	317	11-9-5						
MW-27-5	346	5-7-7						
MW-27-6	315	7-7-7						
				10				

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-27
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	9.46'
DRILL METHOD	6" I.D. H.S. Auger	TOTAL DEPTH	16.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/29/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
MW-27-7	328	25-12-22						@ 10.0 feet: heaving, add water.
MW-27-8	147	10-26-20						**11.5 to 11.7 feet: SILT (ML),** gray, low plasticity, abundant wood fragments, stiff, wet. (UPPER SILT - ESTUARINE)
								11.7 to 15.2 feet: SAND (SP), dark brown, medium sand with fine gravel, dense, wet. Hydrocarbon-like odor. (UPPER SILT (?) - ESTUARINE)
MW-27-9	136	15-18-11						
MW-27-10	<1	3-5-5						
				15				**15.2 to 16.0 feet: SILT (ML),** gray, low plasticity, abundant organic matter, trace fine sand, firm, wet. (UPPER SILT (?) - ESTUARINE)
								Boring completed at 16.0 feet on 7-29-92.
								WELL COMPLETION DETAILS:
								0 to 2.0 feet: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe.
								2.0 to 12.0 feet: 2-inch-diameter, schedule 40 PVC well screen with 0.020-inch machined slots.
								12.0 to 12.3 feet: 2-inch-diameter, schedule 40 PVC blank riser pipe.
								12.3 to 12.4 feet: 2-inch-diameter, schedule 40 flush-threaded PVC end cap.
								0 to 0.5 feet: Concrete.
								0.5 to 1.0 feet: Volclay coarse bentonite chips.
								1.0 to 13.5 feet: 10 - 20 Colorado Silica Sand.
								13.5 to 16.0 feet: Native sand and silt.
				20				

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-28
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.64'
DRILL METHOD	6-inch I.D. HSA	TOTAL DEPTH	6.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/28/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 0.5 feet: CONCRETE
MW-28-1-CAR	<1						**0.5 to 4.0 feet: SANDY GRAVEL (GP),** brown, fine to medium gravel, fine to medium sand, loose, dry to moist. (MIXED FILL)
MW-28-2-CAR	<1						
MW-28-3	<1	3-3-4					
			▽ 7-28-92	5			**4.0 to 5.25 feet: SAND (SP),** gray brown to dark gray, medium, loose, wet. (UPPER SAND - DREDGE FILL)
MW-28-4	98	2					
MW-28-5	48	3-3					**5.25 to 6.5 feet: SILT (ML),** gray brown, abundant wood fragments, stiff, wet. (UPPER SILT - ESTUARINE)
							Boring completed at 6.5 feet on 7-28-92. Boring abandoned with Volclay coarse bentonite chips to 0.5 feet bgs. and concrete to the surface.
				10			

REMARKS

(1) Blow counts do not represent SPT results. (2) No well installed due to limited saturation. (3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-28B
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.67'
DRILL METHOD	6-inch I.D. HSA	TOTAL DEPTH	5.50'
LOGGED BY	Nelson	DATE COMPLETED	07/30/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 8.0 inches: CONCRETE
							8.0 inches to 4.0 feet: SAND (SP), fine, trace fine gravel, trace wood debris, loose, dry to moist, petroleum hydrocarbon-like odor. (FILL)
MW-28B-1							
MW-28B-2		1/8"	▽ 7-30-92				**4.0 to 4.75 feet: SAND (SP),** fine, trace fine gravel, loose, wet, strong hydrocarbon-like odor. (UPPER SAND - DREDGE FILL)
MW-28B-3				5			**4.75 to 5.5 feet: SILT (ML),** brown to gray, abundant organic matter, trace fine sand, wet. (UPPER SILT - ESTUARINE)
							Boring completed at 5.5 feet on 7-30-92.
							Boring abandoned with Volclay coarse bentonite chips to 1 foot bgs. and concrete to the surface.
				10			

REMARKS

(1) Blow counts may not represent SPT results. (2) No well installed due to limited saturation. (3) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-30
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	10.66'
DRILL METHOD	6" I.D. H.S. Auger	TOTAL DEPTH	9.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/28/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
MW-30-0								**0 to 2.0 feet: SANDY GRAVEL (GP),** medium to coarse gravel to cobbles, medium sand, abundant wood fragments, very dense, dry. (GRADE FILL)
MW-30-1 MW-30-1-AS	<1	36-53-50/4"						**2.0 to 8.9 feet: SAND (SP),** dark gray to black, medium sand, dense, wet below 4.5 feet. (UPPER SAND - DREDGE FILL)
MW-30-2	2	60-28-40						@ 2.5 feet: color change to gray brown.
MW-30-3	<1	60-20-26	▽	5				**WELL COMPLETION DETAILS:** 0 to 3.6 feet: 2-inch-diameter, schedule 40 PVC blank riser pipe. 3.6 to 8.85 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots. 8.85 to 9.0 feet: 2-inch-diameter schedule 40 PVC slip cap secured with two stainless-steel screws. 0 to 0.5 feet: Concrete. 0.5 to 2.5 feet: Volclay coarse bentonite chips. 2.5 to 9.5 feet: 10 - 20 Colorado Silica Sand.
MW-30-4	<1	12-16-13						@ 6.5 feet: faint hydrocarbon-like odor.
MW-30-5	2	4-4-5						**8.9 to 9.0 feet: SILT (ML),** dark gray to black, low plasticity, some organic matter, firm, wet. (UPPER SILT - ESTUARINE)
				10				Boring completed at 9.0 feet on 7-28-92.

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is top of casing.

EMCON Northwest, Inc.

0141-037.06.WKOP2.L41/sa:4.01/05/93

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-30D
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Ramlo Well	REFERENCE ELEV.	10.38'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	23.30'
LOGGED BY	Howard Small	DATE COMPLETED	08/03/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
GRAB-1	<1	-	▽ 7-31-92	5				**0 to 1.5 feet: SANDY GRAVEL (GW)**, dark gray, angular pebbles and cobbles, fine to coarse sand, organic/wood debris, very dense, dry. (GRADE FILL)
								1.5 to 9.0 feet: SAND (SP), gray, medium, dense, wet below 4.5 feet. (UPPER SAND - DREDGE FILL)
SB-2	<1	-						
SB-3	<1	-		10				**9.0 to 12.0 feet: SILT (ML)**, gray, non-plastic, trace fine sand, stiff, wet. Scattered sandy silt lenses. (UPPER SILT - ESTUARINE)
SB-4	<1	-						
								12.0 to 23.5 feet: SAND (SP), gray, medium to coarse, trace silt, medium dense, wet. (LOWER SAND - FLUVIAL)
				15				
				20				

REMARKS

Blow counts not recorded. Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-30D
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Ramlo Well	REFERENCE ELEV.	10.38'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	23.30'
LOGGED BY	Howard Small	DATE COMPLETED	08/03/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				25				Boring completed at 23.3 feet bgs on 7-31-92.
				30				**WELL COMPLETION DETAILS:** 0 to 13.1 feet: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe. 13.1 to 22.7 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots. 22.7 to 23.1 feet: 2-inch-diameter threaded end cap. 0 to 1.0 foot: Concrete. 1.0 to 3.0 feet: Medium bentonite chips hydrated with potable water. 3.0 to 9.0 feet: Volclay grout. 9.0 to 11.0 feet: Medium bentonite chips. 11.0 to 23.3 feet: 10 - 20 Colorado Silica Sand.
				35				
				40				

REMARKS

Blow counts not recorded. Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser, Everett	BORING NO.	SB-19
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.66'
DRILL METHOD	HSA	TOTAL DEPTH	3.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/27/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-19-0-CAR	4						0 to 8-inches: CONCRETE.
							8 inches to 3.5 feet: SAND (SP), black, fine to medium, loose, moist. (MIXED FILL)
							@ 1.5 to 2.0 feet: CONCRETE.
SB-19-1			▽ 7-27-92				
							@ 3.5 feet: concrete.
							Boring completed at 3.5 feet on 7-27-92.
							Boring abandoned with hydrated bentonite chips to 1.0 foot bgs. and concrete to the surface.
				5			
				10			
				15			
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser, Everett	BORING NO.	SB-20
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.65'
DRILL METHOD	HSA	TOTAL DEPTH	3.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/27/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-20-0	360	10-16-24					**0 to 0.5 foot: CONCRETE.**
							0.5 to 1.5 feet: SAND (SP), light gray, medium to coarse, with subrounded gravel, dense, moist, strong petroleum hydrocarbon-like odor. (MIXED FILL)
SB-20-1							**1.5 to 2.0 feet: SANDY GRAVEL (GP)**, gray, medium to coarse, subrounded, medium sand, some wood fragments, dense, moist. Strong petroleum hydrocarbon-like odor. (FILL)
				5			**2.0 to 3.0 feet: CONCRETE,** Refusal.
							Boring completed at 3.0 feet.
							Boring abandoned with hydrated bentonite chips to 1.0 foot bgs. and concrete to the surface.
				10			
				15			
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-21
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.82'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	19.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/17/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 2.0 inches: ASPHALT
SB-21-1	2.7	50-70-50					**2.0 inches to 2.0 feet: SANDY GRAVEL (GP),** brown to dark brown, medium to coarse, angular to subrounded gravel, fine to medium sand, some silt, very dense, dry to moist. (GRADE FILL)
SB-21-2	<1	16-17-17	▽ 7-17-92				**2.0 to 7.5 feet: SAND (SP),** top 3 inches black, below 3 inches light brown, fine to medium sand, trace coarse sand, dense, wet below 3.0 feet. (UPPER SAND - DREDGE FILL) @ 3.0 feet: gray to orange banding on sand, iridescent sheen. @ 3.5 feet: sand brown to gray.
SB-21-3	<1	13-15-15					
				5			@ 5.0 feet: color change to gray, trace organic matter.
SB-21-4	<1	14-21-23					
SB-21-5	<1	1-2-2					**7.5 to 18.5 feet: SILT (ML),** brown, low plasticity, interbedded with gray medium sand in upper 3.0 inches, abundant wood fragments, organic matter and rootlets, firm to stiff, wet. (UPPER SILT - ESTUARINE)
SB-21-6	1.0	1-1-2					@ 9.0 to 9.5 feet: gray, medium sand layer.
				10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-21
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.82'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	19.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/17/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-21-7	1.0	5-5-7					
SB-21-8	1.0	2-5-6					@ 13.0 feet: abundant organic matter in gray-brown layers, trace fine sand.
SB-21-9	1.0	5					
SB-21-10	1.0	2-3-4		15			@ 14.5 feet: some organic matter.
SB-21-11	<1	6-16-28					@ 16.0 feet: sandy silt, brown fine sand, wet, abundant organic matter.
SB-21-12	<1	17-23-39					@ 18.25 to 18.5 feet: sandy silt, brown fine to medium sand, trace organic matter.
							18.5 to 19.0 feet: SAND (SP), gray, medium to coarse sand, some wood debris, medium dense, wet. (LOWER SAND - FLUVIAL)
				20			Boring completed at 19.0 feet on 7-17-92. Boring abandoned with Volclay coarse bentonite chips

REMARKS

(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-22
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.69'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	7.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/24/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 6.0 inches: WOOD CHIPS and GRAVEL (GP), dark brown to black angular gravel to cobbles, dense, dry. (GRADE FILL)
SB-22-1		50-43-65					**6.0 inches to 3.5 feet: SANDY GRAVEL (GP),** dark gray-brown to black, fine to medium subrounded gravel, medium sand, very dense, dry. Strong hydrocarbon-like odor. (GRADE FILL)
SB-22-28	488	20-25-40					
			▽ 7-24-92				**3.5 to 7.0 feet: SAND (SP),** dark gray brown to black, medium sand, trace fine to medium subrounded gravel, dense, wet below 4.0 feet. Strong hydrocarbon-like odor and iridescent sheen. Product(?) at 6.5 feet. (UPPER SAND - DREDGE FILL)
SB-22-3	485	20-24-25		5			
SB-22-4	377	11-12-15					
							7.0 to 7.5 feet: SILT (ML), dark gray to black silt with some organic matter, low plasticity, firm, wet. (UPPER SILT - ESTUARINE)
							Boring completed at 7.5 feet on 7-24-92.
							Boring abandoned with Volclay coarse bentonite chips to the surface.
				10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-23
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.00'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	12.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/23/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-23-0							**0 to 2.5 feet: SANDY GRAVEL (GP),** light gray, fine to coarse angular gravel to cobbles, fine to medium sand, abundant organic matter, wood fragments, very dense, dry. Strong creosote-like odor at 2.0 feet. (GRADE FILL)
SB-23-1	504	32-58-51					
							2.5 to 4.0 feet: SANDY GRAVEL (GP), dark brown to black, medium to coarse gravel, fine to medium sand, very dense, dry to moist. Strong creosote-like odor. (GRADE FILL)
SB-23-2	336	22-40-50	▽				
			7-23-92				**4.0 to 12.0 feet: SAND (SP),** dark brown, medium to coarse sand, dense to very dense, wet. Strong creosote-like odor. Some free product? (UPPER SAND - DREDGE FILL)
SB-23-3	371	30-55-50		5			
SB-23-4	394	11-19-34					
SB-23-5	344						
SB-23-6	306	12-15-15		10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Weyerhaeuser - Everett**	BORING NO.	**SB-23**
LOCATION	**Former Mill E/Koppers**	PAGE	**2 OF 2**
DRILLED BY	**Tacoma Pump & Drill.**	REFERENCE ELEV.	**8.00'**
DRILL METHOD	**4" I.D. H.S. Auger**	TOTAL DEPTH	**12.50'**
LOGGED BY	**Burkett/Carl**	DATE COMPLETED	**07/23/92**

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-23-7	320	5-7-22		15			**12.0 to 12.5 feet: SILT (ML),** dark gray to black, low plasticity, abundant wood fragments, firm, wet. (UPPER SILT - ESTUARINE) Boring completed at 12.5 feet on 7-23-92. Boring abandoned with Volclay coarse bentonite chips to the surface.
				20			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-24
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.53'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	18.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/20/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 3.0 inches: GRAVEL (GP), gray, medium to coarse angular gravel, loose, dry. (MIXED FILL)
SB-24-1	5	33-41-40					**3.0 to 3.5 feet: SANDY GRAVEL (GP),** brown, medium to coarse subangular gravel, fine to medium sand, dense, wet below 3.0 feet. Strong hydrocarbon-like odor, iridescence. (MIXED FILL)
SB-24-2	1400	13-29-36	▽ 7-20-92				
SB-24-3	32	16-9-10					**3.5 to 5.5 feet: SAND (SP),** dark gray medium sand, medium dense, wet. Strong hydrocarbon-like odor, iridescence. (UPPER SAND - DREDGE FILL)
SB-24-4	700	8-7-10		5			
SB-24-5	197 240	3-7-9					**5.5 to 17.0 feet: SILT (ML),** dark gray to black with abundant wood fragments, low plasticity, firm to stiff, wet. Interbedded sandy silt and sand. (UPPER SILT - ESTUARINE) @ 7.0 to 7.25 feet: sand interbed, dark gray-brown coarse sand.
SB-24-6	17	3-6-7					@ 8.5 and 8.7 feet: <0.05-foot thick lenses of fine sand.
SB-24-7	8	2-3-6		10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-24
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.53'
DRILL METHOD	4" I.D. H.S. Auger	TOTAL DEPTH	18.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/20/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-24-8	8	3-5-9					
SB-24-9	15	7-7-9					@ 12.25 to 14.0 feet: interbedded silt and sandy silt, layers approximately 0.05-feet thick; brown to gray brown silt, dark gray fine sand, with some wood fragments.
SB-24-10	14	6-9-14		15			@ 14.0 to 14.5 feet: sand, dark gray, medium to coarse, some wood fragments.
SB-24-11	17	17-16-19					@ 15.5 to 16.5 sand, gray, medium, wet, some organic matter.
							@ 16.5 to 17.0 feet: silty fine sand with some organic matter.
SB-24-12	19	37-80-50/2"					**17.0 to 18.5 feet: SAND (SP)**, gray, medium to coarse sand, very dense, wet. (LOWER SAND - FLUVIAL)
							Boring completed at 18.5 feet on 7-20-92. Boring abandoned with Volclay coarse bentonite chips to the surface.
				20			

REMARKS

(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-25
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	8.49'
DRILL METHOD	Hollow Stem Auger	TOTAL DEPTH	6.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/20/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 4.0 inches: CONCRETE
SB-25-1	14	18-38-50					**4.0 inches to 1.0 foot: SANDY GRAVEL (GP),** gray brown to black, medium to coarse angular to subrounded gravel, fine to medium sand, very dense, moist. (MIXED FILL)
SB-25-2	56	30-62-58					**1.0 to 4.0 feet: SAND (SP),** gray-brown, medium, trace coarse sand, very dense, wet below 3.0 feet. Creosote-like odor. (UPPER SAND - DREDGE FILL)
			▽ 7-20-92				
SB-25-3	197	12-11-9					
							4.0 to 5.5 feet: SAND (SP), gray to black, medium to coarse sand, very dense, wet. Strong creosote-like odor, iridescent sheen. (UPPER SAND - DREDGE FILL)
SB-25-4	50	5-11-8		5			
							5.5 to 6.5 feet: SILT (ML), gray, low plasticity, abundant wood fragments, stiff, wet. Few sand lenses less than 0.1-feet thick. (UPPER SILT - ESTUARINE)
							Boring completed at 6.5 feet on 7-20-92.
							Boring abandoned with Volclay coarse bentonite chips to 1 foot bgs. and concrete to the surface.
				10			

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	SB-26
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.87'
DRILL METHOD	4" I.D. HSA	TOTAL DEPTH	9.50'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/10/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-1		8-11-14						**0 to 0.25 feet: ASPHALT.**
SB-2		12-9-8						**0.25 to 1.0 feet: SAND (SP)**, olive gray, medium, some organic debris, loose, dry. (MIXED FILL)
SB-3		5-9-6	▽ 8-10-92	5				**1.0 to 7.0 feet: SAND (SP)**, olive brown to olive gray, medium, loose, wet below 4.0 feet: Creosote-like odor and iridescent sheen at 7.0 to 7.5 feet.
SB-4		5-7-8						**7.0 to 9.5 feet: SILT (ML)**, brown, low plasticity, organic debris, firm, wet.
Shelby		--		10				Boring completed at 9.5 feet bgs on 8-10-92 Boring abandoned by backfilling with medium bentonite chips hydrated with potable water.
				15				
				20				

REMARKS
Blow counts do not represent SPT results. Reference elevation is at ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME **Weyco Mill E/Koppers**
LOCATION
DRILLED BY **Tacoma Pump and Drilling**
DRILL METHOD **Hollow Stem Auger (4-inch ID)**
LOGGED BY **Steve Nelson**

BORING NO. **SB-36**
PAGE **1 OF 1**
GROUND ELEV.
TOTAL DEPTH **9.00'**
DATE COMPLETED **10/15/93**

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 2.0 feet: SAND WITH GRAVEL (SW), brown, fine to medium, fine to coarse gravel, some silt and wood debris, dense, moist. (GRADE FILL)
SS-1	2300	16-30-35	▽ ATD	5				**2.0 to 9.7 feet: SAND (SP)**, brown fine to medium, medium dense, moist to wet below 3.5 feet. Strong creosote odor, brown staining, iridescent product below 2.5 feet. (UPPER SAND)
SS-2	--	16-21-24						
SS-3	--	15-18-21						
SS-4	--	14-16-10		10				**9.7 to 10.5 feet: SILT (ML)**, brown, low plasticity, trace organic debris and fine sand, firm, wet. Brown staining in upper 1 inch. (UPPER SILT)
								Total depth drilled = 9.0 feet.
								Total depth sampled = 10.5 feet.
				15				
				20				

REMARKS

Boring backfilled with hydrated medium bentonite chips. Blow counts do not represent SPT results. PID calibrated with 100 ppm isobutylene.

LOG OF EXPLORATORY BORING

PROJECT NAME **Weyco Mill E/Koppers**
LOCATION
DRILLED BY **Tacoma Pump and Drilling**
DRILL METHOD **Hollow Stem Auger (4-inch ID)**
LOGGED BY **Steve Nelson**

BORING NO. **SB-37**
PAGE **1 OF 1**
GROUND ELEV.
TOTAL DEPTH **7.00'**
DATE COMPLETED **10/15/93**

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
SS-1	2000	12-8-7	ATD	5				**0 to 0.5 foot:** SAND WITH GRAVEL (SW), brown, fine to medium, fine gravel, some silt and organic debris, dense, moist. (MIXED FILL) **0.5 to 7.5 feet:** SAND (SP), brown, fine to medium, medium dense, moist to wet below 3.5 feet. Strong gasoline-like odor. (UPPER SAND)
SS-2	--	4-6-6		10				**7.5 to 8.5 feet:** SILT (ML), brown, low plasticity, trace organic debris and fine sand, firm, wet. Total depth drilled = 7.0 feet. Total depth sampled = 8.5 feet.
				15				
				20				

REMARKS

Boring backfilled with hydrated medium bentonite chips. Blow counts do not represent SPT results. PID calibrated with 100 ppm isobutylene.

LOG OF EXPLORATORY BORING

PROJECT NAME **Weyco Mill E/Koppers**
LOCATION
DRILLED BY **Tacoma Pump and Drilling**
DRILL METHOD **Hollow Stem Auger (4-inch ID)**
LOGGED BY **Steve Nelson**

BORING NO. **SB-38**
PAGE **1 OF 1**
GROUND ELEV.
TOTAL DEPTH **8.50'**
DATE COMPLETED **10/15/93**

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 0.5 foot: CONCRETE
								0.5 to 0.8 foot: SAND (SP), gray, fine, loose, moist. (MIXED FILL)
								0.8 to 1.0 foot: GRAVEL (GP), gray, fine, angular, loose, moist. (MIXED FILL)
								1.0 to 2.0 feet: SAND (SP), brown, fine to medium, fine gravel, loose, moist. (MIXED FILL)
			▽ ATD					**2.0 to 9.5 feet: SAND (SP)**, brown, fine to medium, medium dense, moist to wet below 3.5 feet. Mild to strong creosote odor, iridescence and staining at 9+ feet. (UPPER SAND)
SS-1	50	5-10-14		5				
SS-2	--	12-20-25						
SS-3	--	10-10-7						
				10				**9.5 to 10.0 feet: SILT (ML)**, brown, low plasticity, trace organic debris and fine sand, firm, wet. Brown staining in upper 1 inch. (UPPER SILT)
								Total depth drilled = 8.5 feet.
								Total depth sampled = 10.0 feet.
				15				
				20				

REMARKS

Boring backfilled with hydrated medium bentonite chips and sealed with concrete. Blow counts do not represent SPT results. PID calibrated with 100 ppm isobutylene.

LOG OF EXPLORATORY BORING

PROJECT NAME **Weyco Mill E/Koppers**
LOCATION
DRILLED BY **Tacoma Pump and Drilling**
DRILL METHOD **Hollow Stem Auger (4-inch ID)**
LOGGED BY **Steve Nelson**

BORING NO. **SB-39**
PAGE **1 OF 1**
GROUND ELEV.
TOTAL DEPTH **7.00'**
DATE COMPLETED **10/15/93**

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 1.5 feet: SAND WITH GRAVEL (SW), brown, fine to coarse, fine to medium angular gravel, wood debris, some silt, dense, moist. (GRADE FILL)
								1.5 to 7.5 feet: SAND (SP), brown, fine to medium, medium dense, moist to wet below 3.5 feet. Faint creosote odor. (UPPER SAND)
			▽ ATD					
				5				
SS-1	50	7-7-7						
								7.5 to 8.5 feet: SILT (ML), brown, low plasticity, trace organic debris and fine sand, soft, wet. Sand lenses at 8.0 to 8.5 feet. (UPPER SILT)
								Total depth drilled = 7.0 feet.
								Total depth sampled = 8.5 feet.
				10				
				15				
				20				

REMARKS

Boring backfilled with hydrated medium bentonite chips. Blow counts do not represent SPT results. PID calibrated with 100 ppm isobutylene.

LOG OF EXPLORATORY BORING

PROJECT NAME **Weyco Mill E/Koppers**
LOCATION
DRILLED BY **Tacoma Pump and Drilling**
DRILL METHOD **Hollow Stem Auger (4-inch ID)**
LOGGED BY **Steve Nelson**

BORING NO. **SB-40**
PAGE **1 OF 1**
GROUND ELEV.
TOTAL DEPTH **5.00'**
DATE COMPLETED **10/15/93**

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
SS-1	1000	4-4-10	ATD	5				**0 to 0.5 foot: SILTY SAND (SM)**, dark brown, fine, some wood and organic debris, loose, moist. (MIXED FILL) **0.5 to 1.0 foot: SAND WITH GRAVEL (SW)**, brown, fine to medium, fine gravel, trace silt, moist. (MIXED FILL) **1.0 to 2.0 feet: SAND (SP)**, brown, fine, trace gravel, loose, moist to wet. (MIXED FILL) **2.0 to 5.4 feet: SAND (SP)**, brown, fine to medium, medium dense, moist to wet below 3.0 feet. Strong creosote odor and iridescent staining below 5.0 feet. (UPPER SAND) **5.4 to 6.5 feet: SILT (ML)**, brown, low plasticity, trace organic debris and fine sand, soft, wet. Brown staining in upper 1 to 3 inches. (UPPER SILT) Total depth drilled = 5.0 feet. Total depth sampled = 6.5 feet.
				10				
				15				
				20				

REMARKS

Boring backfilled with hydrated medium bentonite chips. Blow counts do not represent SPT results. PID calibrated with 100 ppm isobutylene.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW- 6D
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Ramlo Well	REFERENCE ELEV.	8.32'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	23.50'
LOGGED BY	John North	DATE COMPLETED	08/05/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
								0 to 4-inches: ASPHALT.
								4-inches to 1.5 feet: GRAVELLY SAND (SW), brown, fine to coarse, some subangular pebbles, dense, moist. (MIXED FILL)
								1.5 to 7.0 feet: SAND (SP), fine to medium, trace silt, fine subrounded gravel, and wood fragments, loose, wet below 4.5 feet. (UPPER SAND - DREDGE FILL)
			▽ 8-5-92	5				
SB/S-1	3.5							
SB/S-2	3							
SB/2-3	<1							**7.0 to 12.0 feet: SILT (ML),** gray, low plasticity, trace wood/root fragments, firm, wet. Thinly bedded sandy silt, very sandy in places. (UPPER SILT - ESTUARINE)
SB/S-4	<1			10				
								12.0 to 23.5 feet: SAND (SP), gray, medium to coarse, trace silt and fine sand, medium dense, wet. Sandy gravel at 20.0 feet. (LOWER SAND - FLUVIAL)
				15				
GRAB/ S-5	<1							
				20				

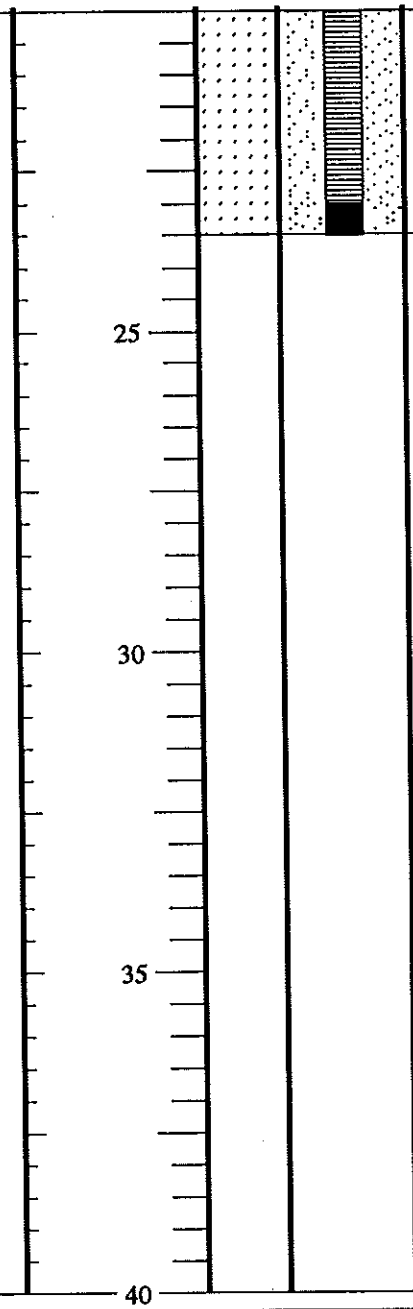
REMARKS

Boring initially advanced to 10.0 feet bgs. with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Sample blow counts not recorded. Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW- 6D
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Ramlo Well	REFERENCE ELEV.	8.32'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	23.50'
LOGGED BY	John North	DATE COMPLETED	08/05/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION



Boring completed at 23.5 feet bgs on 8-6-92.

WELL COMPLETION DETAILS:

+2 to 13.0 feet: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe.

13.0 to 23.0 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots.

23.0 to 23.5 feet: 2-inch-diameter threaded end cap.

0 to 1.0 foot: Concrete.

1.0 to 12.0 feet: Medium bentonite chips hydrated with potable water.

12.0 to 23.5 feet: 10 - 20 Colorado Silica Sand.

REMARKS

Boring initially advanced to 10.0 feet bgs. with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Sample blow counts not recorded. Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW- 9D
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Ramlo Well	REFERENCE ELEV.	10.18'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	23.00'
LOGGED BY	Howard Small	DATE COMPLETED	08/24/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G-1	<1	-	▽ 8-24-92	5				**0 to 2.5 feet: SANDY GRAVEL (GP),** brown coarse gravel to cobble, medium sand, abundant wood fragments, rootlets, very dense, dry to moist. (GRADE FILL)
SB-2	<1							**2.5 to 4.0 feet: SAND (SP),** gray to dark gray, medium, very dense, moist. (UPPER SAND - DREDGE FILL)
SB-3	2			10				**4.0 to 7.0 feet: SAND (SP),** dark gray to black, medium trace coarse sand, strong hydrogensulfide-like odor, iridescent, medium to very dense, wet. (UPPER SAND - DREDGE FILL)
SB-4	<1			15				**7.0 to 11.1: SILT (ML),** brown to black, non-plastic, some wood fragments, firm, wet. Few medium sand lenses 0.05 to 0.1-foot thick, strong odor.
				20				**11.1 to 23.0 feet: SAND (SP),** gray, medium to coarse, medium dense, wet. (LOWER SAND - FLUVIAL)

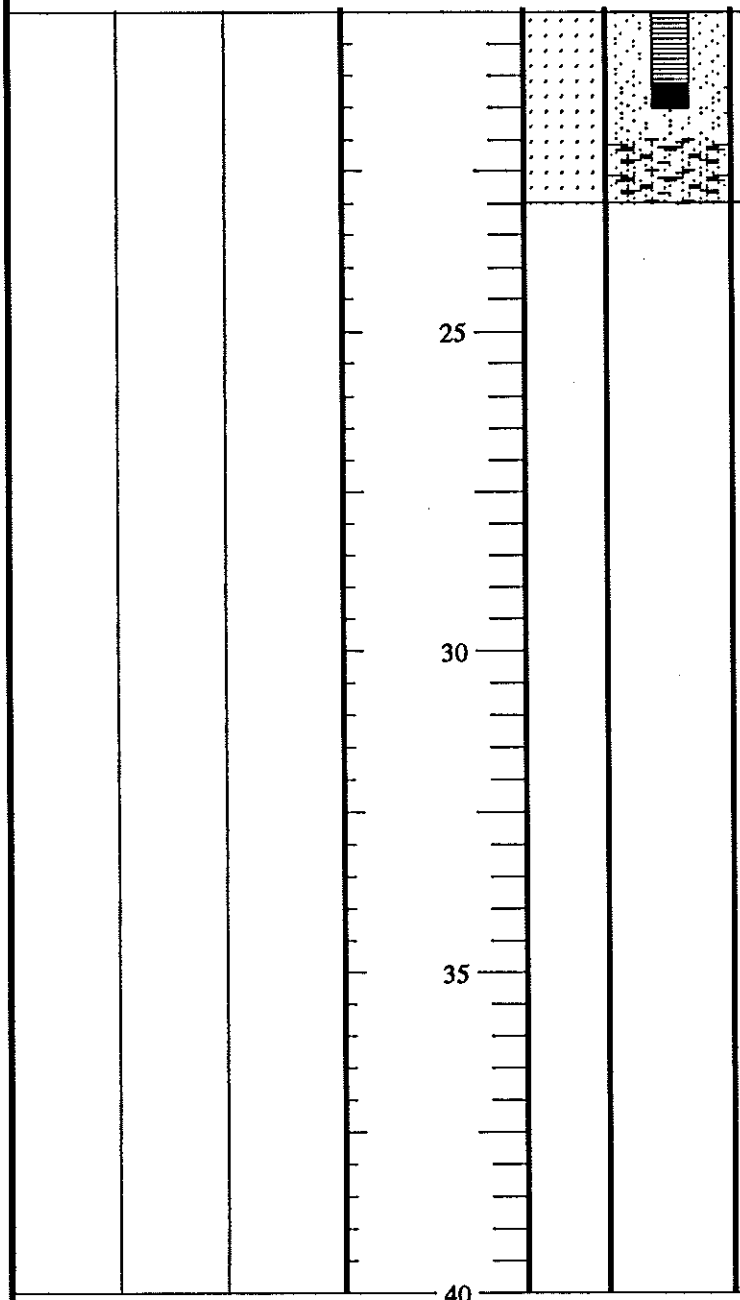
REMARKS

Reference elevation is top of casing. Blow counts not recorded.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW- 9D
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Ramlo Well	REFERENCE ELEV.	10.18'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	23.00'
LOGGED BY	Howard Small	DATE COMPLETED	08/24/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION



Boring completed at 23.0 feet bgs on 8-4-92.

WELL COMPLETION DETAILS:

0 to 11.5 foot: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe.

11.5 to 21.1 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots.

21.1 to 21.5 feet: 2-inch-diameter threaded end cap.

0 to 1.0 foot: Concrete.

1.0 to 11.0 feet: Medium bentonite chips hydrated with potable water.

11.0 to 22.0 feet: 10 - 20 Colorado Silica Sand.

22.0 to 23.0 feet: Native sand.

REMARKS

Reference elevation is top of casing. Blow counts not recorded.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-31
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	10.34'
DRILL METHOD	6-inch H.S. Auger	TOTAL DEPTH	9.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/22/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-1		22-77-43						0 to 2-inches: ASPHALT.
								2-inches to 2.0 feet: SANDY GRAVEL (GW), dark brown, medium to coarse gravel, fine to medium sand, trace angular cobbles, abundant organic and wood debris, very dense, moist. (GRADE FILL)
SB-2		28-30-30	▽ 7-22-92					2.0 to 8.0 feet: SAND (SP), gray, medium, trace coarse, very dense, wet below 4.0 feet. Strong creosote-like odor. (UPPER SAND - DREDGE FILL)
SB-3		6-10-15		5				
SB-4		9-15-9						
SB-5		4-6-9						8.0 to 9.5 feet: SILT (ML), brownish gray, low plasticity, trace wood fragments, stiff, wet. (UPPER SILT - ESTUARINE)
				10				Boring completed at 9.5 feet on 7-22-92.
				15				WELL COMPLETION DETAILS: +2 to 2.6 feet: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe. 2.6 to 7.6 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots. 7.6 to 8.0 feet: 2-inch-diameter threaded end cap. 0 to 1.0 feet: Concrete. 1.0 to 1.5 feet: Bentonite chips hydrated with potable water. 1.5 to 9.5 feet: 10 - 20 Colorado Silica Sand.
				20				

REMARKS

Blow counts do not represent SPT results. Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-31D
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Ramlo	REFERENCE ELEV.	10.03'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	22.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/29/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
			7-22-92	5				0 to 2-inches: ASPHALT. 2-inches to 2.0 feet: SANDY GRAVEL (GW), dark brown, medium to coarse gravel, fine to medium sand, trace angular cobbles, abundant organic and wood debris, very dense, moist. (GRADE FILL) 2.0 to 8.0 feet: SAND (SP), gray, medium, trace coarse, very dense, wet below 4.0 feet. Strong creosote-like odor. (UPPER SAND - DREDGE FILL)
				10				8.0 to 11.0 feet: SILT (ML), brown-gray, low plasticity, wood debris, stiff, wet. (UPPER SILT - ESTUARINE)
				15				11.0 to 22.0 feet: SAND (SP), gray, medium, coarse sand at 18.0 feet, medium dense, wet. (LOWER SAND - FLUVIAL)
				20				

REMARKS

Boring initially advanced to 9.0 feet bgs. with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Bailer samples collected continuously used for soil logging. Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-31D
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Ramlo	REFERENCE ELEV.	10.03'
DRILL METHOD	10"/6" Cable Tool	TOTAL DEPTH	22.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	07/29/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				25				Boring completed at 22.0 feet bgs on 7-30-92.
				30				**WELL COMPLETION DETAILS:** 0 to 12.0 foot: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe. 12.0 to 21.5 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots. 21.5 to 22.0 feet: 2-inch-diameter threaded end cap. 0 to 1.0 foot: Concrete. 1.0 to 11.0 feet: Medium bentonite chips hydrated with potable water. 11.0 to 22.0 feet: 10 - 20 Colorado Silica Sand.
				35				
				40				

REMARKS

Boring initially advanced to 9.0 feet bgs. with 10-inch casing. Boring completed with 6-inch casing. Bentonite grout seal installed in casing annulus. Bailer samples collected continuously used for soil logging. Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-32
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	10.87'
DRILL METHOD	6" I.D. H.S. Auger	TOTAL DEPTH	8.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/23/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
MW-32-1-AS	<1	28-45-60						**0 to 3.0 feet: SANDY GRAVEL (GP),** gray, fine to coarse gravel, few cobbles, medium sand, trace coarse sand, some wood fragments, few orange mottles, very dense, dry to moist. (GRADE FILL)
MW-32-2	7.4	12-24-30						**3.0 to 7.0 feet: SAND (SP),** brown, medium sand, dense, wet below 5.2 feet. (UPPER SAND - DREDGE FILL)
MW-32-3	<1	17-17-19	▽ 7-23-92	5				
MW-32-4	2.0	5-7-6						@ 6.5 to 7.0 feet: several 0.05-foot black layers.
								7.0 to 8.0 feet: SILT (ML), gray, low plasticity, abundant organic matter, firm, wet. (UPPER SILT - ESTUARINE)
				10				Boring completed at 8.0 feet on 7-23-92.
								See page two for Well Completion Details.

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-32
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	10.87'
DRILL METHOD	6" I.D. H.S. Auger	TOTAL DEPTH	8.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/23/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				15				**WELL COMPLETION DETAILS:** 0 to 3.0 feet: 2-inch-diameter, schedule 40 PVC blank riser pipe. 3.0 to 7.0 feet: 2-inch-diameter, schedule 40 PVC well screen with 0.020-inch machined slots. 7.0 to 7.2 feet: 2-inch diameter schedule 40 PVC end cap secured with two stainless-steel screws. 0 to 0.5 feet: Concrete. 0.5 to 2.0 feet: Volclay coarse bentonite chips. 2.0 to 8.0 feet: 10 - 20 Colorado Silica Sand.
				20				

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-33
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	11.06'
DRILL METHOD	6" I.D. H.S. Auger	TOTAL DEPTH	9.50'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/28/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
								0 to 4.0 inches: CONCRETE
MW-33-1	222	34-45-42						**4.0 inches to 2.5 feet: SANDY GRAVEL (GP),** dark brown, fine to coarse angular to subrounded gravel, fine to medium sand, trace organic matter, very dense, dry to moist. (MIXED FILL)
MW-33-2	11	15-20-17						@ 1.5 feet: color change to dark gray to black, strong creosote-like odor.
								2.5 to 9.25 feet: SAND (SP), brown to light gray, strong creosote-like odor, medium sand, trace coarse sand, moist to wet. Iridescence and very strong creosote-like odor at 9.0 feet. (UPPER SAND - DREDGE FILL)
MW-33-3	201	7-7-20						
MW-33-4	351	5-11-28	▽ 7-28-92	5				**WELL COMPLETION DETAILS:** 0 to 2.75 feet: 2-inch-diameter schedule 40 PVC blank riser pipe. 2.75 to 9.35 feet: 2-inch-diameter, schedule 40 PVC well screen with 0.020-inch machined slots. 9.35 to 9.5 feet: 2-inch-diameter schedule 40 PVC flush-threaded end cap. 0 to 0.5 feet: Concrete. 0.5 to 2.0 feet: Volclay coarse bentonite chips. 2.0 to 9.5 feet: 10 - 20 Colorado Silica Sand.
MW-33-5	17	7-8-10						
MW-33-6	245	8-7-5						**9.25 to 9.5 feet: SILT (ML),** gray, low plasticity, abundant organic matter, firm, wet. (UPPER SILT - ESTUARINE)
				10				Boring completed at 9.5 feet on 7-28-92.

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-34
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	7.50'
DRILL METHOD	6-inch I.D. HSA	TOTAL DEPTH	5.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/29/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 3.0 inches: ASPHALT
MW-34-1	<1	13-20-20					**3.0 inches to 1.5 feet: SANDY GRAVEL (GP),** brown, fine to medium gravel, fine to medium sand, dense, moist. (MIXED FILL)
MW-34-2	<1	12-12-9	▽ 7-29-92				**1.5 to 3.0 feet: SAND (SP),** brown, fine to medium, trace coarse sand, loose, moist to wet. (UPPER SAND - DREDGE FILL)
MW-34-3	<1	2-2-5					**3.0 to 4.0 feet: SAND (SP),** gray, medium, loose, wet. (UPPER SAND - DREDGE FILL)
							4.0 to 5.0 feet: SILT (ML), gray, some organic matter, few wood fragments, firm, wet. (UPPER SILT - ESTUARINE)
				5			Boring completed at 5.0 feet on 7-29-92. Boring abandoned with Volclay coarse bentonite chips to 1 foot bgs. and concrete to the surface.
				10			

REMARKS

(1) Blow counts do not represent SPT results. (2) No well installed due to limited saturation. (3) Reference is ground surface.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	MW-35
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	6.58'
DRILL METHOD	6" I.D. H.S. Auger	TOTAL DEPTH	8.00'
LOGGED BY	Burkett/Carl	DATE COMPLETED	07/29/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
								0 to 4.0 inches: ASPHALT
								4.0 inches to 1.0 foot: SAND (SP), dark brown to black, medium, loose, moist. (FILL)
								1.0 to 7.0 feet: SAND (SP), dark gray, medium to coarse, trace gravel, loose, wet below 2.5 feet. (UPPER SAND - DREDGE FILL)
MW-35-1	<1	11-24-27	▽					
			7-29-92					**WELL COMPLETION DETAILS:**
MW-35-2	<1	7-9-9						0 to 2.0 feet: 2-inch-diameter, schedule 40 PVC blank riser pipe.
								2.0 to 7.0 feet: 2-inch-diameter, schedule 40 PVC well screen with 0.020-inch machined slots.
								7.0 to 7.11 feet: 2-inch-diameter, schedule 40 PVC end cap.
								0 to 0.5 feet: Concrete.
								0.5 to 1.5 feet: Volclay coarse bentonite chips.
MW-35-3	<1	4-5-5		5				1.5 to 7.0 feet: 10 - 20 Colorado Silica Sand.
								7.0 to 8.0 feet: Slough.
MW-35-4	<1	3-2-3						
								7.0 to 8.0 feet: SILT (ML), gray brown, low plasticity, trace organic matter, soft, wet. (UPPER SILT - ESTUARINE)
								Boring completed at 8.0 feet on 7-29-92.
				10				

REMARKS
(1) Blow counts do not represent SPT results. (2) Reference elevation is top of casing.

EMCON Northwest, Inc.

0141-037.06.WKOP2.L41/sa:4.01/05/93

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	TW- 1
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Ramlo	REFERENCE ELEV.	10.83'
DRILL METHOD	Cable Tool - 10-inch	TOTAL DEPTH	13.50'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/07/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
								0 to 1.5 feet: GRAVELLY SAND (SW), dark brown, angular cobbles and wood debris in gravelly sand matrix, very dense, moist. (GRADE FILL)
			▽ 8-7-92	5				**1.5 to 12.0 feet: SAND (SP)**, olive brown, gray, medium, five to ten percent coarse sand, trace fine sand, trace fine gravel, trace wood debris, loose, damp to moist at 4.0 feet, moist to wet at 4.0 feet, wet at 5.0 feet. Strong creosote-like odor 2.0 to 12.0 feet. Brown product with iridescence and creosote-like odor at water table. Black coating with iridescence on sand grains at 11.0 to 12.0 feet (product?). (UPPER SAND - DREDGE FILL)
GRAB-0		-						
				10				
SB-1		70						**12.0 to 13.5 feet: SILT with SAND (ML)**, dark brownish gray, low plasticity, trace fine sand, soft to firm, wet. Sand lenses and stringers 2-inch to 0.5-inch. Strong creosote-like odor, black iridescence on sand grains in lenses (product?). (UPPER SILT - ESTUARINE)
				15				Boring completed at 13.5 feet on 8-10-92.
				20				See Page 2 for Well Completion Details.

REMARKS
Blow counts may not represent SPT results. Reference elevation is at top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	TW-1
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Ramlo	REFERENCE ELEV.	10.83'
DRILL METHOD	Cable Tool - 10-inch	TOTAL DEPTH	13.50'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/07/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				25				
				30				
				35				
				40				

WELL COMPLETION DETAILS:

+2.0 to 7.0 feet: 6-inch-diameter, black iron riser pipe.

7.0 to 12.0 feet: 6-inch-diameter, stainless steel 0.040-inch wire-wrap screen.

12.0 to 12.2 feet: 6-inch stainless steel end-cap.

0 to 1.0 foot: Concrete.

1.0 to 4.0 feet: Medium bentonite chips hydrated with potable water.

4.0 to 12.5 feet: 8 - 12 Colorado Silica Sand.

12.5 to 13.5 feet: Medium bentonite chips hydrated with potable water.

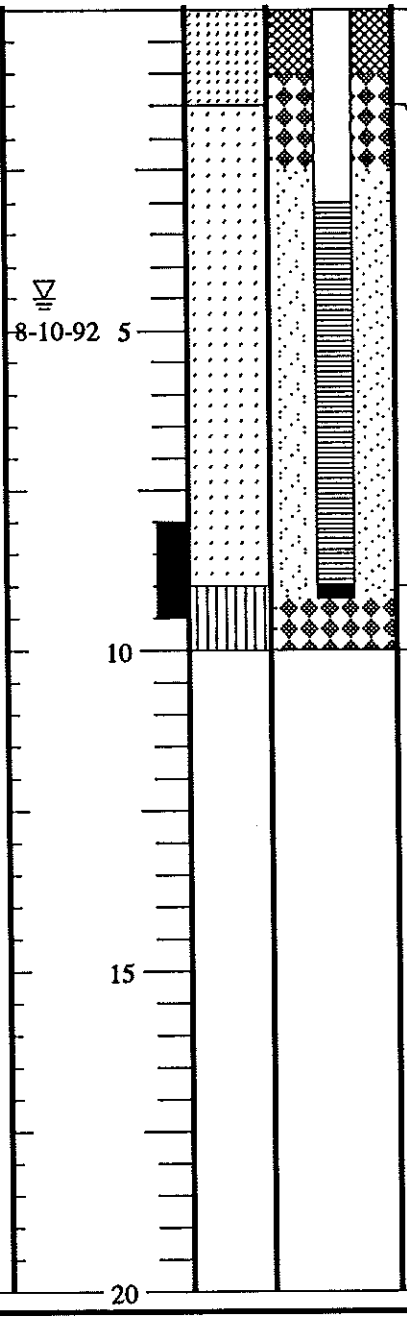
REMARKS

Blow counts may not represent SPT results. Reference elevation is at top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	P- 1
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	10.86'
DRILL METHOD	6" I.D. HSA	TOTAL DEPTH	10.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/10/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-1		4-5-6	▽ 8-10-92	5				



0 to 1.5 feet: GRAVELLY SAND (SW), dark brown, angular cobbles and wood debris in gravelly sand matrix, very dense, moist. (GRADE FILL)

1.5 to 9.0 feet: SAND (SP), brownish gray, fine to medium, moderately dense, moist, wet below 4.5 feet. Strong creosote-like odor. Iridescent sheen and brown product at water table. (UPPER SAND - DREDGE FILL)

9.0 to 10.0 feet: SILT (ML), dark gray, low plasticity, trace fine sand, scattered organic debris, soft, wet. Strong creosote-like odor. (UPPER SILT - ESTUARINE)

Boring completed at 10.0 feet bgs on 8-10-92.

WELL COMPLETION DETAILS:

+2.0 to 3.0 foot: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe.

3.0 to 9.0 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots.

9.0 to 9.2 feet: 2-inch-diameter threaded end cap.

0 to 1.0 foot: Concrete.

1.0 to 2.5 feet: Medium bentonite chips hydrated with potable water.

2.5 to 9.0 feet: 10 - 20 Colorado Silica Sand.

9.0 to 10.0 feet: Medium bentonite chips hydrated with potable water.

REMARKS

Blow counts do not represent SPT results. Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	P- 2
LOCATION	Former Mill E/Koppers	PAGE	1 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	10.47'
DRILL METHOD	6" I.D. HSA	TOTAL DEPTH	13.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/10/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
SB-1	-		8-10-92	5, 10, 15, 20				**0 to 1.5 feet: GRAVELLY SAND (SW)**, dark brown, angular cobbles and wood debris in gravelly sand matrix, very dense, moist. (GRADE FILL) **1.5 to 12.0 feet: SAND (SP)**, brownish gray, fine to medium, moderately dense, moist, wet below 4.5 feet. Strong creosote-like odor. Iridescent sheen and brown product at water table. (UPPER SAND - DREDGE FILL) **12.0 to 13.0 feet: SILT (ML)**, dark gray, low plasticity, trace fine sand, scattered organic debris, soft, wet. Strong creosote-like odor. (UPPER SILT - ESTUARINE) Boring completed at 13.0 feet bgs on 8-10-92. See Page 2 for Well Completion Detials.

REMARKS
Blow counts not recorded. Reference elevation is top of casing.

LOG OF EXPLORATORY BORING

PROJECT NAME	Weyerhaeuser - Everett	BORING NO.	P- 2
LOCATION	Former Mill E/Koppers	PAGE	2 OF 2
DRILLED BY	Tacoma Pump & Drill.	REFERENCE ELEV.	10.47'
DRILL METHOD	6" I.D. HSA	TOTAL DEPTH	13.00'
LOGGED BY	Steve Nelson	DATE COMPLETED	08/10/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				25				**WELL COMPLETION DETAILS:** +2.0 to 3.0 foot: 2-inch-diameter, flush threaded schedule 40 PVC blank riser pipe. 3.0 to 12.0 feet: 2-inch-diameter, flush threaded schedule 40 PVC well screen with 0.020-inch machined slots. 12.0 to 12.2 feet: 2-inch-diameter threaded end cap. 0 to 1.0 foot: Concrete. 1.0 to 2.5 feet: Medium bentonite chips hydrated with potable water. 2.5 to 12.0 feet: 10 - 20 Colorado Silica Sand. 12.0 to 13.0 feet: Medium bentonite chips hydrated with potable water.
				30				
				35				
				40				

REMARKS

Blow counts not recorded. Reference elevation is top of casing.

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser Everett	TEST PIT NO.	TP-16
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DUG BY	Sleister	REFERENCE ELEV.	7.24'
METHOD	Backhoe	TOTAL DEPTH	4.50'
LOGGED BY	Brian S. Carl	DATE COMPLETED	08/13/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 12-inches: SAND WITH GRAVEL (SP). (MIXED FILL)
S-1							**12-inches to 2.5 feet: SAND (SM),** brown, fine to medium. (DREDGE SAND)
S-2			▽				**2.5 to 2.9 feet: SILT (ML),** with abundant wood debris.
							2.9 to 4.5 feet: SAND (SM), brown, fine to medium. (DREDGE SAND) @ 3.0 feet: sand, wet.
				5			Bottom of pit at 4.5 feet.
				10			

REMARKS
Reference Elevation is at ground surface.

EXPLORATORY TEST PIT LOG

PROJECT NAME	Weyerhaeuser Everett	TEST PIT NO.	TP-17
LOCATION	Former Mill E/Koppers	PAGE	1 OF 1
DUG BY	Sleister	REFERENCE ELEV.	7.42'
METHOD	Backhoe	TOTAL DEPTH	5.00'
LOGGED BY	Brian S. Carl	DATE COMPLETED	08/13/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 to 6-inches: SAND WITH GRAVEL (SP), medium to fine. (MIXED FILL)
S-1							**6-inches to 4.0 feet: SAND (SM)**, brown stained black with iridescent sheen, medium size.
							@ 1.5 feet: sandy gray with black streaks.
S-2			▽				@ 3.0 feet: sand, wet.
				5			**4.0 to 5.0 feet: SILT (ML)**, black with abundant wood fragments.
							Bottom of pit at 5.0 feet.
				10			

REMARKS
Reference Elevation is at ground surface.

Sweet-Edwards / EMCON, Inc.

PROJECT NO. 0141-037.51 (07) | TEST PIT NO. 18 | SHEET OF

TEST PIT LOG

PROJECT Weyco Mill E SR1 LOCATION _____ LOGGER SN

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD 580 Case DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
			Y	SP gray fine sand		
				pit backfill soil mod upper or gravel, silt	SP	
			1			

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 19 SHEET OF

TEST PIT LOG

PROJECT Wayne Mill E SR1 LOCATION _____ LOGGER SW

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD 580 Case DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE. GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-6" topsoil, gravel mixed	GW	
				6" - 4' SP grey sand	SP	
			▽	water at 3.5		

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 20	SHEET	OF

TEST PIT LOG

PROJECT Weyco Koppers SR1 LOCATION _____ LOGGER SW

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-2 ft - Gravelfill	GW/SW	Gravel
				cobbles, grey to black		sand + gravel
				2- [illegible] Sand [illegible]		~~Wood debris~~
						black Sand
			X		SP	Sand ↓

TP-92-3 Type

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 21 SHEET OF

TEST PIT LOG

PROJECT Weyco Mill E SRI LOCATION _____ LOGGER SW

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-1.5 Grade fill gravel sand & wood debris grey-brown, compact	GW	
				1.5 - 3.5 sand	SP	
				▽ 3.5 wet - no product strong Petroleum + creosote odor		
						TP-33-1, 33-3 dupe

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 22 SHEET OF

TEST PIT LOG

PROJECT Weyco Mill E SRI LOCATION _____ LOGGER SN

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 540 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 3.5

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE. GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
			1	0-2 Sand silt + wood debris brown	SM	
				3-inch layer of Sand	SD	
			3	2+ ~~Sand + Silt~~?	ML	
				2.3+ Silt		
				no water		
	5			Sample collected from sand layer		

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. TP-23 SHEET OF

TEST PIT LOG

PROJECT Weyco Mill E SR1 LOCATION _____ LOGGER SW

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4+

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-6 topsoil, gravel & wood	GW	
				6"- 1.5 gradefill gravel w/sand grey - black - compact	GW	
				1.5 - 3.5 Sand	SP	
			D			
	5					

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 24 SHEET OF

TEST PIT LOG

PROJECT Mill E SR1 LOCATION _____ LOGGER SN

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-6" topsoil + grout	GW	
				6" – 2.5 gravel cobbles boulders	GW	
				2.5+ Sand SP	SP	
	5		V			

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 25 SHEET OF

TEST PIT LOG

PROJECT Weyco Mill E SR1 LOCATION _____ LOGGER SW

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE. GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-2.5 gravel, cobbles boulders (hard) wood debris	GW	
				2.5 - wood debris layer		
				2.5+ sand (SP)	SP	
			V			
	5					
				asphalt paving ~50' to SW		

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 26 SHEET OF

TEST PIT LOG

PROJECT Weyco Mill E SRI LOCATION _____ LOGGER SN

ELEVATION _____ CONTRACTOR Glocier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0+2.5 gravel + cobbles, sand		
				@ 2.5+ Sand (SW)	SW-GW	
			I	dark gray soil layer between Crackfill + upper Sand	SP	
	5					

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. TP.27 SHEET OF

TEST PIT LOG

PROJECT Weyco Mill E SR1 LOCATION _____ LOGGER SW

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-2 Gravel, sand, cobbles wood debris	SW	
				2+ Upper Sand	SP	
			V			
	5					

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 28	SHEET	OF

TEST PIT LOG

PROJECT Weyco Mill E SRI LOCATION _____ LOGGER SW

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth ~3

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-3 Topsoil	SP	
				0-1 Sand SP	SP	
				1-3 ~~Sand + trace~~ silt	SP	
				1-1.3 ash wood debris layer (sampled)	ML	
	5			1.3-2.5 Sand fine-coarse (perched water)		
				2.5 silt		

8-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 29	SHEET	OF

TEST PIT LOG

PROJECT Weyco Mill E SRI LOCATION _____ LOGGER SW

ELEVATION _____ CONTRACTOR Gloria

EXCAVATION METHOD Cat 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 3

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
	5			0-3" topsoil 3"-1 SP fine 1-2.5 SP fine-coarse 2.5'-3' silt	SP SP SP ML	

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 30	SHEET	OF

TEST PIT LOG

PROJECT Wayco Mill E SRI LOCATION _____ LOGGER SN

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Cat 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 3

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE. GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-6" topsoil	SP	
				6"-9" blacksand sapled	SP	
				9"-2.5 Sand SP fine		
				2.5 silt	ML	

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 31	SHEET	OF

TEST PIT LOG

PROJECT Weyco Mill E SRI LOCATION _____ LOGGER SN

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-3" topsoil	SP	
				3"+ Sand		
	5			silt at 3.5	ML	

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT NO. 32 SHEET OF

TEST PIT LOG

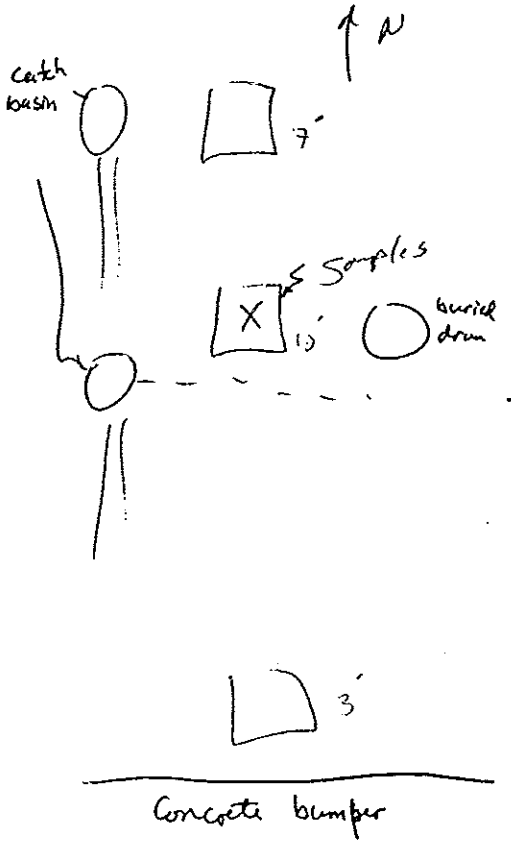
PROJECT Weyco Mill E SRI LOCATION _____ LOGGER SN

ELEVATION _____ CONTRACTOR Glacier

EXCAVATION METHOD Case 580 DATE EXCAVATED 10-18-93

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length _____ Width _____ Maximum Depth 4+

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE. GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
	5			0-2" As 2"-1.5 gravelly sand 1.5+ SP sand product at 3.5-4'	4S SW SP	



4' deep

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO. [illegible] 97.15 | TEST PIT TK-2 | SHEET OF

TEST PIT LOG

PROJECT [illegible] - Exxon Koffler LOCATION S of Building LOGGER [illegible]

ELEVATION ~ Backhoe CONTRACTOR Sleister

EXCAVATION METHOD DATE EXCAVATED 8-14-92

WATER LEVEL AND DATE ~4' APPROX. DIMENSIONS: Length 8 Width 3 Maximum Depth 4.5

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE. GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
	1			0-1.5 Sandy Gravel (GW) brown, fine to coarse, subangular, medium to coarse sand wood debris SURFACE FILL	GW	Compact fill at surface No evidence of Petroleum Hydrocarbons or ballast
	2			[illegible] Sand (SP) brown fine to coarse, faint creosote-like odor		Sharp contact Native Soil
	3		1			
	4		2		▽	
	5					

S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT
	TR-3A and 3B * SHEET 1 OF 1

TEST PIT LOG

PROJECT [illegible] Everett Koppers LOCATION ______ LOGGER S/J

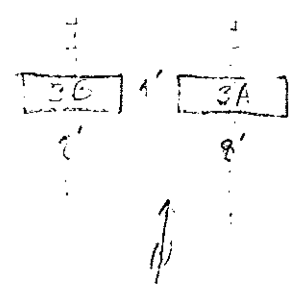
ELEVATION - Backhoe CONTRACTOR Sleister

EXCAVATION METHOD ______ DATE EXCAVATED 8-14-92

WATER LEVEL AND DATE 4 ft APPROX. DIMENSIONS: Length 8 + 8 Width 3 Maximum Depth 5

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE. GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-2 Compacted gravel, clay and soil with wood debris Clay [illegible] at 1.5-2.0 (GRACE FILL)	GW	Compact surface layer No evidence of [illegible] [illegible]
	1					
	2	[illegible]	[illegible]	2-4 [illegible] [illegible] layer immediately below Grace Fill No odor	SP	loose sand
	4				∇	
	5					

* Trench 3A and 3-B dug across [illegible] rail lines, approx. 2 [illegible] apart, 3B dug E of 3A



S-E/E 300-07

Sweet-Edwards / EMCON, Inc.

PROJECT NO.	TEST PIT TR-4A and 4B	SHEET 1 OF 1

TEST PIT LOG

PROJECT: [illegible] Everett Koppers LOCATION: S of Building LOGGER: SJ

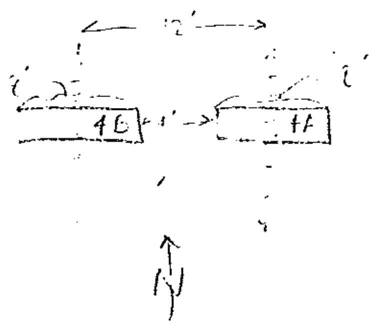
ELEVATION: - Backhoe CONTRACTOR: Sleister

EXCAVATION METHOD: ____ DATE EXCAVATED: 8-14-92

WATER LEVEL AND DATE: 4'(?) APPROX. DIMENSIONS: Length 7+2 Width 3 Maximum Depth 4.5

ELEVATION ( )	DEPTH BELOW SURFACE ( )	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SOIL DESCRIPTION: SOIL NAME, GRADATION OR PLASTICITY, PARTICLE SIZE, DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, STRUCTURE, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
				0-1.5 Sandy Gravel Fill (GW) compact angular gravel and sand and wood debris GRADE FILL	GW	Compact fill at surface
	1		4A			
	2	X		.5-2 Gravel and Clay fill faint hydrocarbon-like odor	GM	
	3			2-2.5 Dark gray Sand	SP	Loose sand
	4			[illegible]-4.5 Sand	▽	
	5					

x Trench 4A and 4B dug [illegible] approx. 2 feet apart. 4A dug east of 4B



Summary of Hand Auger Boring Details

Hand Auger	Thickness of Grade/Mixed Fill	Thickness of Upper Sand	Total Depth	Remarks
D-1	10 inches	> 3.5 ft	3.8 ft	Groundwater at 3.8 feet; sample collected at 3 feet bgs
D-3	10 inches	> 3.5 feet	3.7 ft	Groundwater at 3.8 feet; sample collected at 3 feet bgs
D-4	12 inches	> 3.5 feet	3.5 ft	Groundwater at 3.5 feet; sample collected at 2.5 feet bgs
HA-1	6 inches	> 3.5 feet	3.5 ft	Groundwater at 3 feet; sample collected at 1 feet bgs and 3 feet bgs
HA-2	6 inches	> 3.5 feet	3.5 ft	Groundwater at 3 feet; sample collected at 1 feet bgs and 3 feet bgs

ATTACHMENT 3

SURVEY INFORMATION, WATER ELEVATION DATA, AND CALCULATIONS OF HYDRAULIC GRADIENTS AND GROUNDWATER VELOCITIES

CLARK M. LEEMAN
LAND SURVEYING

3218 Wetmore Avenue
Everett, Washington 98201
Phone (206) 259-8072

FACSIMILE TRANSMISSION

DATE: OCT. 10, 1992

JOB NO.: 126577

JOB TITLE: Weyehaeuser Co.
Mon. Wells, Pits

LOCATION: Everett, WA

TO: EMCON
Attn.: Steve Nelson
FAX: 486-9766

WE ARE SENDING HEREWITH:

DESCRIPTION

MESSAGE CONSISTS OF 6 PAGES, INCLUDING THIS COVER SHEET.

_____ FOR APPROVAL _____ TAKE APPROPRIATE ACTION

_____ FOR YOUR FILE XX AS REQUESTED

REMARKS:

BY: Clark M. Leeman
CLARK M. LEEMAN, P.L.S.

PT. NO.	N	E	ELEV	PT.
list: from 1733 to 1818				
1733	36381.94	46347.29	8.580	MW 35
1734	36330.80	46761.22	7.504	MW34
1735	35940.37	46738.91	7.425	TP17
1736	36056.84	46697.35	7.240	TP16
1737	36192.01	46839.05	9.790	HC5
1738	36194.66	46836.06	7.503	SB5
1739	36071.45	46625.43	8.640	MW11D
1740	36065.59	46622.51	9.220	HC11D
1741	36071.74	46617.95	9.230	HC11
1742	36039.02	46533.05	9.970	HC17
1743	35978.11	46783.85	7.535	SB24
1744	35892.02	46853.59	6.677	SB17
1745	36084.81	46761.24	10.020	HC21
1746	36094.56	46760.45	7.823	SB21
1747	36134.98	46854.18	7.871	SB26
1748	36017.29	46783.58	9.460	MW27
1749	35734.07	46752.94	10.520	HC4
1750	36592.45	46321.72	9.500	HC26
1751	35710.34	46928.92	7.527	SB4
1752	35602.86	46991.18	8.238	SB3
1753	35602.03	47000.19	11.150	HC3
1754	35513.81	46983.31	8.025	SB2
1755	35412.58	47047.28	10.960	HC1
1756	35412.20	47035.22	8.629	SB1
1757	35405.86	47048.76	11.180	HC1D
1758	35627.81	47129.14	11.490	HC2
1759	35945.22	46800.95	7.477	BLDSW
1760	35996.94	46785.42	7.547	BLD
1761	36090.04	46792.60	7.503	BLDNW
1762	36244.98	46847.37	7.677	BLDSW
1763	36367.56	46811.66	7.562	BLDNW
1764	35990.21	46824.39	8.654	SB20
1765	36003.75	46847.82	8.640	MW28
1766	35987.34	46853.07	8.664	SB19
1767	35975.55	46855.38	8.087	SB20A
1768	35985.55	46846.39	8.675	SB19B
1769	36179.44	47179.45	10.340	MW31
1770	36169.62	47178.24	10.030	MW31D
1771	36101.29	47204.45	11.420	HC7
1772	36026.10	47185.11	11.320	HC23D
1773	36007.97	47163.14	11.090	MW23D2
1774	35998.77	47163.60	11.160	MW23
1775	36003.45	47113.21	8.488	SB8
1776	35905.35	47154.96	8.486	SB9
1777	35844.36	47149.48	10.560	HC9
1778	35845.58	47143.00	10.180	MW32D
1779	35734.00	47141.12	10.870	MW32
1780	35780.38	47041.84	10.550	HC14

CLARK M. LEEMAN
LAND SURVEYING
3216 WETMORE AVENUE
EVERETT, WA 98201
10-10-92

1780	35780.38	47041.64	10.550	HC14
1781	35785.81	47040.76	8.193	SB14
1782	35864.17	47059.51	7.876	SB10
1783	35823.11	46983.50	10.380	MW30D
1784	35820.45	46975.06	10.660	MW30
1785	35900.38	46896.88	7.036	SB16
1786	35913.15	46916.57	9.630	HC16
1787	35956.98	46877.46	8.333	SB18
1788	35941.53	46972.44	8.286	SB11
1789	35941.61	46975.97	8.464	SB11B
1790	35960.30	47032.73	10.470	P2
1791	35982.52	47038.42	10.660	P1
1792	35932.05	47077.66	10.170	HC13
1793	35937.07	47040.39	10.830	TW1
1794	35941.55	47035.17	7.996	SB23
1795	36044.31	47007.68	10.800	HC15
1796	36043.46	47012.77	7.890	SB15
1797	36046.70	47017.24	10.230	HC15D
1798	36109.71	47077.37	11.470	HC12
1799	36105.11	47079.08	7.915	SB12
1800	36010.22	46897.60	10.520	HC22
1801	36013.87	46896.77	8.691	SB22
1802	35968.48	46880.88	8.557	BLDSE
1803	36036.72	46861.14	8.720	BLD
1804	36101.15	46832.36	8.639	BLDNE
1805	36104.32	46806.60	11.060	MW33
1806	36258.95	46895.42	7.834	BLDSE
1807	36381.54	46859.70	7.586	BLDNE
1808	36310.80	46991.61	8.320	MW6D
1809	36245.53	46969.47	7.955	SB6
1810	36241.83	46971.93	10.350	HC6
1811	36182.41	46980.72	8.489	SB25
1812	36292.22	47097.86	7.910	HC19
1813	36309.12	47163.31	10.410	HC10
1814	36310.30	47168.23	10.500	HC10D
1815	36384.96	46934.81	7.540	HC20
1816	36442.12	47123.99	10.410	HC18
1817	36013.96	47232.75	8.507	PILING
1818	35985.25	47189.83	11.610	HC8

END List

SB-13 = HC-13 − 2.0

8.17

(HC-7) 8.52 − 2.9

11.42

CLARK M. LEEMAN
LAND SURVEYING
3216 WETMORE AVENUE
EVERETT, WA 98201

10-10-92

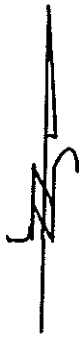
COORDINATES IN FEET
SCALE 1"=150'
RATIO 1:1800
Rotation: 0 00 00

WEYERHAEUSER CO.

EVERETT

NORTH AREA

SCALE: 1"=150'



1750 1816 1733 1763 1807 1815 1734 1813 1814 1808 1812 1762 1806 1809 1810 1738 1811 1769 1770 1747 1798 1741 1739 1804 1805 1771 1799 1745 1761 1736 1742 1740 1803 1797 1796 1748 1801 1800 1772 1817 1760 1765 1775 1773 1818 1743 1766 1791 1802 1787 1788 1790 1774 1735 1759 1792 1764 1789 1786 1776 1744 1785 1782 1787 1788 1783 1784 1781 1780 1749 1779 1751 1752 1758 1753 1754 1755 1756 1757

CLARK M. LEEMAN
LAND SURVEYING
3216 WETMORE AVENUE
EVERETT, WA 98201

10-10-92

WEYERHAEUSER FORMER MILL E/KOPPERS

HORIZONTAL AND VERTICAL ELEVATION SURVEY DATA

Clark Leeman Land Surveying Everett, WA, 9-10-92

	EASTING	NORTHING	CASING ELEVATIO	STICKUP	SURFACE ELEVATION
HC-1	7047	5413	10.96	2.5	8.46
HC-1D	7049	5406	11.18	2.6	8.58
HC-2	7129	5628	11.49	2.7	8.79
HC-3	7000	5602	11.15	2.4	8.75
HC-4	6763	5734	10.52	2.8	7.72
HC-5	6839	6192	9.79	2.4	7.39
HC-6	6972	6242	10.35	2.4	7.95
MW-6D	6992	6311	8.32	-0.3	8.62
HC-7	7204	6101	11.42	2.9	8.52
HC-8	7190	5985	11.61	1.8	9.81
HC-9	7149	5844	10.58	2	8.58
MW-9D	7143	5846	10.18	2.4	7.78
HC-10	7163	6309	10.41	2.4	8.01
HC-10D	7168	6310	10.50	2.4	8.10
HC-11	6818	6072	9.23	2.5	6.73
HC-11D	6823	6086	9.22	2.6	6.62
MW-11D2	6825	6071	8.84	2.5	6.34
HC-12	7077	6110	11.47	2	9.47
HC-13	7078	5932	10.17	1.7	8.47
HC-14	7042	5780	10.55	1.7	8.85
HC-15	7008	6044	10.80	2.4	8.40
HC-15D	7017	6047	10.23	2	8.23
HC-16	6919	5913	9.63	1.8	7.83
HC-17	6533	6039	9.97	2.6	7.37
HC-18	7124	6442	10.41	2.4	8.01
HC-19	7098	6292	7.91	-0.3	8.21
HC-20	6936	6385	7.54	-0.3	7.84
HC-21	6781	6085	10.02	2.5	7.52
HC-22	6898	6010	10.52	2.4	8.12
MW-23	7164	5999	11.16	2.5	8.66
HC-23D	7185	6028	11.32	2.3	9.02
MW-23D2	7163	6008	11.09	2.5	8.59
HC-24	6462	5392	8.39	2.1	6.29
HC-25	6282	5992	8.56	2	6.56
HC-26	6322	6592	9.50	2.1	7.40
MW-27	6784	6017	9.46	2.5	6.96
MW-28	6848	6004	8.64	0	8.64
MW-30	6975	5820	10.66	2.5	8.16
MW-30D	6983	5823	10.38	2.5	7.88
MW-31	7178	6178	10.34	2.5	7.84
MW-31D	7178	6170	10.03	2.5	7.53
MW-32	7141	5734	10.87	2.5	8.37
MW-33	6907	6104	11.06	2.5	8.56
MW-34	6781	6331	7.50	0	7.50
MW-35	6347	6382	6.58	-0.3	6.88
P-1	7038	5983	10.86	2.5	8.36
P-2	7033	5960	10.47	2.5	7.97
TW-1	7040	5937	10.83	2.5	8.33
PILING	7233	6014			8.51
SB-1	7035	5412			8.63
SB-2	6983	5514			8.02
SB-3	6991	5603			8.24
SB-4	6929	5710			7.53
SB-5	6836	6195			7.50
SB-6	6969	6246			7.86
SB-8	7113	6003			8.49
SB-9	7155	5905			8.49
SB-10	7080	5864			7.88
SB-11	6972	5942			8.29
SB-11B	6976	5942			8.46
SB-12	7079	6105			7.91
SB-13					8.17
SB-14	7041	5786			8.19
SB-15	7013	6043			7.89
SB-16	6897	5900			7.04
SB-17	6854	5892			6.68
SB-18	6877	5957			8.33
SB-19	6853	5987			8.66
SB-19B	6846	5986			8.67
SB-20	6824	5990			8.65
SB-20A	6855	5976			8.67
SB-21	6760	6095			7.82
SB-22	6897	6014			8.69
SB-23	7035	5942			8.00
SB-24	6784	5978			7.53
SB-25	6981	6182			8.49
SB-26	6854	6135			7.87
TP-16	6897	6057			7.24
TP-17	6739	5940			7.42

SB-7 8.52

WEYERHAEUSER FORMER MILL E/KOPPERS

GROUND WATER ELEVATION DATA

		7/14/92		8/18-8/24		9/10/92		10/15/92		11/16/92		12/30/92		1/29/93		2/17/93		4/21/93		5/20/93		8/15/93		2/27/94	
	CASING ELEVATION	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)	Water Depth (ft)	Ele vation (ft)
HC-1	10.96	7.00	3.96	7.50	3.46	7.67	3.29	7.62	3.34	6.65	4.31	5.65	5.31	5.98	4.98	6.70	4.26	6.51	4.45	6.55	4.41	7.31	3.65	4.91	6.05
HC-2	11.49	7.63	3.86	7.96	3.53	8.15	3.34	8.24	3.25	7.75	3.74	6.58	4.91	6.60	4.89	7.15	4.34	6.9	4.59	7.07	4.42	7.73	3.76	6.59	4.9
HC-3	11.15	7.06	4.09	7.32	3.83	7.40	3.75	7.77	3.38	7.35	3.8	5.98	5.17	5.90	5.25	-		6.22	4.93	-		-		5.76	5.39
HC-4	10.52	5.44	5.08	5.82	4.70	5.72	4.80	5.90	4.62	4.23	6.29	4.64	5.88	4.54	5.98	5.20	5.32	4.88	5.64	5.13	5.39	5.71	4.81	3.91	6.61
HC-5	9.79	5.70	4.09	6.15	3.64	6.25	3.54	6.40	3.39	5.75	4.04	4.66	4.93	4.87	4.92	-		5.05	4.74	-		-		4.77	5.02
HC-6	10.35	6.52	3.83	6.85	3.50	7.06	3.29	7.20	3.15	6.61	3.74	5.71	4.64	5.73	4.62	6.17	4.18	5.94	4.41	5.94	4.41	6.66	3.69	5.79	4.56
HC-7	11.42	8.70	2.72	9.25	2.17	9.43	1.99	9.41	2.01	8.27	3.15	7.66	3.76	7.69	3.73	8.26	3.16	8.4	3.02	8.37	3.05	9.11	2.31	7.61	3.81
HC-8	11.61	dry		dry		dry		dry		dry		dry		dry		dry		8.21	3.40	-		-		7.78	3.83
HC-9	10.56	6.47	4.09	6.80	3.76	7.00	3.56	7.26	3.30	6.78	3.78	5.4	5.16	5.33	5.23	5.92	4.64	5.58	4.98	5.66	4.9	6.49	4.07	5.32	5.24
HC-10	10.41	7.45	2.96	8.00	2.41	8.10	2.31	8.20	2.21	7.24	3.17	6.36	4.05	6.54	3.87	7.06	3.35	7.09	3.32	7.08	3.33	7.77	2.64	6.6	3.81
HC-11	9.23	4.15	5.08	4.35	4.88	4.38	4.85	4.41	4.82	3.41	5.82	3.63	5.60	3.63	5.60	4.20	5.03	3.75	5.48	3.88	5.35	4.28	4.95	2.92	6.31
HC-12	11.47	7.50	3.97	7.82	3.65	8.00	3.47	8.25	3.22	7.66	3.81	6.64	4.83	6.54	4.93	7.10	4.37	6.75	4.72	6.76	4.71	-		6.49	4.98
HC-13	10.17	5.90	4.27	6.47	3.70	6.70	3.47	7.38	2.79	6.75	3.42	4.9	5.27	4.68	5.49	5.42	4.75	5.1	5.07	5.21	4.96	6.08	4.09	4.8	5.37
HC-14	10.55	6.45	4.10	6.84	3.71	7.06	3.49	7.30	3.25	6.65	3.9	5.33	5.22	5.25	5.30	-		5.58	4.97	-		-		5.02	5.53
HC-15	10.80	6.75	4.05	7.10	3.70	7.34	3.46	7.58	3.22	7.04	3.76	5.62	5.18	5.57	5.23	6.20	4.60	5.8	5.00	5.90	4.9	6.72	4.08	5.52	5.28
HC-16	9.63	5.46	4.17	5.87	3.76	6.10	3.53	6.36	3.27	5.53	4.1	4.26	5.37	4.13	5.50	4.67	4.76	4.41	5.22	4.58	5.04	5.54	4.09	4.11	5.52
HC-17	9.97	4.53	5.44	4.64	5.33	4.80	5.37	4.59	5.38	3.81	6.16	4.1	5.87	4.14	5.83	4.34	5.63	4.26	5.71	4.38	5.59	4.48	5.49	3.77	6.2
HC-18	10.41	6.83	3.78	8.10	2.31	7.15	3.26	7.33	3.08	6.5	3.91	5.76	4.65	6.00	4.41	-		6.46	3.95	-		-		5.91	4.5
HC-19	7.91	4.95	2.96	5.52	2.39	5.63	2.28	5.82	2.09	4.98	2.93	-	7.91	3.93	3.98	-		4.38	3.53	-		-		3.99	3.92
HC-20	7.54	3.73	3.81	4.10	3.44	4.30	3.24	4.43	3.11	3.67	3.87	-	7.54	2.98	4.56	-		3.21	4.33	-		-		-	
HC-21	10.02	5.73	4.29	6.16	3.86	6.35	3.67	6.49	3.53	5.4	4.62	4.95	5.07	4.68	5.14	-		5.11	4.91	-		-		4.09	5.94
HC-22	10.52	6.45	4.07	6.84	3.68	7.00	3.52	7.29	3.23	6.48	4.04	5.3	5.22	5.25	5.27	5.85	4.67	5.45	5.07	5.56	4.96	6.5	4.02	5.07	5.45
MW-23	11.16	#		7.48	3.68	7.72	3.44	7.96	3.20	7.44	3.72	6.15	5.01	6.09	5.07	6.60	4.56	6.05	5.11	6.40	4.76	7.2	3.96	6.15	5.01
HC-24	8.39	-		-		-		3.56	4.83	2.33	6.06	2.72	5.67	2.61	5.78	3.25	5.14	2.85	5.54	3.20	5.19	3.35	5.04	2.35	6.04
HC-25	8.56	-		-		-		3.25	5.31	2.6	5.96	2.82	5.74	2.79	5.77	2.98	5.58	2.95	5.61	3.20	5.36	3.02	5.54	2.66	5.9
HC-26	9.50	4.20	5.30	-		4.28	5.22	4.37	5.13	-	-	3.85	5.65	3.84	5.66	4.22	5.28	3.99	5.51	4.13	5.37	2.23	7.27	3.43	6.07
MW-27	9.46	#		6.88	3.58	6.15	3.31	6.13	3.33	4.98	4.48	4.4	5.06	4.29	5.17	5.10	4.36	4.58	4.88	4.82	4.64	5.59	3.87	4.87	4.79
MW-30	10.66	#		6.8	3.86	7.05	3.61	7.32	3.34	6.26	4.38	5.23	5.43	5.03	5.63	5.92	4.74	5.46	5.20	5.56	5.1	6.56	4.08	4.37	6.29
MW-31	10.34	#		7.12	3.22	7.35	2.99	7.60	2.74	6.92	3.42	5.83	4.51	5.83	4.51	6.34	4.00	6.1	4.24	6.13	4.21	6.88	3.46	5.73	4.61
MW-32	10.87	#		7.28	3.59	7.47	3.40	7.73	3.14	6.82	4.05	5.79	5.08	5.76	5.11	6.37	4.50	6.06	4.79	6.16	4.71	6.98	3.89	5.45	5.42
MW-33	11.06	#		7.40	3.66	7.57	3.49	7.83	3.23	7.13	3.93	5.97	5.09	5.95	5.11	6.46	4.60	6.1	4.96	6.20	4.86	7.06	3.98	5.68	5.18
MW-35	6.58	#		-		1.52	5.06	1.52	5.06	0.28	6.3	0.84	5.74	0.79	5.79	1.30	5.28	1.02	5.56	1.20	5.38	1.39	5.19	0.31	6.27
P-1	10.86	#		#		6.75	4.11	6.98	3.88	6.39	4.47	5.09	5.77	-		-		5.25	5.61	5.62	5.24	-		-	
P-2	10.47	#		#		6.95	3.52	7.23	3.24	6.6	3.87	5.3	5.17	-		-		5.5	4.97	5.20	5.27	-		-	
TW-1	10.83	#		#		7.30	3.53	9.42	1.41	-		7.4	3.43	-		-		7.3	3.53	7.40	3.43	-		-	
HC-1D	11.18	12.15	-0.97	9.60	1.58	13.15	12:59	8.23	10:35	6.95	10:44	6.71	11:28	8.00	11:58	8.1	13:30	11.75	10:52	-					
MW-8D	8.32	#		7.25	1.07	10.48	11:31	5.04	9:48	3.80	11:58	5.71	13:16	4.18	11:13			7.57	9:55	7.49	14:28	-		-	
MW-9D	10.18	#		8.85	1.33	12.54	12:12	7.25	9:20	5.91	10:48	5.87	11:54	6.80	11:47	7.14	14:15	10.6	10:42	11.08	9:58	-		-	
HC-10D	10.50	13.40	-2.90	9.55	0.95	13.40	11:44	7.07	9:30	5.67	10:58	7.1	12:45	6.92	11:27	8.37	16:00	11.06	10:06	12.55	10:45	-		-	
HC-11D	9.22	7.88	1.34	8.67	0.55	9.55	11:06	7.15	9:38	5.90	11:09	5.47	10:00	5.49	10:37	6.44	15:15	8.28	11:02	9.13	10:43	8.82	NR	-	
MW-11D	8.84	#		8.12	0.72	9.32	11:05	6.93	9:39	5.66	11:03	5.33	9:58	5.32	10:38	6.26	15:20	8.11	11:04	8.98	10:47	-		-	
HC-15D	10.23	13.00	-2.77	8.95	1.28	12.35	12:36	7.37	9:33	6.02	11:40	5.75	10:53	7.23	12:30	8.07	9:05	11.45	11:56	8.09	8:25	-		-	
HC-23D	11.32	13.48	-2.16	9.72	1.60	7.72	12:07	6.18	9:25	6.83	10:52	7.35	12:18	8.00	11:38	9.11	9:40	12.05	10:36	10.89	9:05	-		-	
MW-23D	11.09	#		14.93	-3.84	13.15	12:00	8.26	9:24	6.88	10:53	7.55	12:20	7.92	11:39	8.48	8:45	11.91	10:22	10.98	9:02	-		-	
MW-30D	10.38	#		9.25	1.13	12.31	12:25	7.59	9:44	6.28	11:15	6.15	12:03	7.14	12:12	5.92	8:30	10.96	11:18	10.74	12:56	-		-	
MW-31D	10.03	#		9.74	0.29	12.75	11:52	6.69	9:28	5.35	10:56	6.38	12:35	6.44	11:32	6.37	11:05	10.45	10:13	11.26	12:47	-		-	
PILING	8.51	-		-		-				2.55	10:51	7.7	13:35												

= not installed; - = not measured; NR = not recorded

Horizontal Hydraulic Gradient
Upper Sand Aquifer

July HC4 → HC16 - HC7

$\Delta h = 5.0 - 3.0 = \frac{2\ ft}{534\ ft}$

$\Delta h = 3.15_{in} \times 170\ ft/in$

$i = \frac{\Delta h}{\Delta L} = 0.0037$

August $\Delta h = 2\ ft$

$\Delta L = 3.5_{in} \times 170'/_{in}$ $i = 0.0034$

September $\Delta h = 2ft$

$\Delta L = 3.0_{in} \times 170'/_{in}$ i 0.0039

October $\Delta h = 2ft$

$\Delta L = 3.1_{in} \times 170'/_{in}$ $i = 0.0038$

Geomtric mean

$\bar{i} = 0.0037\ ft/ft$

Horizontal Hydraulic Gradient

Lower Sand Aquifer

Measured Between HC-11D and HC-23D

Low Tide = ~~2/600~~ = 1.79/560 = 0.0032 ft/ft east

Rising Tide 0.5/480 = 0.0010 ft/ft west

High Tide = 2/600 = 0.0033 ft/ft west

Falling Tide 1.17/560 = 0.0021 ft/ft east

COMPUTATION SHEET

PROJECT TITLE: Weyco Mill E / Koppers PROJECT NO. 01403717

DESCRIPTION: Vertical Hydraulic Gradient SHEET 2 OF 2

PREP. BY: SEN DATE: 11-3-92 CHKD BY: _____ DATE: _____

Maximum Vertical Gradients (Low Tide)

	Δh	ΔZ	i_v
HC-11/11D	5.4	19.19	0.28 ft/ft
MW-23/23D	5.13	12.38	0.41
MW-30/30D	5.13	11.28	0.45 downward
HC-15/15D	5.40	13.63	0.40
HC-9/9D	5.69	10.85	0.52
		Mean	0.40

Minimum Vertical Gradients

	Δh	ΔZ	i_v
HC-11/11D	1.47	19.19	0.077 downward
HC-23/23D	1.25 upward	12.38	0.10 upward
MW-30/30D	0	11.28	0
HC-15/15D	0.19 upward	13.63	0.014 upward
HC-9/9D	0	10.85	0
		Mean	0.0074

Average Vertical Gradients

			ΔZ	
HC-11/11D	1.73 - 3.49		19.19	0.18
HC-23/23D	3.19 1.11	2.08	12.38	0.17
MW-30/30D		2.5	11.28	0.22
~~HC~~ MW-9/9D	3.31 - 1.05	2.61	10.85	0.24
HC-15/15D		2.7	13.63	0.20
			Mean	0.20

COMPUTATION SHEET

PROJECT TITLE: Wyeo Former Mill E / Hoppers PROJECT NO. _____

DESCRIPTION: _____ SHEET ___ OF ___

PREP. BY: SN DATE: _____ CHKD BY: _____ DATE: _____

Vertical Permeabilities

HC -	HC-11 D	$K_z = 3.3 \times 10^{-7}$ cm/sec
ENW	SB-12	$K_z = 9.7 \times 10^{-8}$
	SB-26	$K_z = 2.9 \times 10^{-7}$ cm/sec

Geometric mean

2.2×10^{-7} cm/sec

$= 6.2 \times 10^{-4}$

COMPUTATION SHEET

PROJECT TITLE: Wyco Former Mill E / Koppers PROJECT NO. _____

DESCRIPTION: Average Linear Velocity SHEET ___ OF ___

PREP. BY: SN DATE: 12-15-92 CHKD BY: _____ DATE: _____

Average Linear Velocity - Horizontal

$\bar{V} = \frac{Ki}{n}$

		Lo	Ave	Hi
Upper Sand	K	0.018 cm/s	0.05 cm/sec	0.073 cm/sec
	i	0.0033 ft/ft	0.0037 ft/ft	0.0039 ft/ft
	n	0.3	0.3	0.3
	$\bar{V}$	0.56 ft/d	1.75 ft/d	2.69 ft/d

		Lo	Ave	High
Lower Sand High Tide Low	K	0.006 cm/s	0.05	0.09
	i	0.0033 ft/ft	0.0033	0.0033
	n	0.3	0.3	0.3
	$\bar{V}$	0.2 ft/d	1.6 ft/d	2.8 ft/d

V

Lower Sand	K	0.006	0.05	0.09
	i	0.00046	0.00096	0.00046
	n	0.3	0.3	0.3
Net		0.03 ft/d	0.2 ft/d	0.4 ft/d

106135

COMPUTATION SHEET

PROJECT TITLE: Weyco Former Mill E / Koppers PROJECT NO. _____

DESCRIPTION: Upper Silt Aquitard Vertical Velocity SHEET ___ OF ___

PREP. BY: _____ DATE: _____ CHKD BY: _____ DATE: _____

Upper Silt Aquitard

$K = 2.2 \times 10^{-7}$ cm/sec

i - 0.40 ↓ Low

0.007 ↑ High

0.20 ↓ Net

$$\bar{V} = \frac{Ki}{n}$$

$n = 0.40$

$$V_{Lo} = \frac{2.2 \times 10^{-7} \text{ cm/sec} \cdot 0.40 \text{ ft/ft}}{0.40} =$$

$= 6.2 \times 10^{-4}$ ft/day

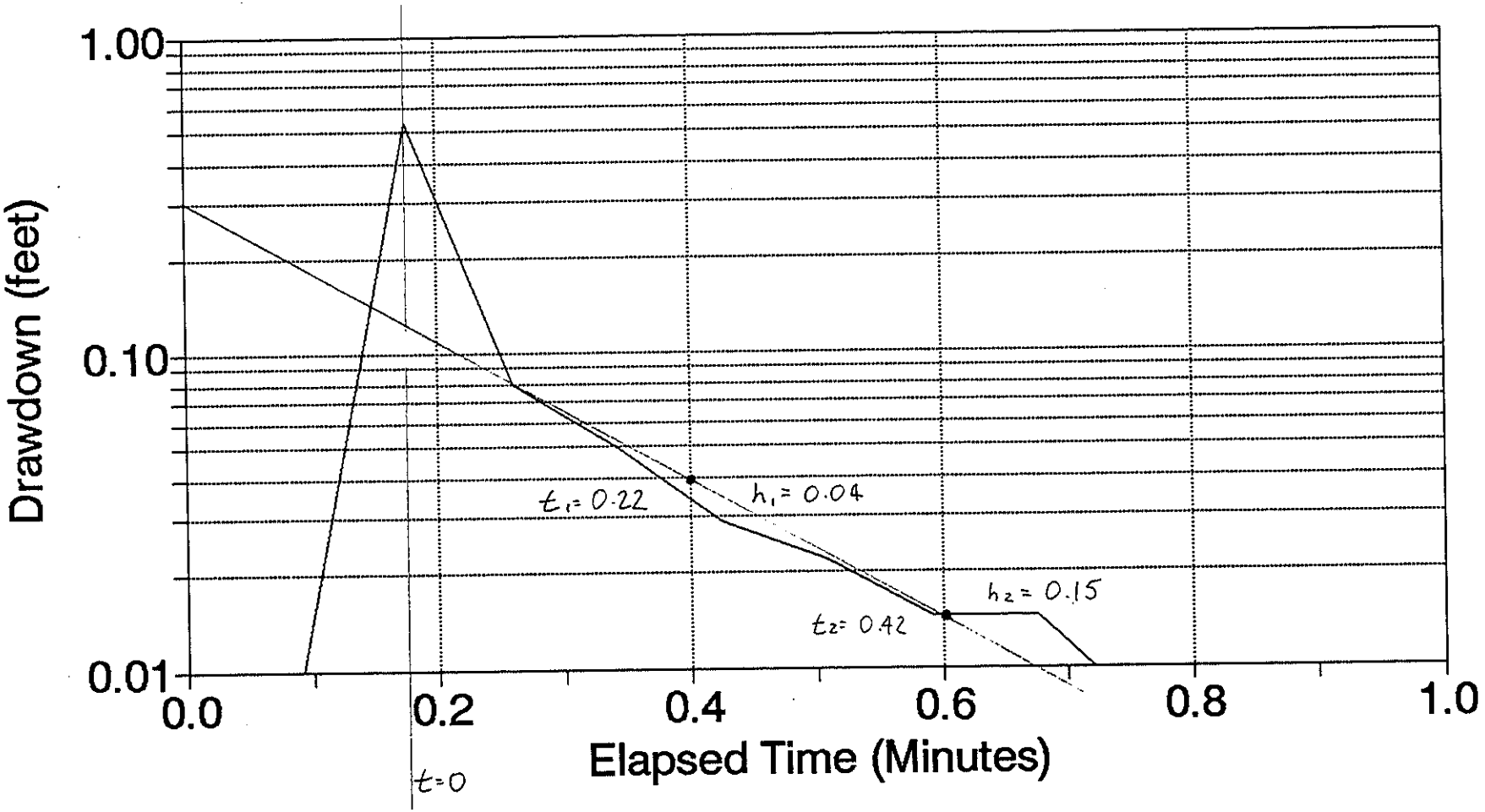
$V_{hi} = 1.1 \times 10^{-5}$ ft/d

$V_{net} = 3.1 \times 10^{-4}$ ft/d

ATTACHMENT 4

HYDRAULIC CONDUCTIVITY TESTING RESULTS

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



BOUWER AND RICE SLUG TEST ANALYSIS
Weyerhaeuser Former Mill E/Koppers - MW-30

	INPUT	(KGS)
H = Saturated Thickness of Aquifer (ft)	4.4	134.112
Lw = Water Table Elevation - Bottom of Well (ft)	4.4	134.112
Le = Saturated Well Screen Length (ft)	4.4	134.112
2rw = Boring Diameter (in)	9	22.86
2rc = Well Diameter (in)	2	5.08
h1 = Initial Head (ft)	0.04	1.2192
h2 = Final Head (ft)	0.015	0.4572
t1 = Initial Time (sec)	13.2	13.2
t2 = Final Time (sec)	25.2	25.2
Porosity of Gravel Pack (%)	40	0.4

	INPUT	(from Bouwer, 1989; PAGE DOWN for values for A, B, and C using Le/rw =	11.73	
A =	1.9			
B =	0.26			
C =	1.3			25.2

CALCULATIONS

Effective Radius of Well 7.49 cm

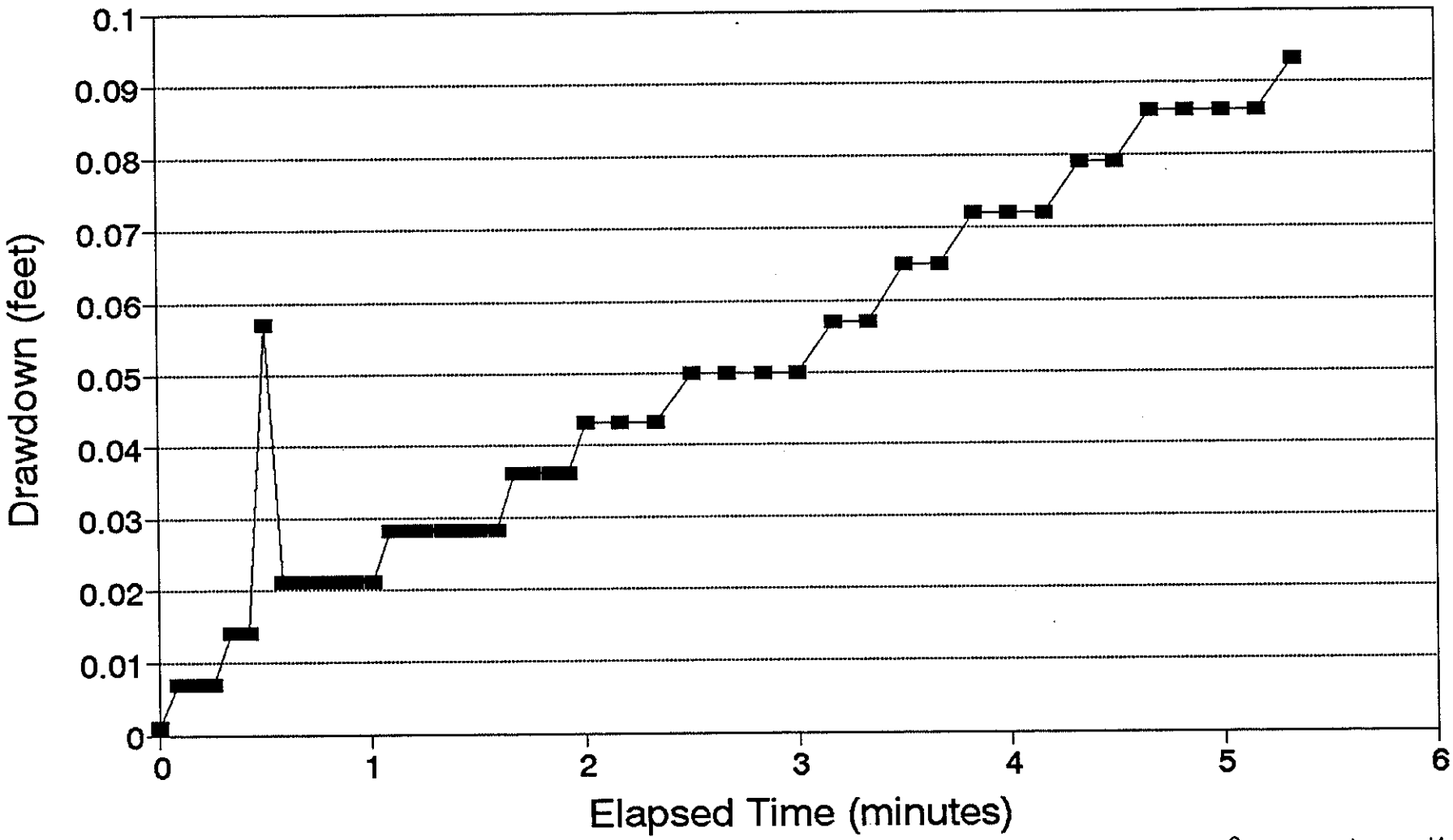
If Lw < H ln (Re/rw) = ERR

Horizontal Hydraulic Conductivity = ERR cm/sec

If Lw = H ln (Re/rw) = 1.79

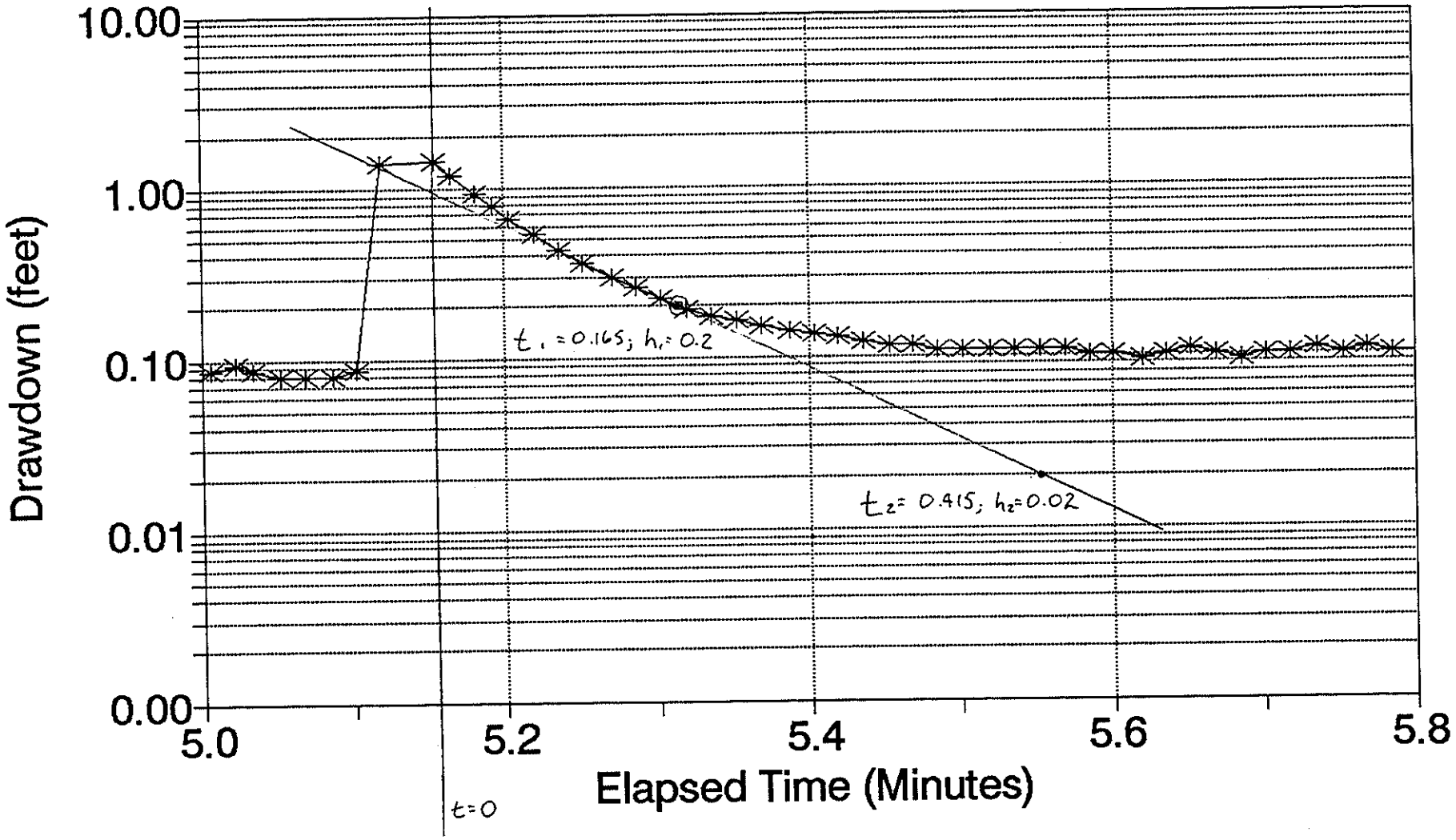
Horizontal Hydraulic Conductivity = 3.07E-02 cm/sec

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



Response too rapid for estimation of K_h

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



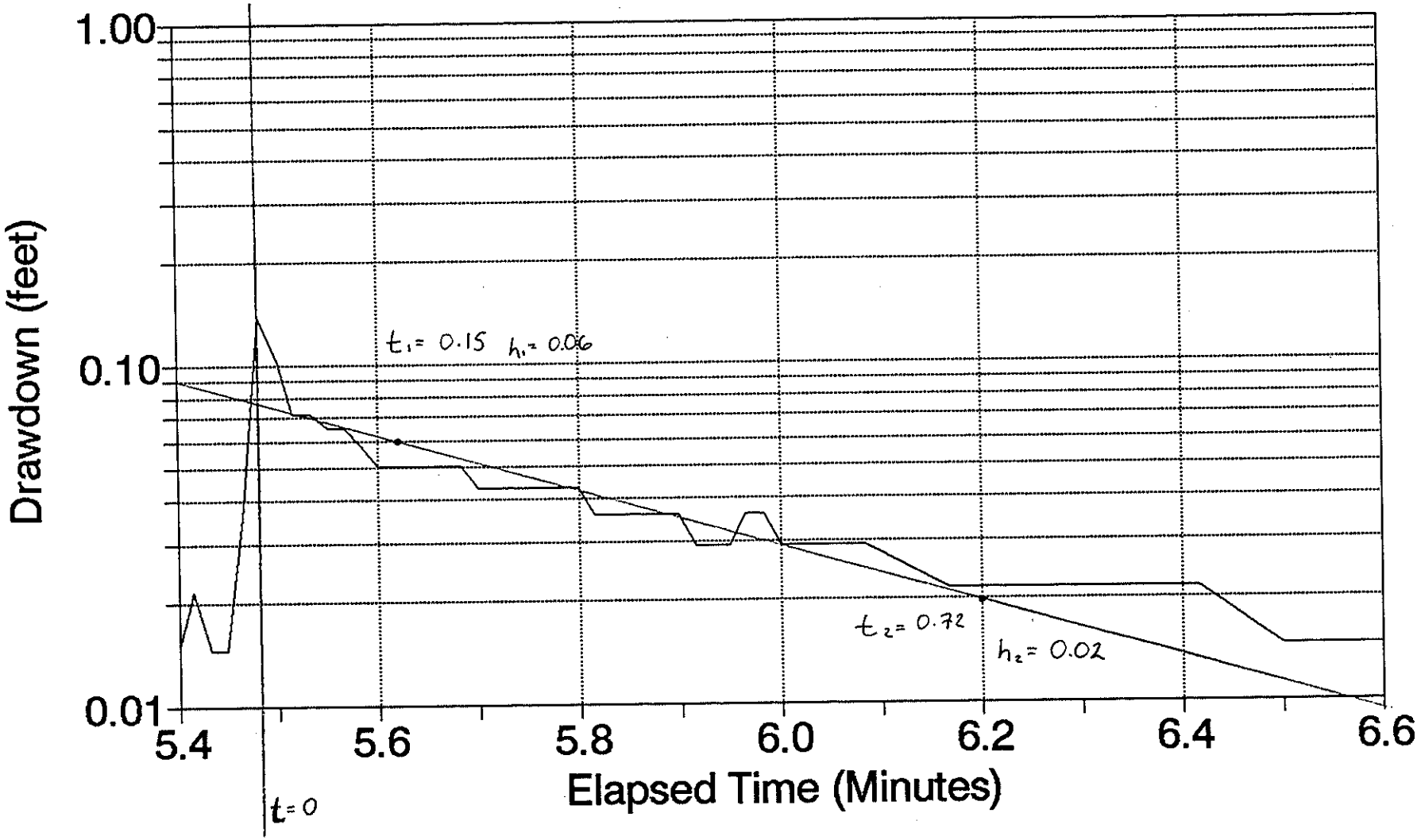
WEYERHAEUSER FORMER MILL E HVORSLEV SLUG TEST
MW-23D2

		INPUT	(KGS)
Well Diameter (in)		2	5.08
Saturated Screen Length (ft)		10	304.8
Gravel Pack Diameter (in)		6	15.24
Initial Head (ft)		0.2	6.096
Final Head (ft)		0.02	0.6096
Initial Time (sec)		9.9	9.9
Final Time (sec)		24.9	24.9
Kh / Kv =	'5' for homogeneous '10' for stratified	5	5

Horizontal Hydraulic Conductivity = 7.30E-03 cm/sec

Vertical Hydraulic Conductivity = 1.46E-03 cm/sec

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



BOUWER AND RICE SLUG TEST ANALYSIS
Weyerhaeuser Former Mill E/Koppers - MW-32

	INPUT	(KGS)
H = Saturated Thickness of Aquifer (ft)	2	60.96
Lw = Water Table Elevation - Bottom of Well (ft)	2	60.96
Le = Saturated Well Screen Length (ft)	2	60.96
2rw = Boring Diameter (in)	9	22.86
2rc = Well Diameter (in)	2	5.08
h1 = Initial Head (ft)	0.06	1.8288
h2 = Final Head (ft)	0.02	0.6096
t1 = Initial Time (sec)	9	9
t2 = Final Time (sec)	43.2	43.2
Porosity of Gravel Pack (%)	40	0.4

	INPUT	(from Bouwer, 1989; PAGE DOWN for values for A, B, and C using Le/rw =	5.33
A =	1.7		
B =	0.25		
C =	0.8		

CALCULATIONS

Effective Radius of Well 7.49 cm

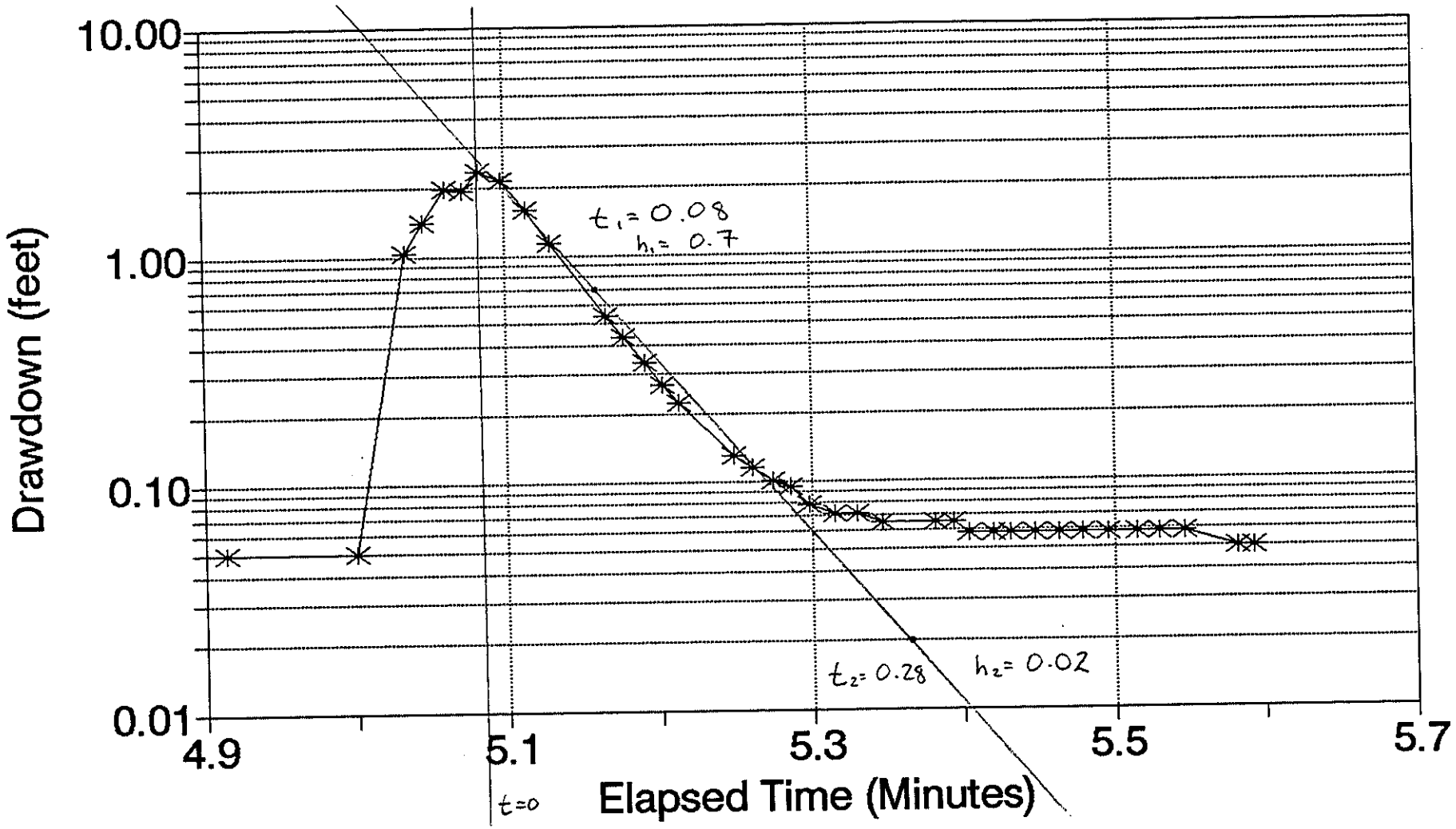
If Lw < H ln (Re/rw) = ERR

Horizontal Hydraulic Conductivity = ERR cm/sec

If Lw = H ln (Re/rw) = 1.24

Horizontal Hydraulic Conductivity = 1.83E-02 cm/sec

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



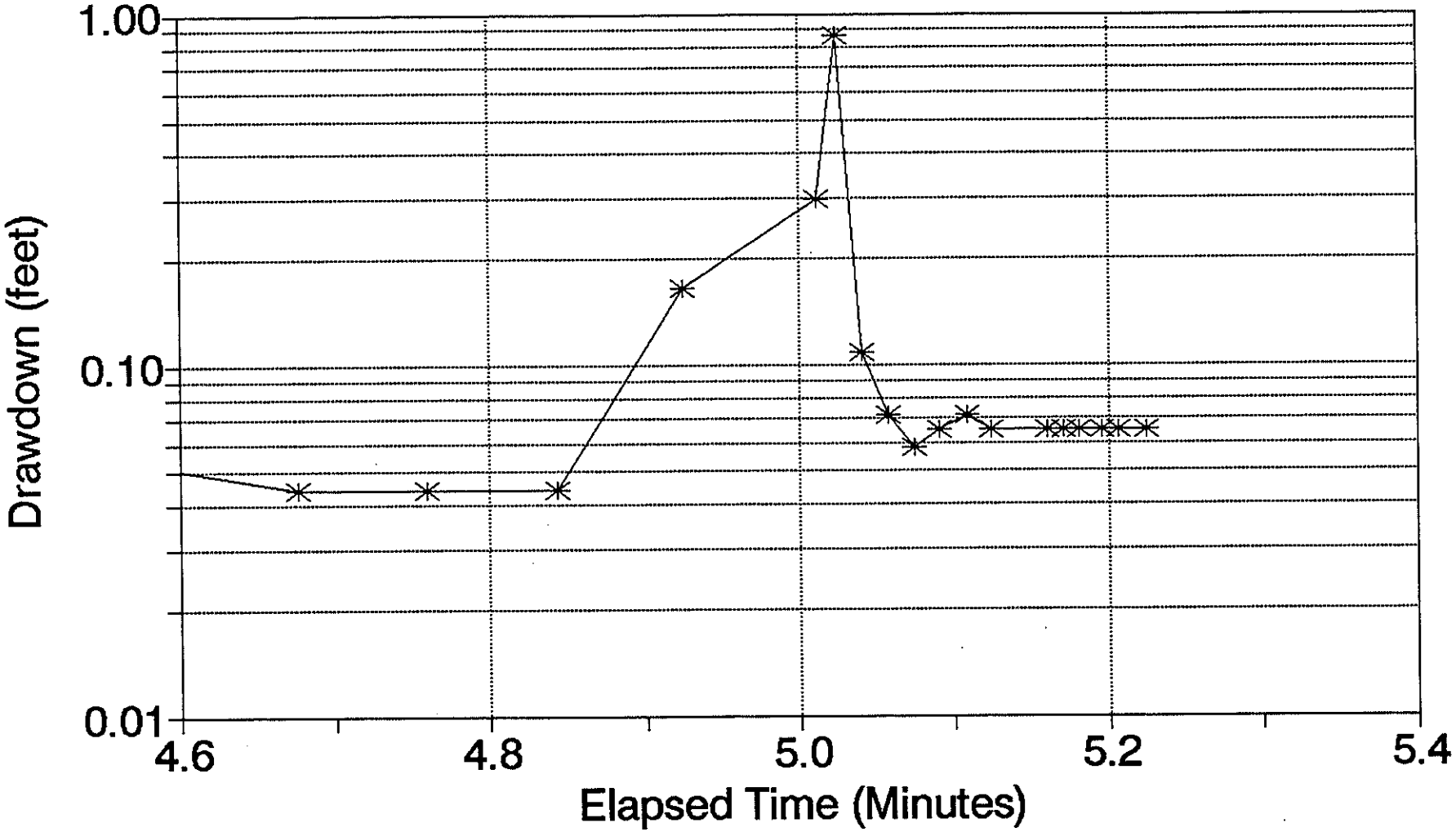
WEYERHAEUSER FORMER MILL E HVORSLEV SLUG TEST
MW-6D

		INPUT	(KGS)
Well Diameter (in)		2	5.08
Saturated Screen Length (ft)		10	304.8
Gravel Pack Diameter (in)		6	15.24
Initial Head (ft)		0.7	21.336
Final Head (ft)		0.02	0.6096
Initial Time (sec)		4.8	4.8
Final Time (sec)		16.8	16.8
Kh / Kv =	'5' for homogeneous '10' for stratified	5	5

Horizontal Hydraulic Conductivity = 1.41E-02 cm/sec

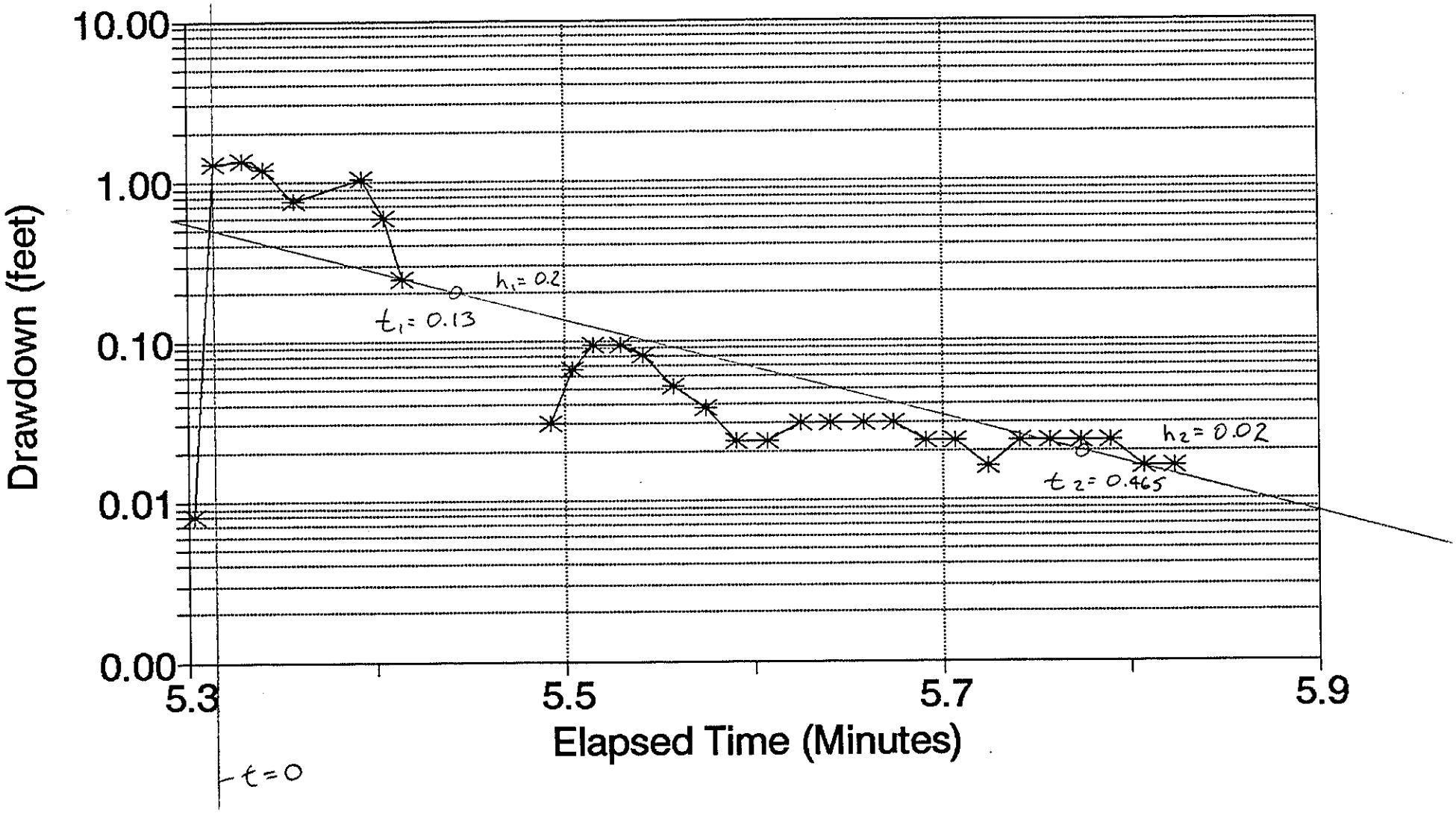
Vertical Hydraulic Conductivity = 2.82E-03 cm/sec

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



Response too rapid for estimation of K_h

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



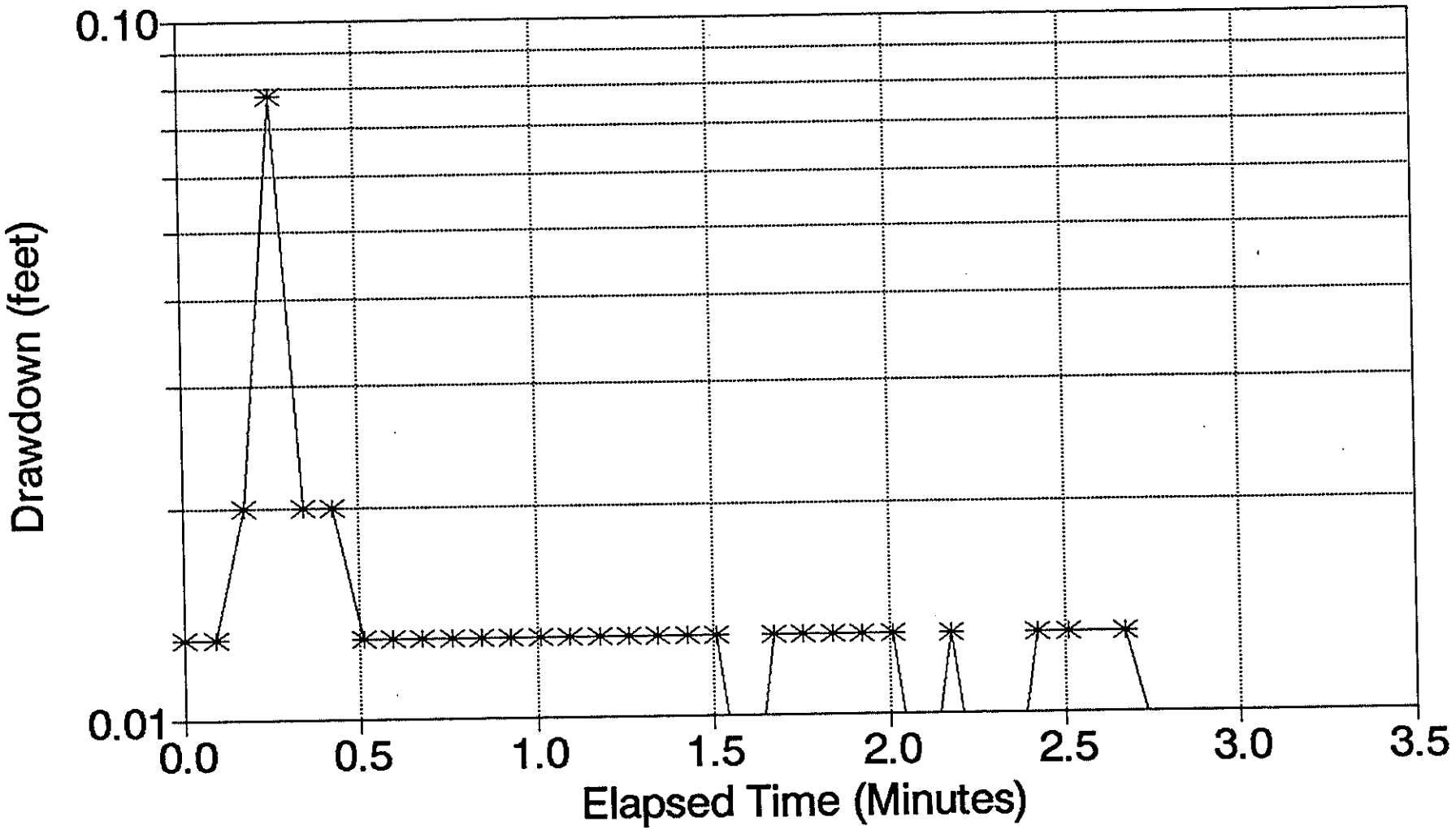
WEYERHAEUSER FORMER MILL E HVORSLEV SLUG TEST
MW-11D2

		INPUT	(KGS)
Well Diameter (in)		2	5.08
Saturated Screen Length (ft)		10	304.8
Gravel Pack Diameter (in)		6	15.24
Initial Head (ft)		0.2	6.096
Final Head (ft)		0.02	0.6096
Initial Time (sec)		7.8	7.8
Final Time (sec)		27.9	27.9
Kh / Kv =	'5' for homogeneous '10' for stratified	5	5

Horizontal Hydraulic Conductivity = 5.45E-03 cm/sec

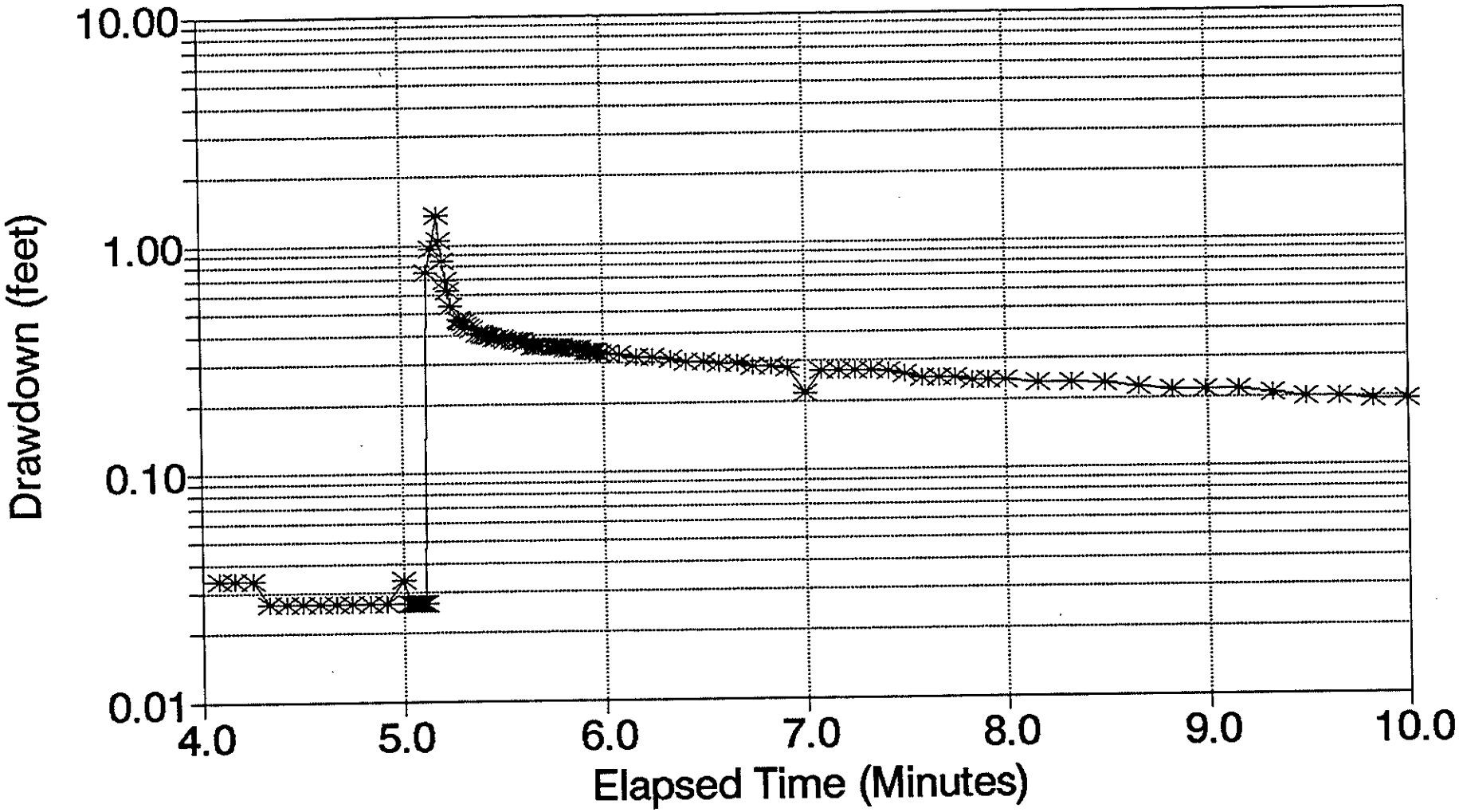
Vertical Hydraulic Conductivity = 1.09E-03 cm/sec

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



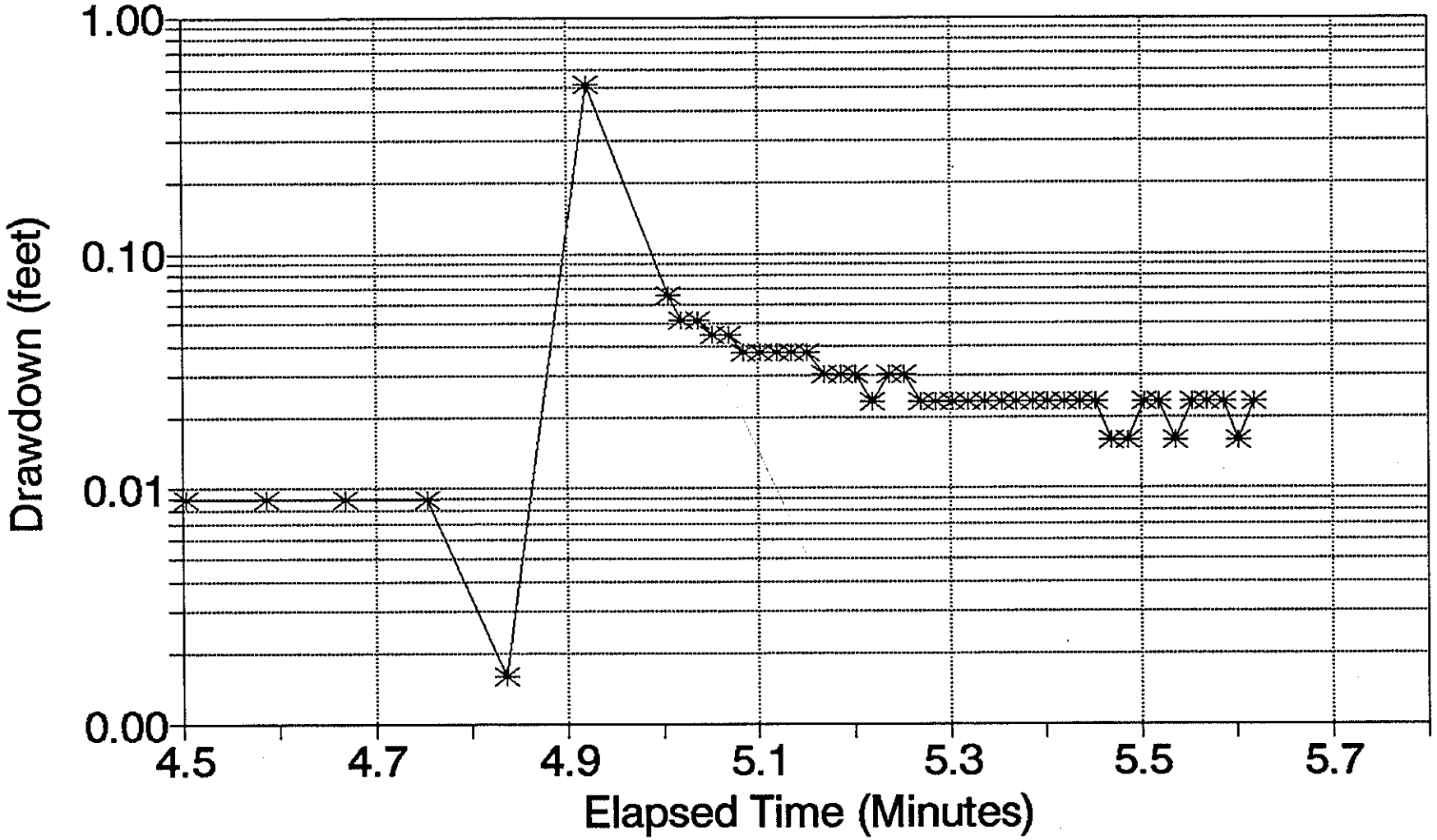
Response too rapid for estimation of K_h

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



Response too rapid for estimation of K_h

Weyerhaeuser Former Mill E/Koppers
Hydraulic Conductivity Test



Response too rapid for estimation of K_h

SUMMARY OF HYDRAULIC CONDUCTIVITY TEST RESULTS

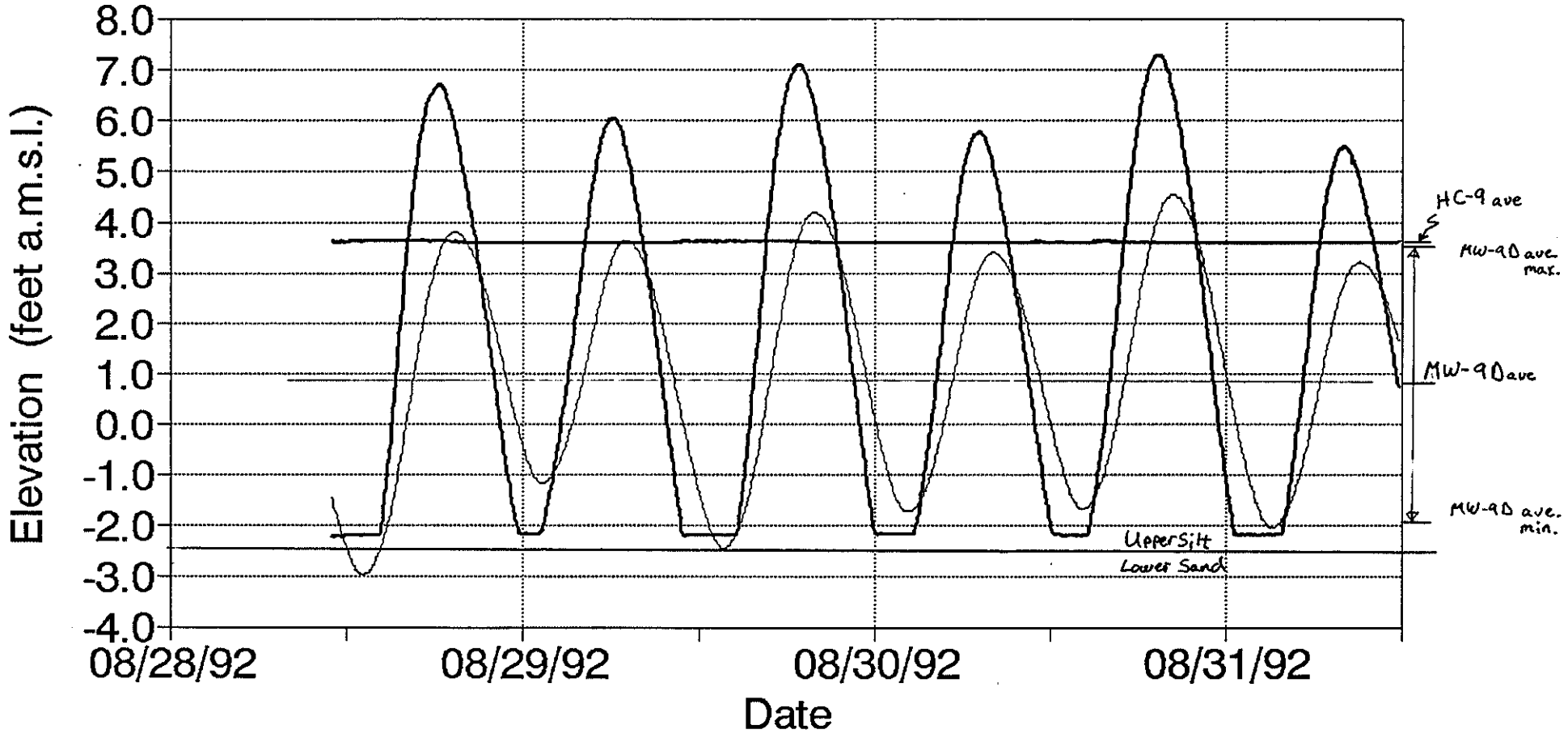
Well	Hydraulic Conductivity (cm/sec)	Well	Hydraulic Conductivity (cm/sec)
	Upper Sand		Lower Sand
HC-1	0.062[a] / .001	HC-1D[a]	0.073[a]
HC-4	0.048[a]	HC-10D	0.04[a]
HC-5	0.073[a]	HC-11D	0.09[a]
HC-7	0.017[a]	MW-6D	0.014
HC-10	0.004[a]-0.013	MW-9D	> 0.05
HC-11	0.001[a]-0.003	MW-23D2	0.0073
MW-23	> 0.05	MW-30D	> 0.05
MW-27	> 0.05	MW-31D	> 0.05
MW-30	0.022-0.031		
MW-32	0.018		
TW-1	0.05-0.06[b]		

*a Estimated from grain size analysis (Hart Crowser, 1989 b)
All other results from slug tests
b Estimated from pumping test

ATTACHMENT 5

TIDAL STUDY RESULTS

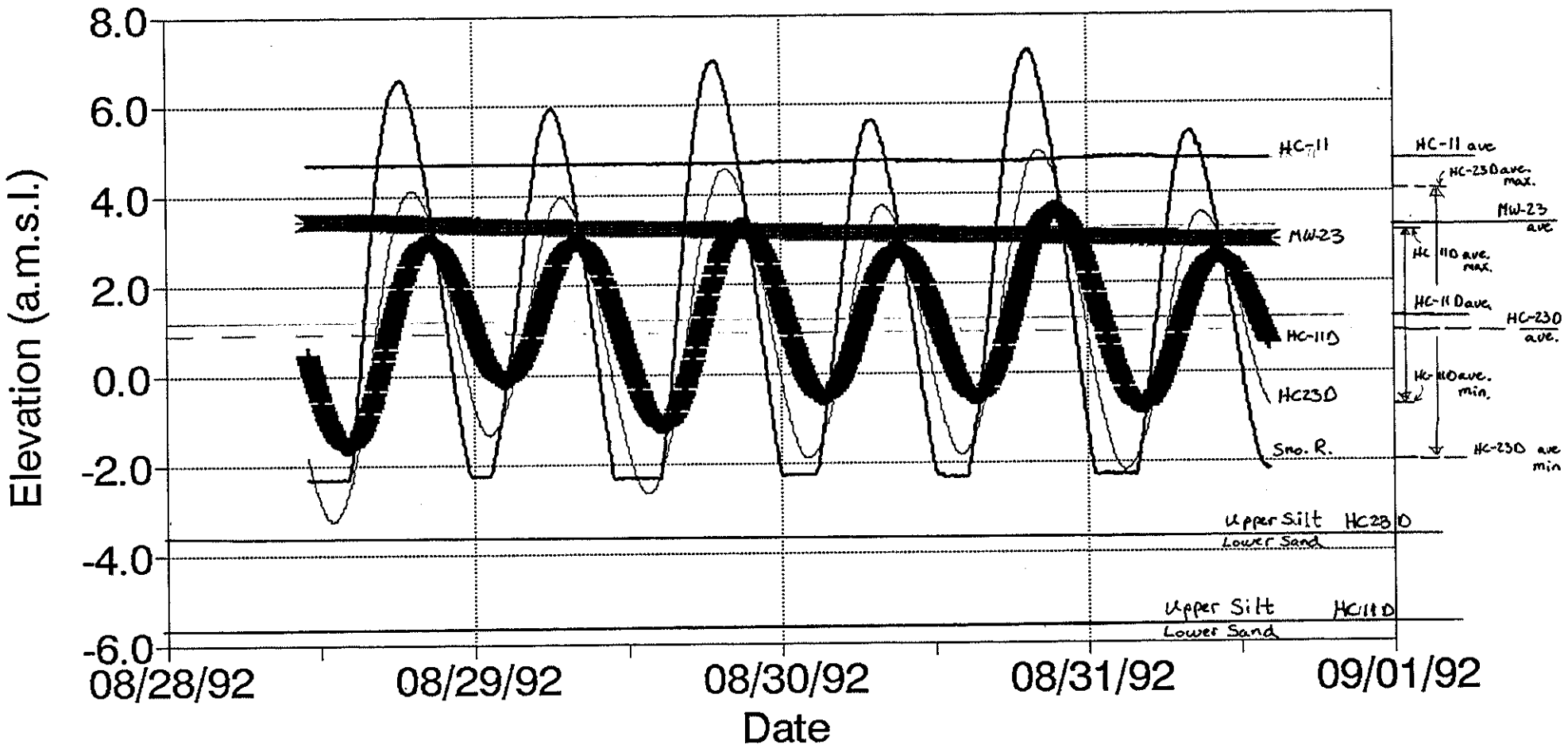
WEYERHAEUSER FORMER MILL E/KOPPERS
Tidal Study - HC-9 & MW-9D



Snohomish River — HC-9 — MW-9D

WEYERHAEUSER FORMER MILL E/KOPPERS

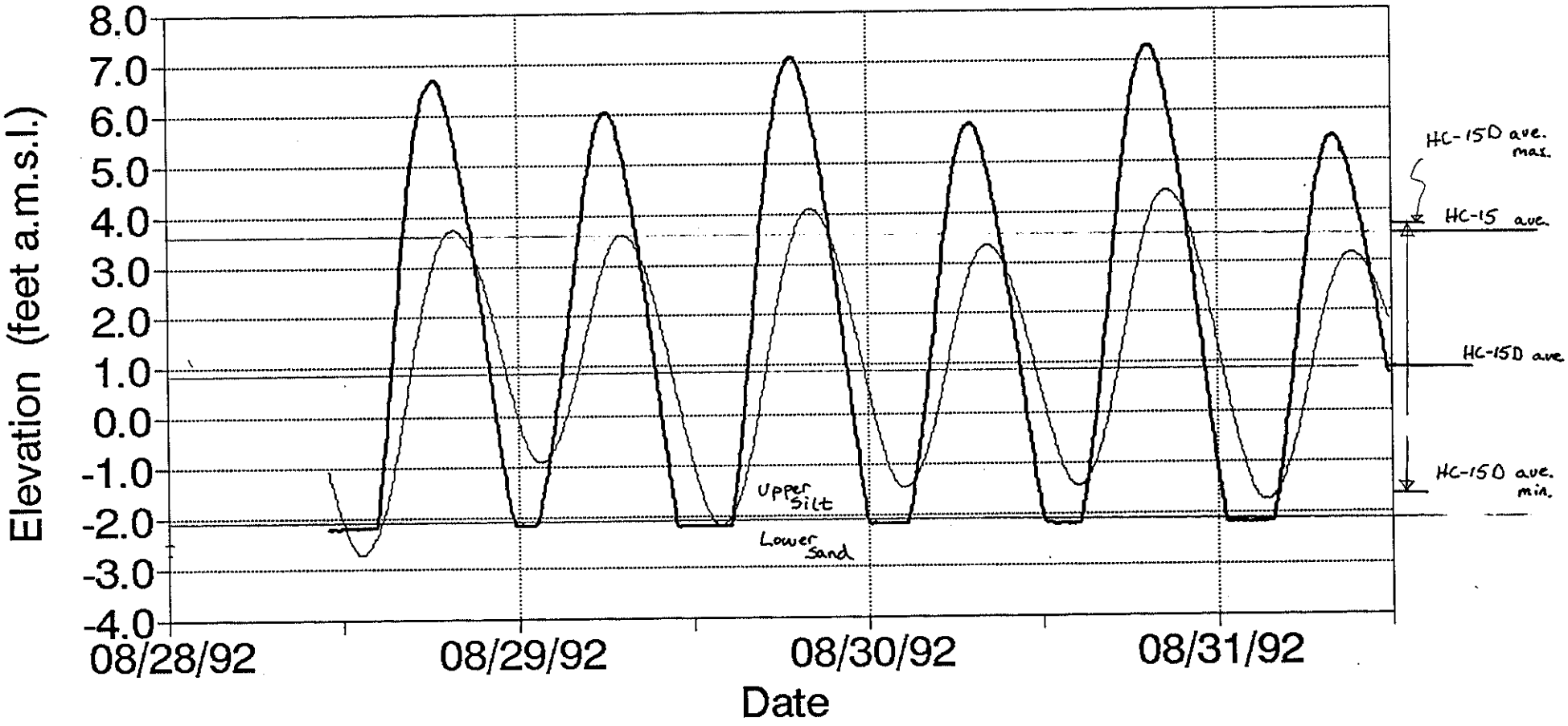
Tidal Study - HC-11, -11D, -23, & -23D



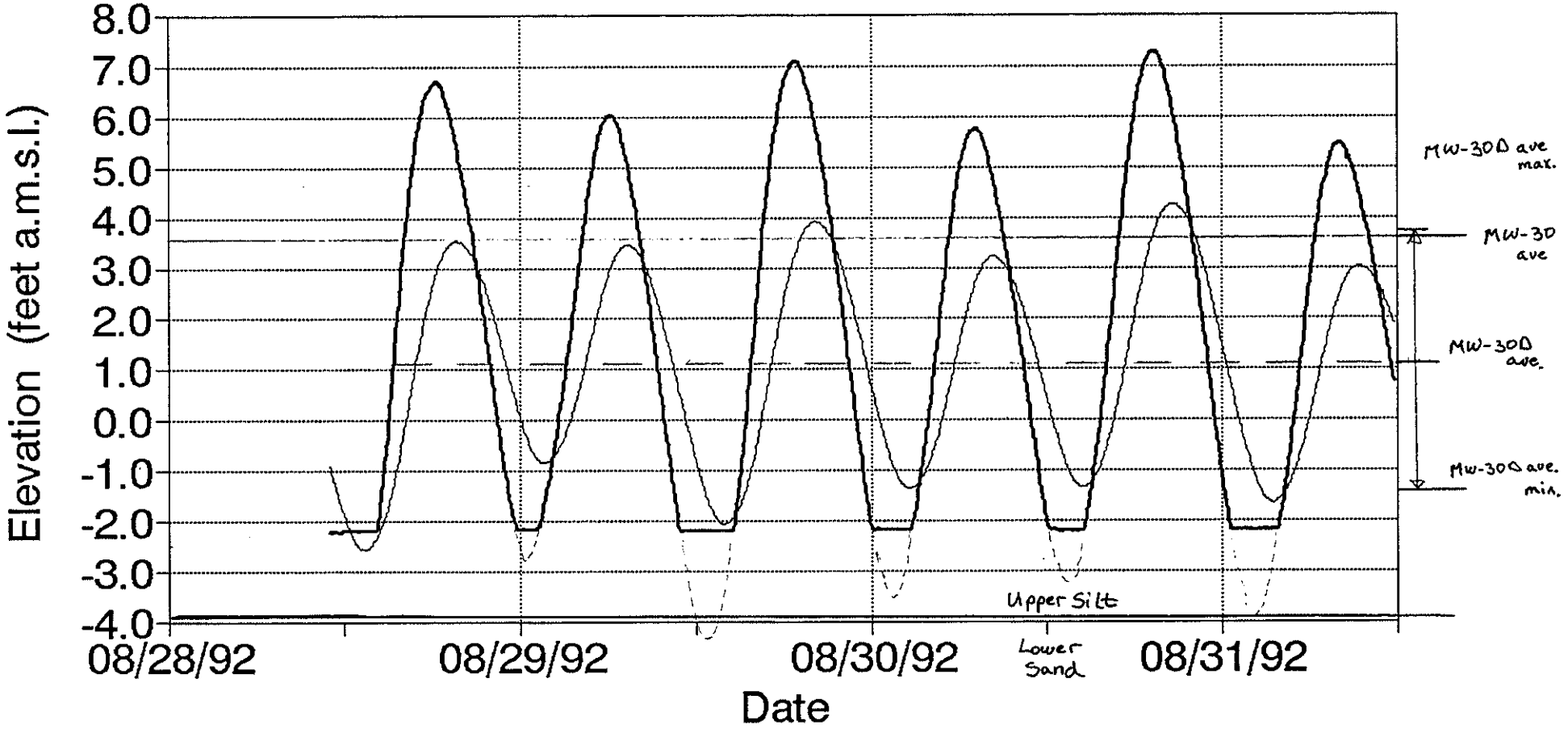
Snohomish R — HC-11 — HC-11D

* ~~HC~~-23 (MW) — HC-23D

WEYERHAEUSER FORMER MILL E/KOPPERS
Tidal Study - MW-15D



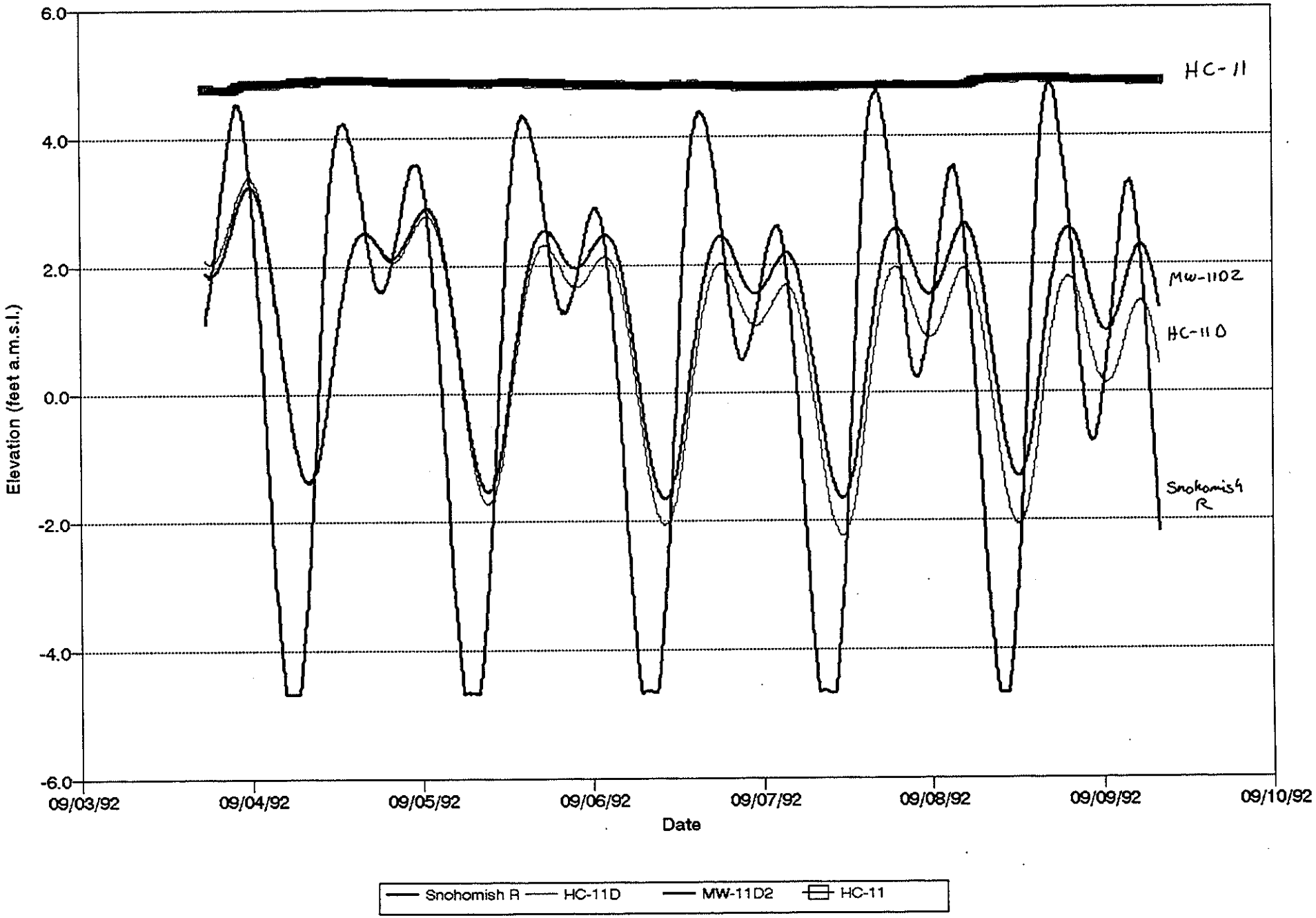
WEYERHAEUSER FORMER MILL E/KOPPERS
Tidal Study - MW-30D



Comparison of HC-11D and MW-11D2

WEYERHAEUSER FORMER MILL E/KOPPERS

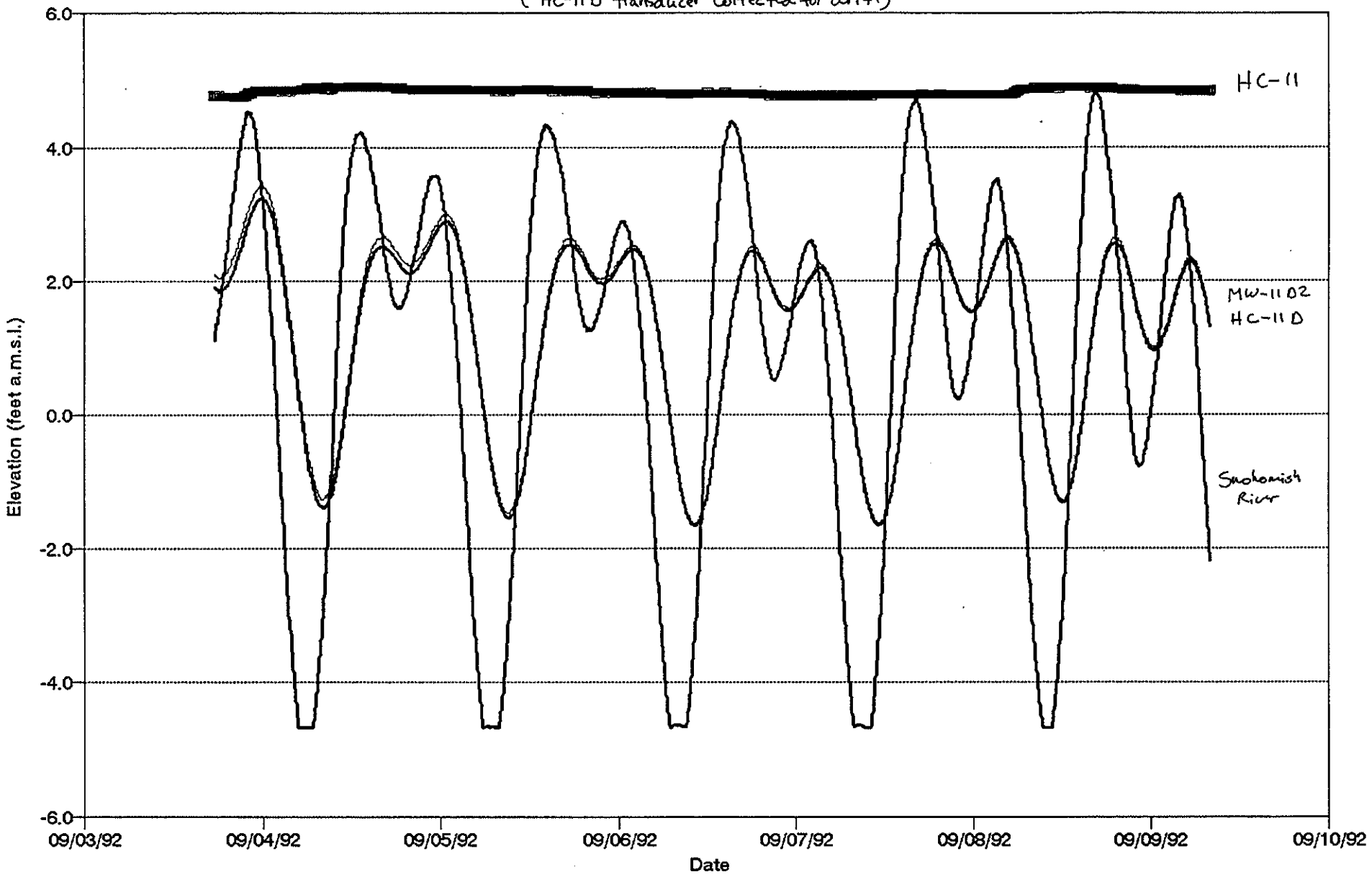
Tidal Study - HC-11, HC-11D & MW-11D2



WEYERHAEUSER FORMER MILL E/KOPPERS

Tidal Study - HC-11, HC-11D & MW-11D2

(HC-11D transducer corrected for drift)

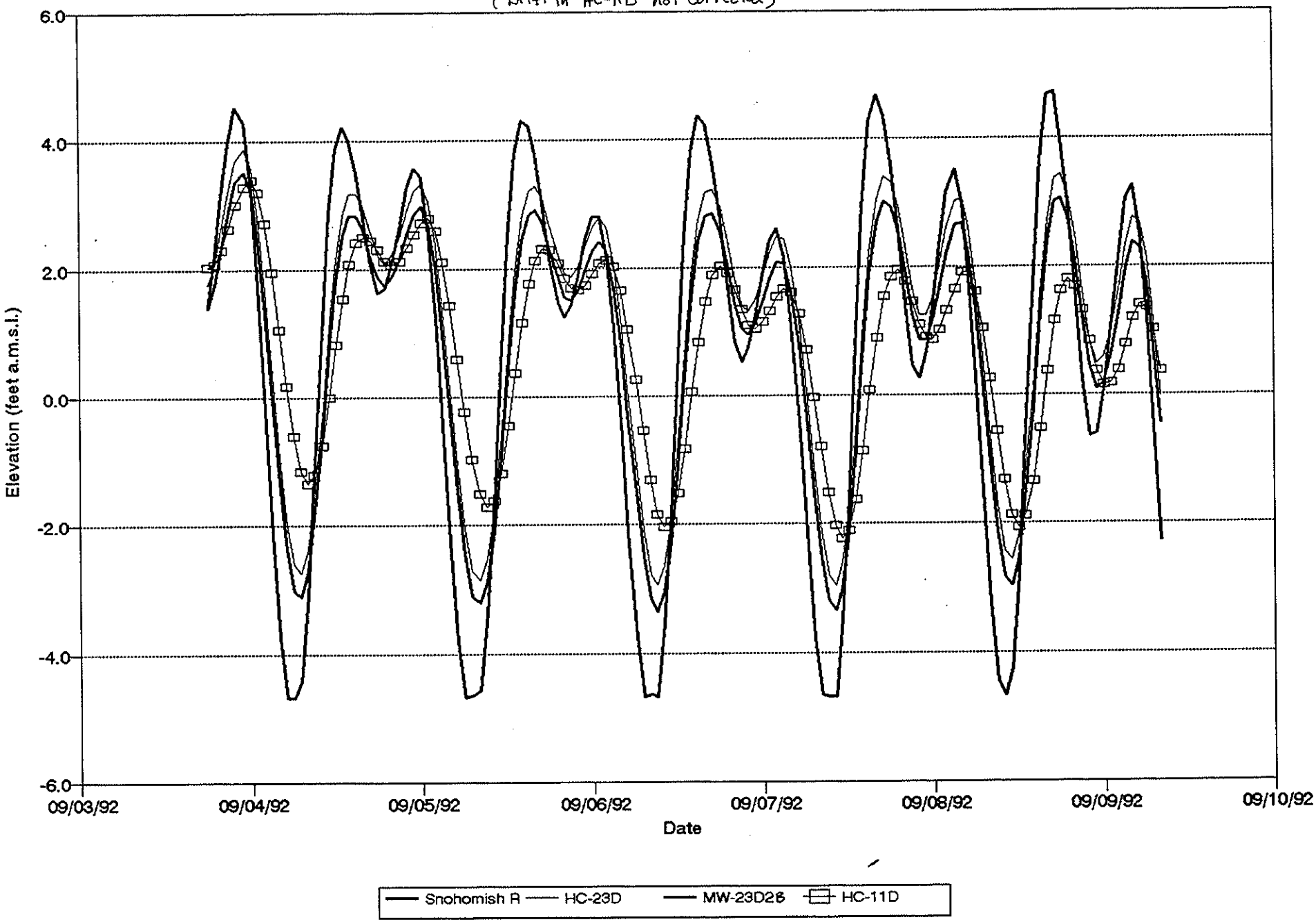


Comparison of HC-23D and MW-23D2B

WEYERHAEUSER FORMER MILL E/KOPPERS

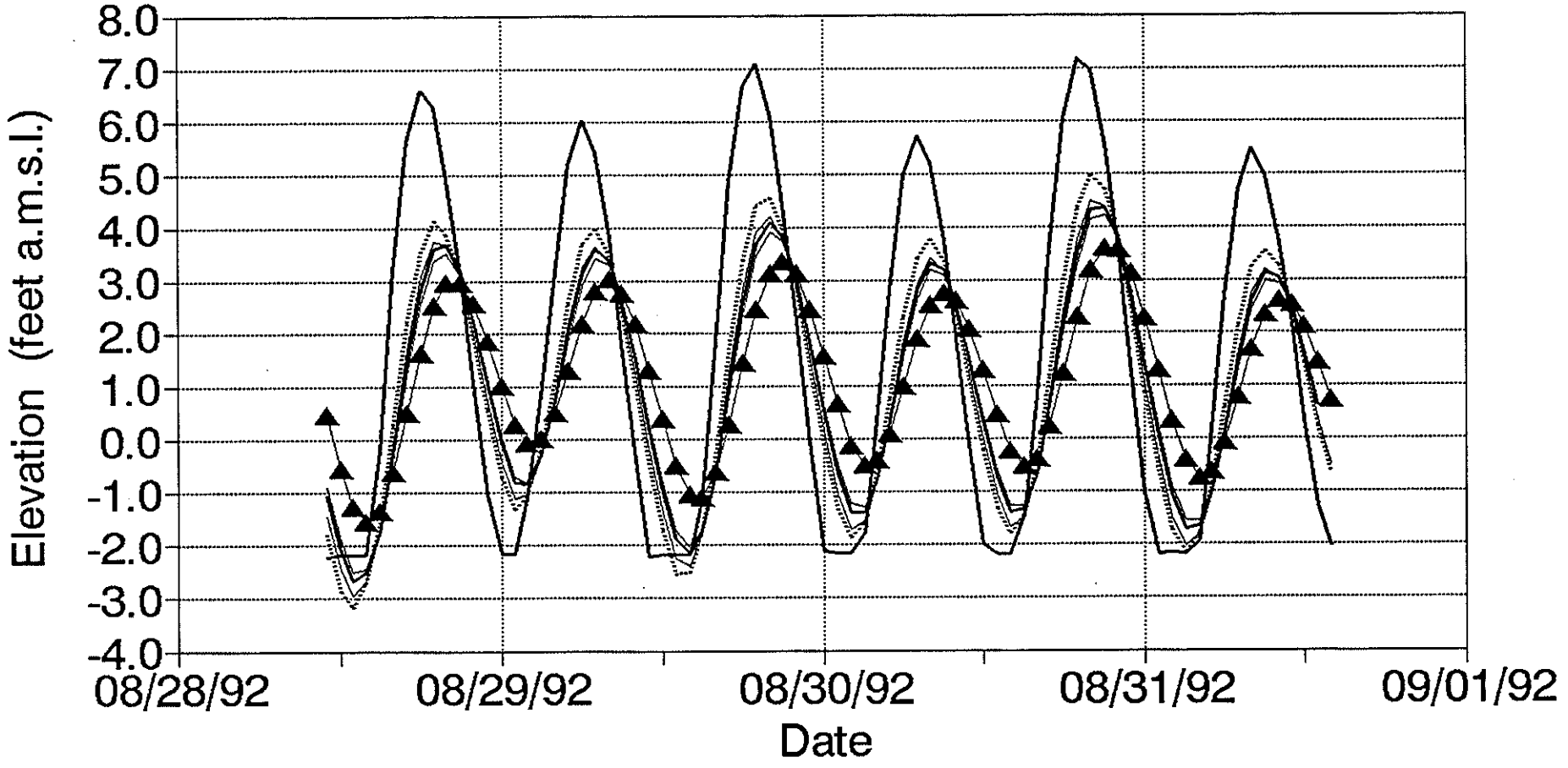
Tidal Study - HC-11D, HC-23D & MW-23D2

(Drift in HC-11D not corrected)



WEYERHAEUSER FORMER MILL E/KOPPERS

Tidal Study - Lower Sand Aquifer



Ground Water Elevations

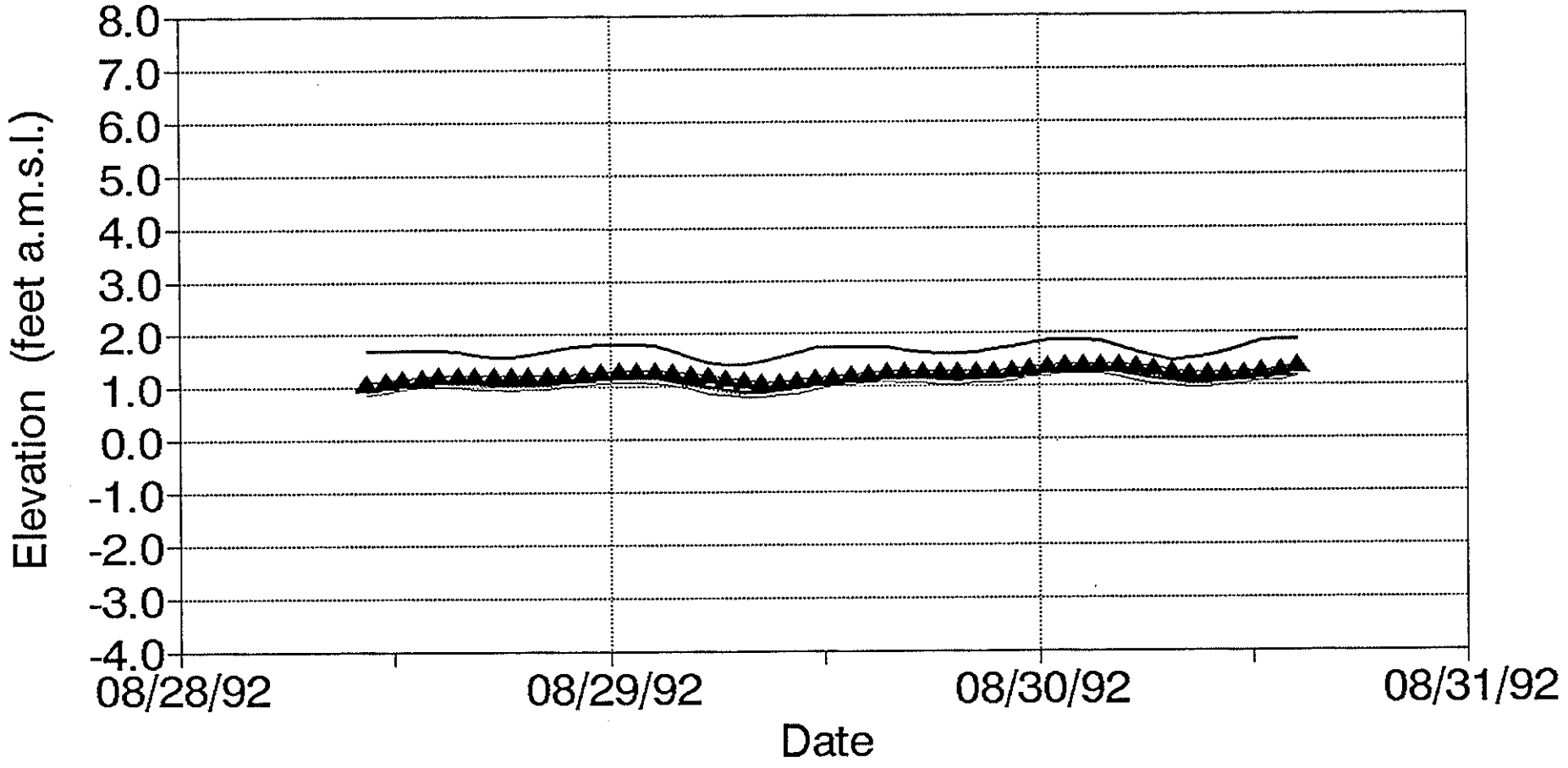
Tidal Study

Date	Time	SNOHOMIS Elev. (Ft)	MW-9 Elev. (Ft)	MW-9D Elev. (Ft)	MW-30D Elev. (Ft)	MW-15D Elev. (Ft)	HC-23 Elev. (Ft)	HC-23D Elev. (Ft)	HC-11 Elev. (Ft)	HC-11D Elev. (Ft)
08/28/92	11:00	-2.24	3.64	-1.46	-0.91	-1.09	3.45	-1.83	4.72	0.46
08/28/92	12:00	-2.22	3.61	-2.48	-1.91	-2.12	3.45	-2.88	4.72	-0.55
08/28/92	13:00	-2.22	3.64	-2.99	-2.53	-2.70	3.48	-3.22	4.72	-1.27
08/28/92	14:00	-2.19	3.64	-2.69	-2.46	-2.54	3.45	-2.74	4.72	-1.57
08/28/92	15:00	-0.21	3.64	-1.72	-1.76	-1.75	3.45	-1.58	4.72	-1.36
08/28/92	16:00	3.17	3.64	-0.10	-0.41	-0.28	3.43	0.29	4.72	-0.62
08/28/92	17:00	5.61	3.64	1.70	1.22	1.45	3.43	2.21	4.72	0.51
08/28/92	18:00	6.61	3.64	3.07	2.57	2.83	3.43	3.55	4.72	1.64
08/28/92	19:00	6.26	3.64	3.74	3.38	3.60	3.43	4.10	4.72	2.52
08/28/92	20:00	4.87	3.61	3.67	3.49	3.66	3.41	3.87	4.72	2.96
08/28/92	21:00	3.14	3.61	3.04	3.09	3.17	3.41	3.11	4.72	2.96
08/28/92	22:00	1.04	3.61	2.03	2.26	2.26	3.39	1.91	4.72	2.58
08/28/92	23:00	-1.06	3.61	0.73	1.14	1.08	3.38	0.52	4.72	1.85
08/29/92	00:00	-2.17	3.59	-0.45	0.04	-0.08	3.36	-0.73	4.72	1.02
08/29/92	01:00	-2.17	3.61	-1.14	-0.72	-0.83	3.36	-1.33	4.72	0.28
08/29/92	02:00	-1.13	3.59	-1.05	-0.82	-0.86	3.36	-1.07	4.72	-0.09
08/29/92	03:00	0.83	3.61	-0.35	-0.33	-0.30	3.34	-0.20	4.72	0.00
08/29/92	04:00	3.14	3.61	0.80	0.63	0.73	3.34	1.12	4.72	0.51
08/29/92	05:00	5.18	3.59	2.16	1.84	2.02	3.32	2.58	4.72	1.29
08/29/92	06:00	6.03	3.59	3.23	2.90	3.10	3.32	3.69	4.72	2.17
08/29/92	07:00	5.41	3.59	3.64	3.42	3.59	3.29	3.96	4.72	2.80
08/29/92	08:00	3.79	3.61	3.30	3.29	3.38	3.29	3.46	4.72	3.00
08/29/92	09:00	1.78	3.61	2.44	2.62	2.63	3.29	2.41	4.72	2.77
08/29/92	10:00	-0.39	3.61	1.19	1.56	1.49	3.29	1.01	4.72	2.17
08/29/92	11:00	-2.24	3.64	-0.17	0.33	0.20	3.29	-0.47	4.72	1.32
08/29/92	12:00	-2.19	3.64	-1.39	-0.84	-1.01	3.29	-1.74	4.72	0.37
08/29/92	13:00	-2.22	3.64	-2.27	-1.75	-1.93	3.27	-2.57	4.72	-0.51
08/29/92	14:00	-2.19	3.64	-2.41	-2.07	-2.19	3.27	-2.53	4.72	-1.04
08/29/92	15:00	-1.18	3.64	-1.81	-1.71	-1.74	3.27	-1.74	4.72	-1.11
08/29/92	16:00	1.83	3.64	-0.56	-0.73	-0.66	3.25	-0.26	4.72	-0.64
08/29/92	17:00	4.85	3.64	1.22	0.80	0.98	3.25	1.70	4.70	0.28
08/29/92	18:00	6.65	3.64	2.83	2.33	2.56	3.22	3.39	4.72	1.43
08/29/92	19:00	7.07	3.64	3.87	3.44	3.67	3.22	4.40	4.70	2.45
08/29/92	20:00	6.08	3.61	4.17	3.90	4.08	3.22	4.54	4.72	3.12
08/29/92	21:00	4.39	3.61	3.78	3.72	3.82	3.20	3.96	4.72	3.33
08/29/92	22:00	2.20	3.61	2.83	3.01	3.03	3.20	2.85	4.72	3.10
08/29/92	23:00	-0.09	3.61	1.52	1.90	1.84	3.20	1.38	4.72	2.45
08/30/92	00:00	-2.15	3.59	0.13	0.64	0.52	3.18	-0.13	4.75	1.57
08/30/92	01:00	-2.17	3.59	-1.07	-0.50	-0.66	3.18	-1.35	4.75	0.65
08/30/92	02:00	-2.17	3.59	-1.72	-1.25	-1.39	3.15	-1.68	4.72	-0.14
08/30/92	03:00	-1.78	3.59	-1.58	-1.31	-1.39	3.15	-1.58	4.75	-0.51
08/30/92	04:00	0.30	3.59	-0.84	-0.80	-0.79	3.15	-0.68	4.75	-0.41
08/30/92	05:00	2.80	3.61	0.39	0.21	0.31	3.15	0.75	4.75	0.09
08/30/92	06:00	4.94	3.59	1.84	1.50	1.67	3.15	2.30	4.75	0.97
08/30/92	07:00	5.73	3.61	2.93	2.60	2.79	3.13	3.41	4.75	1.87
08/30/92	08:00	5.18	3.59	3.39	3.17	3.32	3.11	3.75	4.75	2.52
08/30/92	09:00	3.72	3.61	3.14	3.09	3.17	3.11	3.34	4.75	2.77
08/30/92	10:00	1.87	3.61	2.37	2.51	2.52	3.11	2.39	4.75	2.61
08/30/92	11:00	-0.16	3.64	1.24	1.56	1.50	3.13	1.12	4.75	2.08
08/30/92	12:00	-2.03	3.61	-0.03	0.43	0.31	3.11	-0.24	4.75	1.29
08/30/92	13:00	-2.22	3.61	-1.09	-0.60	-0.75	3.11	-1.33	4.72	0.46
08/30/92	14:00	-2.22	3.61	-1.69	-1.27	-1.40	3.09	-1.81	4.72	-0.23
08/30/92	15:00	-1.45	3.61	-1.49	-1.27	-1.33	3.09	-1.44	4.72	-0.53
08/30/92	16:00	0.79	3.64	-0.63	-0.67	-0.65	3.09	-0.43	4.72	-0.37
08/30/92	17:00	3.60	3.61	0.76	0.49	0.60	3.09	1.17	4.72	0.25
08/30/92	18:00	6.03	3.61	2.42	1.97	2.16	3.06	2.97	4.72	1.25
08/30/92	19:00	7.18	3.61	3.76	3.29	3.51	3.06	4.33	4.75	2.31
08/30/92	20:00	6.95	3.61	4.48	4.10	4.30	3.06	4.96	4.75	3.19
08/30/92	21:00	5.54	3.61	4.38	4.21	4.34	3.06	4.70	4.75	3.61
08/30/92	22:00	3.60	3.61	3.71	3.75	3.79	3.04	3.82	4.77	3.56
08/30/92	23:00	1.22	3.61	2.51	2.76	2.74	3.04	2.44	4.79	3.10
08/31/92	00:00	-1.06	3.59	1.06	1.51	1.40	3.04	0.84	4.79	2.29
08/31/92	01:00	-2.19	3.59	-0.38	0.21	0.05	3.02	-0.63	4.82	1.32
08/31/92	02:00	-2.17	3.59	-1.49	-0.91	-1.09	2.99	-1.77	4.82	0.35
08/31/92	03:00	-2.19	3.59	-2.04	-1.57	-1.73	3.02	-2.18	4.82	-0.41
08/31/92	04:00	-1.96	3.59	-1.83	-1.57	-1.65	2.99	-1.79	4.82	-0.76
08/31/92	05:00	0.14	3.59	-1.07	-1.03	-1.02	2.99	-0.67	4.82	-0.62
08/31/92	06:00	2.68	3.59	0.20	0.02	0.11	2.99	0.59	4.79	-0.09
08/31/92	07:00	4.69	3.59	1.63	1.32	1.48	2.97	2.14	4.79	0.79
08/31/92	08:00	5.48	3.59	2.72	2.40	2.57	2.97	3.22	4.79	1.69
08/31/92	09:00	4.92	3.59	3.18	2.96	3.11	2.95	3.55	4.79	2.33
08/31/92	10:00	3.67	3.61	3.00	2.93	3.02	2.97	3.25	4.79	2.61
08/31/92	11:00	2.15	3.61	2.40	2.49	2.51	2.95	2.48	4.79	2.52
08/31/92	12:00	0.35	3.64	1.45		1.64	2.97	1.40	4.77	2.10
08/31/92	13:00	-1.32	3.64	0.34		0.61	2.95	0.22	4.77	1.43
08/31/92	14:00	-2.06	3.64	-0.52			2.95	-0.66	4.77	0.74

WEYERHAEUSER FORMER MILL E/KOPPERS

Tidal Study - Lower Sand Aquifer - AVE

Means of moving average of 24 hourly elevations



Snohomish River
MW-9D
HC-15D
MW-30D
HC-23D
HC-11D

AVERAGE Ground Water Elevations

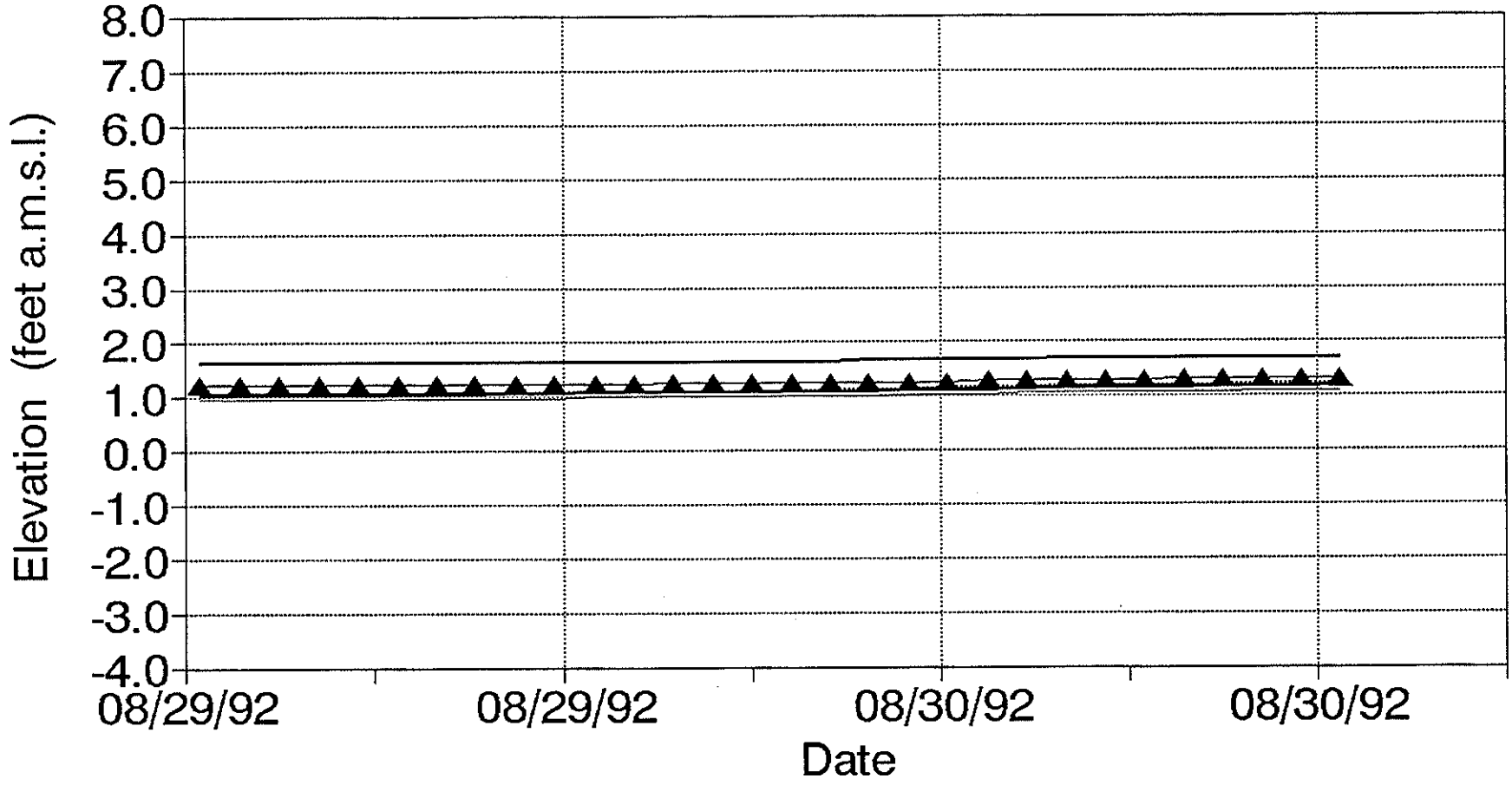
Tidal Study Means of moving average (Serfes, 1991)

Date	Time	SNOHOMI Elev. (Ft)	MW-9 Elev. (Ft)	MW-9D Elev. (Ft)	MW-30D Elev. (Ft)	MW-15D Elev. (Ft)	HC-23 Elev. (Ft)	HC-23D Elev. (Ft)	HC-11 Elev. (Ft)	HC-11D Elev. (Ft)
08/28/92	11:30	1.70	3.61	0.85	0.90	0.94	3.38	0.93	4.72	1.08
08/28/92	11:30	1.70	3.61	0.90	0.95	0.99	3.37	0.98	4.72	1.12
08/29/92	11:30	1.70	3.62	0.95	1.00	1.04	3.37	1.03	4.72	1.16
08/29/92	11:30	1.70	3.62	0.98	1.03	1.07	3.36	1.06	4.72	1.19
08/29/92	11:30	1.70	3.62	0.99	1.04	1.08	3.35	1.06	4.72	1.21
08/29/92	11:30	1.66	3.62	0.98	1.05	1.08	3.34	1.06	4.72	1.22
08/29/92	11:30	1.61	3.62	0.96	1.03	1.07	3.34	1.04	4.72	1.22
08/29/92	11:30	1.58	3.62	0.94	1.02	1.05	3.33	1.01	4.72	1.21
08/29/92	11:30	1.58	3.62	0.93	1.01	1.04	3.32	1.01	4.72	1.20
08/29/92	11:30	1.61	3.62	0.94	1.01	1.04	3.31	1.02	4.72	1.20
08/29/92	11:30	1.66	3.62	0.96	1.03	1.06	3.30	1.05	4.72	1.21
08/29/92	11:30	1.71	3.62	0.99	1.05	1.08	3.29	1.08	4.72	1.22
08/29/92	11:30	1.76	3.62	1.03	1.08	1.12	3.29	1.12	4.72	1.24
08/29/92	11:30	1.80	3.62	1.06	1.11	1.15	3.28	1.16	4.72	1.27
08/29/92	11:30	1.80	3.62	1.08	1.14	1.17	3.27	1.18	4.72	1.29
08/29/92	11:30	1.80	3.61	1.09	1.15	1.18	3.27	1.18	4.72	1.31
08/29/92	11:30	1.76	3.61	1.06	1.13	1.16	3.26	1.15	4.72	1.31
08/29/92	11:30	1.65	3.61	1.01	1.09	1.11	3.25	1.09	4.72	1.29
08/29/92	11:30	1.53	3.61	0.94	1.03	1.05	3.24	1.02	4.73	1.25
08/29/92	11:30	1.43	3.61	0.86	0.96	0.98	3.23	0.94	4.73	1.20
08/29/92	11:30	1.39	3.61	0.81	0.90	0.92	3.23	0.88	4.73	1.15
08/29/92	11:30	1.40	3.61	0.78	0.87	0.88	3.22	0.86	4.73	1.11
08/29/92	11:30	1.46	3.61	0.78	0.86	0.88	3.21	0.87	4.73	1.09
08/29/92	11:30	1.54	3.61	0.81	0.88	0.90	3.21	0.91	4.73	1.09
08/29/92	11:30	1.63	3.61	0.86	0.92	0.95	3.20	0.97	4.73	1.11
08/29/92	11:30	1.72	3.61	0.92	0.98	1.00	3.19	1.03	4.73	1.14
08/30/92	11:30	1.73	3.61	0.97	1.03	1.06	3.18	1.10	4.73	1.18
08/30/92	11:30	1.73	3.61	1.02	1.08	1.11	3.18	1.15	4.73	1.22
08/30/92	11:30	1.73	3.61	1.05	1.11	1.14	3.17	1.18	4.73	1.25
08/30/92	11:30	1.71	3.61	1.07	1.13	1.16	3.16	1.19	4.73	1.27
08/30/92	11:30	1.67	3.61	1.06	1.13	1.16	3.15	1.18	4.73	1.29
08/30/92	11:30	1.62	3.61	1.04	1.12	1.14	3.15	1.16	4.73	1.29
08/30/92	11:30	1.59	3.61	1.03	1.10	1.12	3.14	1.14	4.73	1.28
08/30/92	11:30	1.60	3.61	1.02	1.10	1.12	3.13	1.14	4.74	1.27
08/30/92	11:30	1.64	3.61	1.03	1.10	1.13	3.13	1.16	4.74	1.27
08/30/92	11:30	1.68	3.61	1.06	1.12	1.15	3.12	1.19	4.74	1.29
08/30/92	11:30	1.74	3.61	1.10	1.16	1.18	3.11	1.23	4.74	1.31
08/30/92	11:30	1.80	3.61	1.14	1.19	1.22	3.11	1.27	4.74	1.33
08/30/92	11:30	1.84	3.61	1.18	1.23	1.25	3.10	1.32	4.74	1.36
08/30/92	11:30	1.84	3.61	1.21	1.26	1.28	3.10	1.34	4.75	1.39
08/30/92	11:30	1.84	3.61	1.21	1.27	1.30	3.09	1.35	4.75	1.41
08/30/92	11:30	1.82	3.61	1.20	1.26	1.28	3.08	1.32	4.75	1.41
08/30/92	11:30	1.73	3.61	1.15	1.23	1.25	3.08	1.28	4.76	1.40
08/30/92	11:30	1.62	3.61	1.09	1.18	1.19	3.07	1.21	4.76	1.37
08/30/92	11:30	1.52	3.61	1.03	1.12	1.13	3.06	1.14	4.76	1.33
08/30/92	11:30	1.48	3.61	0.97	1.06	1.07	3.06	1.09	4.76	1.28
08/30/92	11:30	1.49	3.61	0.94	1.03	1.04	3.05	1.06	4.77	1.25
08/30/92	11:30	1.54	3.60	0.95	1.03	1.04	3.04	1.07	4.77	1.23
08/30/92	11:30	1.62	3.60	0.97	1.04	1.06	3.04	1.11	4.77	1.23
08/30/92	11:30	1.71	3.60	1.02	1.08	1.10	3.03	1.17	4.77	1.25
08/31/92	11:30	1.81	3.60	1.08	1.06	1.16	3.02	1.23	4.77	1.28
08/31/92	11:30	1.85	3.61	1.14	1.09	1.21	3.02	1.30	4.77	1.32
08/31/92	11:30	1.86	3.61	1.19	1.14	1.27	3.01	1.35	4.78	1.36

WEYERHAEUSER FORMER MILL E/KOPPERS

Tidal Study - Lower Sand Aquifer - AVE2

Mean of means of moving average



Snohomish River
MW-9D
HC-15D
MW-30D
HC-23D
HC-11D

AVERAGE (2) Ground Water Elevations

Tidal Study

Means of Means of moving averages (Serfes, 1991)

Date	Time	SNOHOMI Elev. (Ft)	MW-9 Elev. (Ft)	MW-9D Elev. (Ft)	MW-30D Elev. (Ft)	MW-15D Elev. (Ft)	HC-23 Elev. (Ft)	HC-23D Elev. (Ft)	HC-11 Elev. (Ft)	HC-11D Elev. (Ft)
08/29/92	11:30	1.64	3.62	0.94	1.01	1.04	3.29	1.03	4.72	1.20
08/29/92	11:30	1.63	3.62	0.95	1.01	1.04	3.29	1.03	4.72	1.20
08/29/92	11:30	1.63	3.62	0.95	1.02	1.04	3.28	1.03	4.72	1.20
08/29/92	11:30	1.63	3.62	0.95	1.02	1.04	3.27	1.04	4.72	1.20
08/29/92	11:30	1.64	3.61	0.95	1.02	1.05	3.26	1.04	4.73	1.21
08/29/92	11:30	1.64	3.61	0.95	1.02	1.05	3.25	1.04	4.73	1.21
08/29/92	11:30	1.64	3.61	0.96	1.03	1.05	3.25	1.05	4.73	1.21
08/29/92	11:30	1.64	3.61	0.96	1.03	1.05	3.24	1.06	4.73	1.21
08/29/92	11:30	1.64	3.61	0.96	1.03	1.06	3.23	1.06	4.73	1.21
08/29/92	11:30	1.64	3.61	0.97	1.04	1.06	3.22	1.07	4.73	1.22
08/29/92	11:30	1.64	3.61	0.97	1.04	1.07	3.22	1.07	4.73	1.22
08/29/92	11:30	1.64	3.61	0.97	1.04	1.07	3.21	1.08	4.73	1.22
08/29/92	11:30	1.64	3.61	0.98	1.05	1.07	3.20	1.08	4.73	1.23
08/29/92	11:30	1.64	3.61	0.98	1.05	1.07	3.20	1.09	4.73	1.23
08/30/92	11:30	1.64	3.61	0.98	1.05	1.08	3.19	1.09	4.73	1.23
08/30/92	11:30	1.64	3.61	0.99	1.06	1.08	3.18	1.10	4.73	1.23
08/30/92	11:30	1.64	3.61	0.99	1.06	1.08	3.17	1.10	4.73	1.24
08/30/92	11:30	1.65	3.61	1.00	1.07	1.09	3.17	1.11	4.73	1.24
08/30/92	11:30	1.65	3.61	1.01	1.07	1.10	3.16	1.12	4.74	1.25
08/30/92	11:30	1.66	3.61	1.02	1.08	1.11	3.15	1.13	4.74	1.25
08/30/92	11:30	1.67	3.61	1.02	1.09	1.11	3.15	1.14	4.74	1.26
08/30/92	11:30	1.68	3.61	1.03	1.10	1.12	3.14	1.15	4.74	1.27
08/30/92	11:30	1.68	3.61	1.04	1.11	1.13	3.13	1.16	4.74	1.28
08/30/92	11:30	1.68	3.61	1.05	1.12	1.14	3.13	1.17	4.74	1.28
08/30/92	11:30	1.68	3.61	1.05	1.12	1.14	3.12	1.18	4.74	1.29
08/30/92	11:30	1.68	3.61	1.06	1.13	1.15	3.11	1.18	4.75	1.29
08/30/92	11:30	1.68	3.61	1.06	1.13	1.15	3.11	1.19	4.75	1.30
08/30/92	11:30	1.68	3.61	1.07	1.13	1.16	3.10	1.20	4.75	1.30
08/30/92	11:30	1.69	3.61	1.07	1.13	1.16	3.09	1.20	4.75	1.31
08/30/92	11:30	1.69	3.61	1.08	1.14	1.17	3.09	1.21	4.75	1.31
08/30/92	11:30	1.65	3.61	1.00	1.07	1.09	3.19	1.11	4.73	1.24

MEAN VALUES

WEYERHAEUSER FORMER MILL E/KOPPERS
Tidal Study

Evaluation of Lag Time and Attenuation

Date	Time	Transducer Reading (feet)	Amplitude Change	Tidal Effcy. Factor	Geom. Mean	Lag (Days)	Lag (Min)	Mean Time Lag (Min)	Distance To River (feet)
Sno. River									
09/08/92	09:57	-0.4		0		0.000	0	0	1
09/08/92	16:39	9.5172	9.9172	0		0.000	0		
09/08/92	22:24	3.9039	5.6133	0		0.000	0		
09/09/92	03:51	7.9926	4.0887	0		0.000	0		
HC-23D									
09/08/92	10:48	8.6163				0.035	51		48
09/08/92	17:33	14.715	6.0987	61		0.037	54		
09/08/92	23:18	11.689	3.026	54	57.49	0.037	54	48	
09/09/92	04:27	14.022	2.333	57		0.025	36		
MW-23D2									
09/08/92	10:36	12.959				0.027	39		73
09/08/92	17:30	19.081	6.122	62		0.035	51		
09/08/92	23:15	16.031	3.05	54	57.90	0.035	51	41	
09/09/92	04:18	18.388	2.357	59		0.019	27		
HC-11D									
09/08/92	11:59	5.0127				0.084	122		625
09/08/92	19:05	8.8935	3.8808	39		0.101	146		
09/09/92	00:26	7.2072	1.6863	30	33.79	0.084	122	117	
09/09/92	05:17	8.6239	1.3167	32		0.059	86		
MW-11D2									
09/08/92	11:59	6.0993				0.084	122		625
09/08/92	19:05	10.903	3.9037	39		0.101	146		
09/09/92	00:26	9.2862	1.6168	28	33.46	0.084	122	117	
09/09/92	05:17	10.603	1.3168	32		0.059	86		

Date	Time	Transducer Reading (feet)	Change (feet)	Tidal Effcy. Factor	Geom. Mean	Lag (Days)	Lag (Min)	Mean Time Lag (Min)	Distance To River (feet)
Sno. River									
08/28/92	18:21	8.96							
08/29/92	00:30	-1	9.96	0		0.000	0		1
08/29/92	06:06	8.27	9.27	0		0.000	0	0	
08/29/92	12:42	-2.2	10.47	0		0.000	0		
MW-9D									
08/28/92	19:24	15.09				0.044	63		65
08/29/92	01:24	10.7	4.99	50		0.037	54		
08/29/92	07:00	15.52	4.82	52	53.45	0.038	54	56	
08/29/92	13:36	9.42	6.1	58		0.037	54		
MW-15D									
08/28/92	19:37	18.04				0.053	76		220
08/29/92	01:31	14.29	4.65	47		0.042	61		
08/29/92	07:10	18.83	4.54	49	50.38	0.045	64	68	
08/29/92	13:52	13.02	5.81	55		0.049	70		
MW-30D									
08/28/92	19:41	17.917				0.056	80		230
08/29/92	01:38	13.542	4.375	44		0.048	68		
08/29/92	07:14	17.838	4.296	40	47.66	0.047	68	72	
08/29/92	13:53	12.322	5.516	53		0.050	71		

SUMMARY

	r	Effcy.	Time Lag	Log Effcy.
Sno River	0	0	0	-
HC-23D	48	57.5	48.1	-0.240
MW-9D	65	53.5	56.1	-0.272
MW-23D2	73	57.9	40.7	-0.237
MW-15D	220	50.4	67.6	-0.298
MW-30D	230	47.7	72.0	-0.322
HC-11D	625	33.8	116.5	-0.471
HC-11D2	625	33.5	116.5	-0.476

ATTACHMENT 6

AQUIFER PUMP TEST RESULTS

MEMORANDUM

TO: Project File DATE: May 16, 1994

FROM: Steve Nelson

RE: Aquifer Pumping Test - former Mill E/Koppers site

The aquifer pumping test was performed on September 22 to 24, 1992. The first day of the test involved setting up the pump in test well TW-1 and a discharge line into a temporary storage tank. The pump capacity was also evaluated. Transducers were placed in wells TW-1, HC-13, HC-15, HC-15D, HC-16, P-1, P-2, and TW-P, a temporary well point. An in-line gate valve and flow meter were used to regulate and measure discharge. The discharge rate of the 4-inch Grundfos pump ranged from 15 to 35 gpm. The maximum discharge of the 3-inch Standard pump was 9 gpm. The 4-inch pump was tested at 35, 15, and 25 gpm for 30 to 60 minutes each.
The initial test began the second day, after complete well recovery. The gate valve was set for a 15 gpm discharge rate from the previous day. After starting the long term test, measurements indicated that the actual rate was 25 gpm. The pump was shut off and the wells were allowed to fully recover. The valve was readjusted and the pumping began again. After 1 hour, it appeared that excessive drawdown (greater than 25 percent of the aquifer thickness) would occur after several hours of pumping. The 4-inch pump was replaced with the 3-inch pump. Pumping began again after full recovery, at a rate of 9 gpm. Pumping continued for 760 minutes. Recovery was monitored for 14 hours following shut down. Water elevations were measured by hand during the entire pumping test and the first 2 hours of the recovery test. Electronic pressure transducers and dataloggers monitored and recorded water elevations during both tests.

The data were downloaded to spreadsheet files and time-drawdown curves were prepared. The data were evaluated using the Theis, Neumann, and Cooper-Jacob methods. The Upper Sand aquifer is assumed to be unconfined, isotropic, homogeneous, and non-leaky. It was assumed that the effects of pumping well partial penetration were insignificant at radial distances greater than 15 feet.

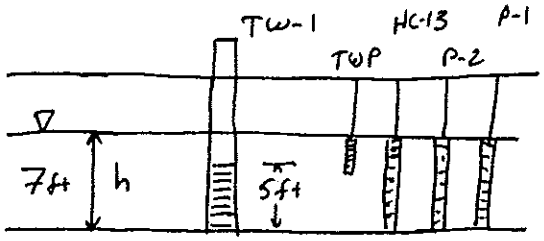
The result from the Neumann curve matching method for "early" portions of the drawdown curve indicated a hydraulic conductivity of 0.087 cm/sec, and for "late time" the calculated hydraulic conductivity was 0.052 cm/sec. For the recovery period, the Theis and Neumann semi-log methods indicated a hydraulic conductivity of 0.053 cm/sec. For the purposes of this study, a hydraulic conductivity value of 0.05 cm/sec is assigned to the Upper Sand aquifer.

COMPUTATION SHEET

PROJECT TITLE: Weyco Koppers/Mill E PROJECT NO. 01410371F

DESCRIPTION: Aquifer Pumping Test SHEET 1 OF ____

PREP. BY: S. Nelson DATE: ____ CHKD BY: ____ DATE: ____



Aquifer Parameters

$h = 7$ ft

$r_w = 0.42$ feet

Distance to observation wells

TWP -	14.5 feet
HC-13	23 feet
P-2	24.5 feet
P-1	45 feet

Assumptions

Unconfined

Isotropic

Homogeneous

$K_h = 1\text{-}2 \times K_z$

Non-leaky

No effect of partial penetration on observation well drawdown (P-2)

1) $r > h_m \sqrt{\frac{K_h}{K_z}}$, $24.5\text{ ft} > 7\text{ ft}\sqrt{2}$ (Neuman, 1974)

2) $t > \frac{S_y r^2}{K_h h_m}$

$S_y \cong 0.3$

$K_h \cong 0.1$ ft/min

$\frac{S_y r^2}{K_h \cdot h} = \frac{0.3\,(24.5\text{ ft})^2}{0.1\text{ ft/min} \cdot 7\text{ ft}} \cong 260$ min

(Neuman 1974)

3) $r \geq 1.5 \cdot h \cdot \sqrt{K_r/K_z}$

$24.5 > 1.5 \cdot 7\text{ ft}\sqrt{2}$

$24.5\text{ ft} > 15\text{ ft}$

106135

COMPUTATION SHEET

PROJECT TITLE: Weyerhaeuser Mill E / Koppers R I PROJECT NO: 014037 1:
DESCRIPTION: Aquifer Pumping Test SHEET 2 OF ___
PREP. BY S. Nelson DATE: ___ CHKD BY: ___ DATE: ___

Neuman (1972, 1973)

1) $S = \frac{Q}{4\pi K h} W(u_B)$ late time

2) $S = \frac{Q}{4\pi K h} W(u_A)$ early time

Refer to figures 1, 2 + 3 for time-drawdown curves

Note no difference between curves for uncorrected and corrected ($s' = s - s^2/2h$) drawdown data

Refer to Figure 3 for match points

Early $S = 0.8$ ft
$W(u_A) = 10$
at $Q = 9$ gpm $= 1.2$ ft³/min
$h = 7$ ft

$$K = \frac{Q\, W(u_A)}{4\pi h s} = \frac{1.2 \text{ ft}^3/\text{min} \cdot 10}{4 \cdot 3.14 \cdot 7\text{ft} \cdot 0.8\text{ft}}$$

$K = 0.17$ ft/min $= 0.087$ cm/sec

Late $s = 0.8$ ft
$W(u_B) = 6$

$$K = \frac{1.2 \text{ ft}^3/\text{min} \cdot 6}{4 \cdot 3.14 \cdot 7\text{ft} \cdot 0.8\text{ft}}$$

$K = 0.10$ ft/min $= 0.052$ cm/sec

COMPUTATION SHEET

PROJECT TITLE: Weyerhaeuser Mill E / Koppers RI PROJECT NO. 014103717

DESCRIPTION: Aquifer Pumping Test SHEET 3 OF ___

PREP. BY: S Nelson DATE: ___ CHKD BY: ___ DATE: ___

Recovery Theis (1935) & Neuman (1975)

$$\Delta s' = \frac{2.3Q}{4\pi K \cdot h}$$ late time

$$K = \frac{2.3Q}{4\pi h \Delta s'} = \frac{2.3 \cdot 1.2\ ft^3/min}{4\pi \cdot 7ft \cdot 0.3ft}$$

$\Delta s' = 0.3$ ft (from figure 4)

$K = 0.10$ ft/min

$= 0.053$ cm/sec

106135

Sweet-Edwards/EMCON

Figure 1

9 gpm - Uncorrected

P-2

r = 24.5 ft

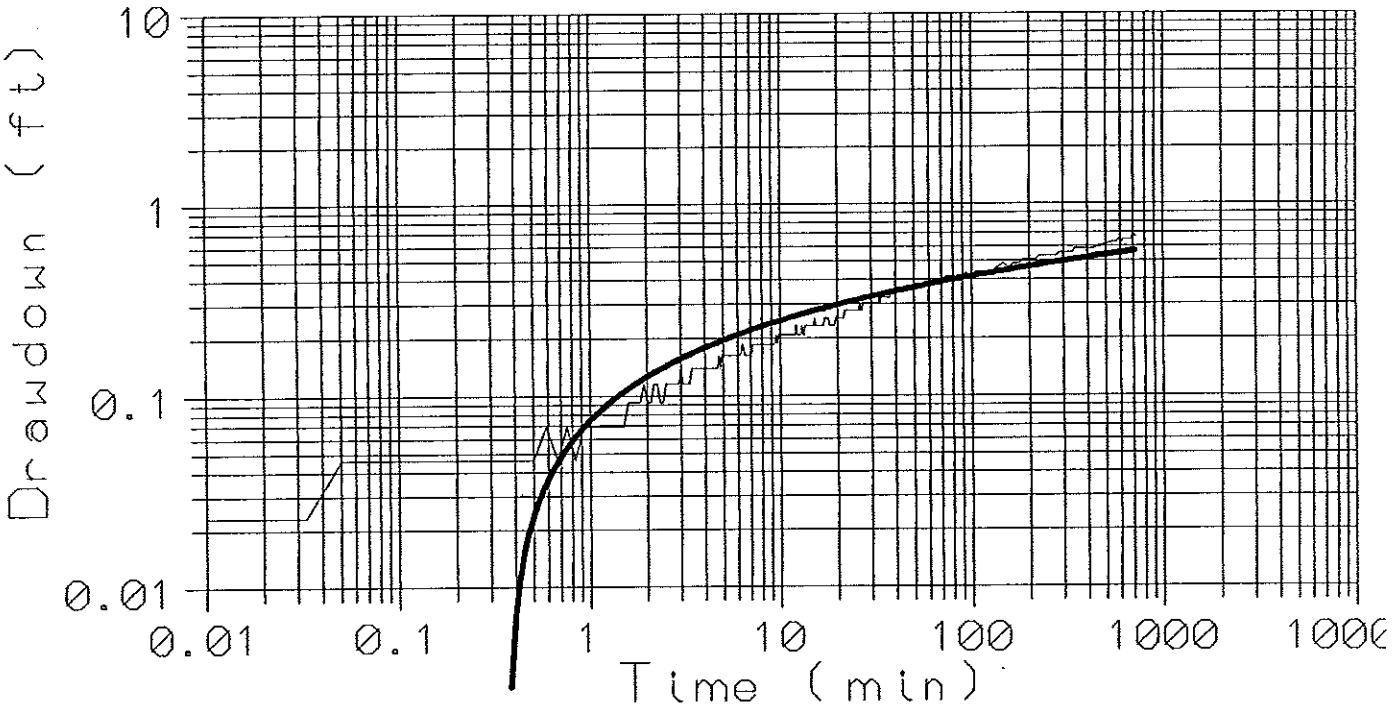


Figure 2

9 gpm - Corrected

P-2

r= 24.5

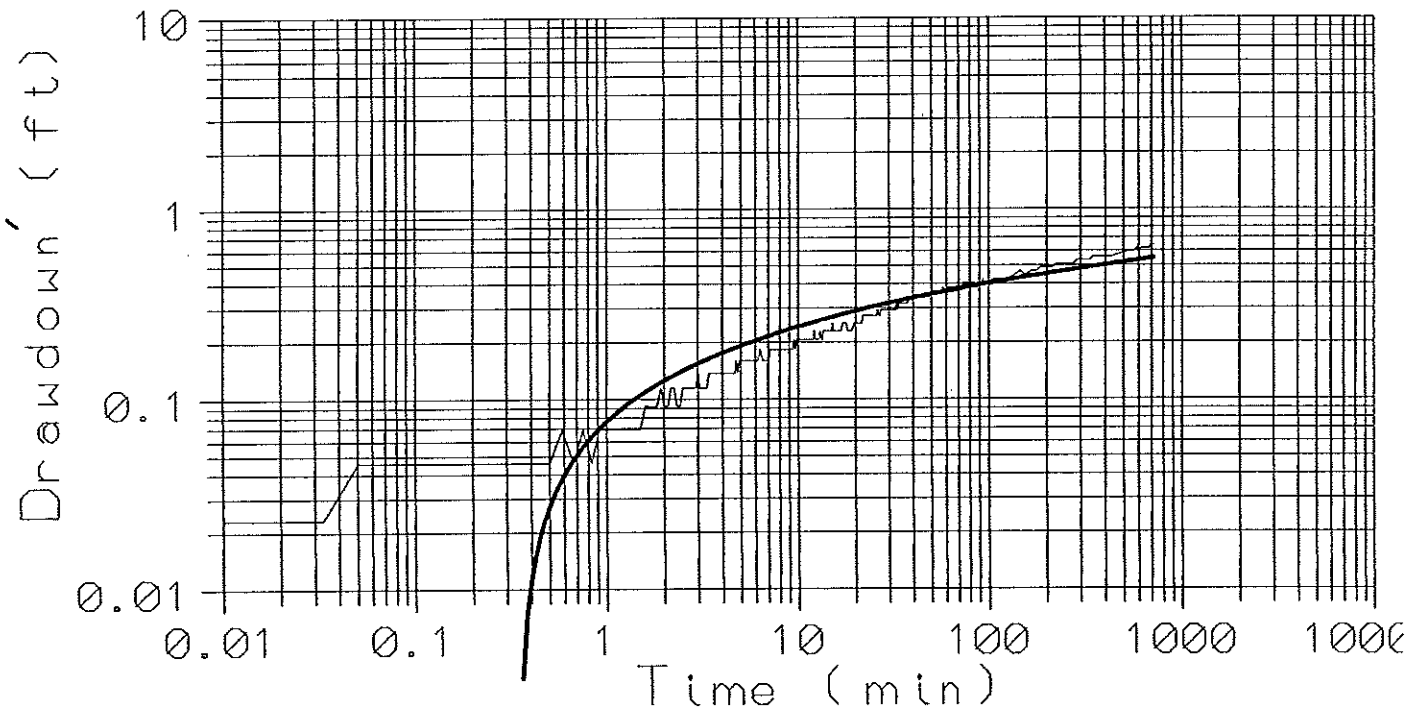


Figure 3

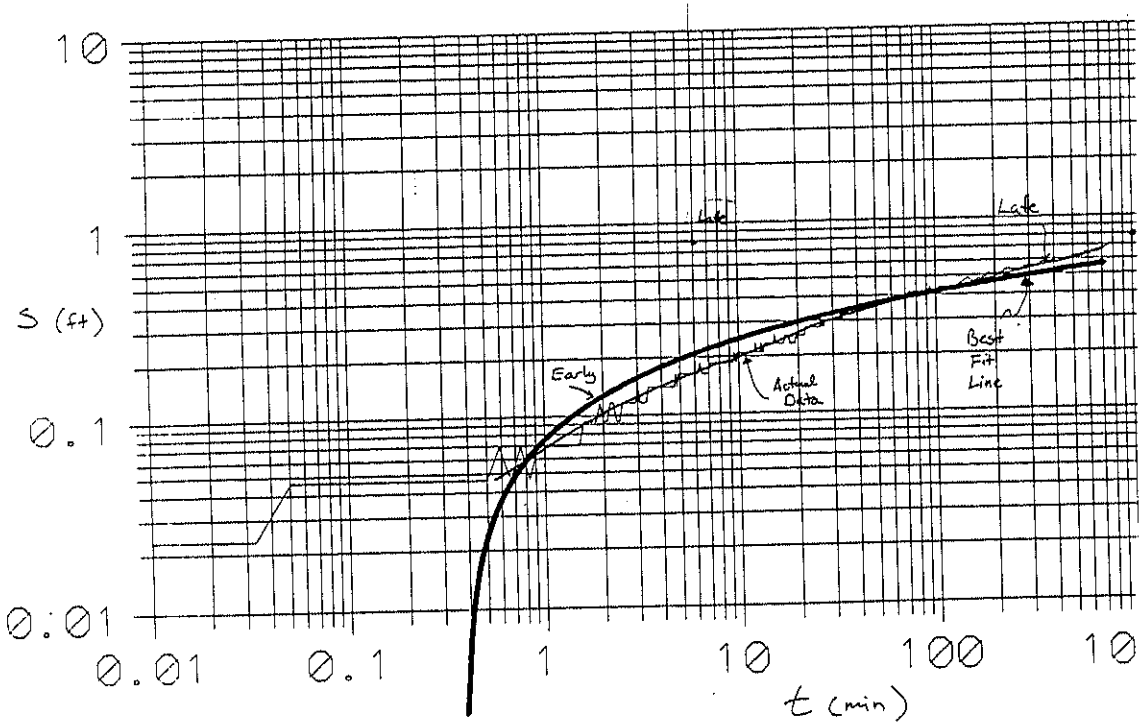
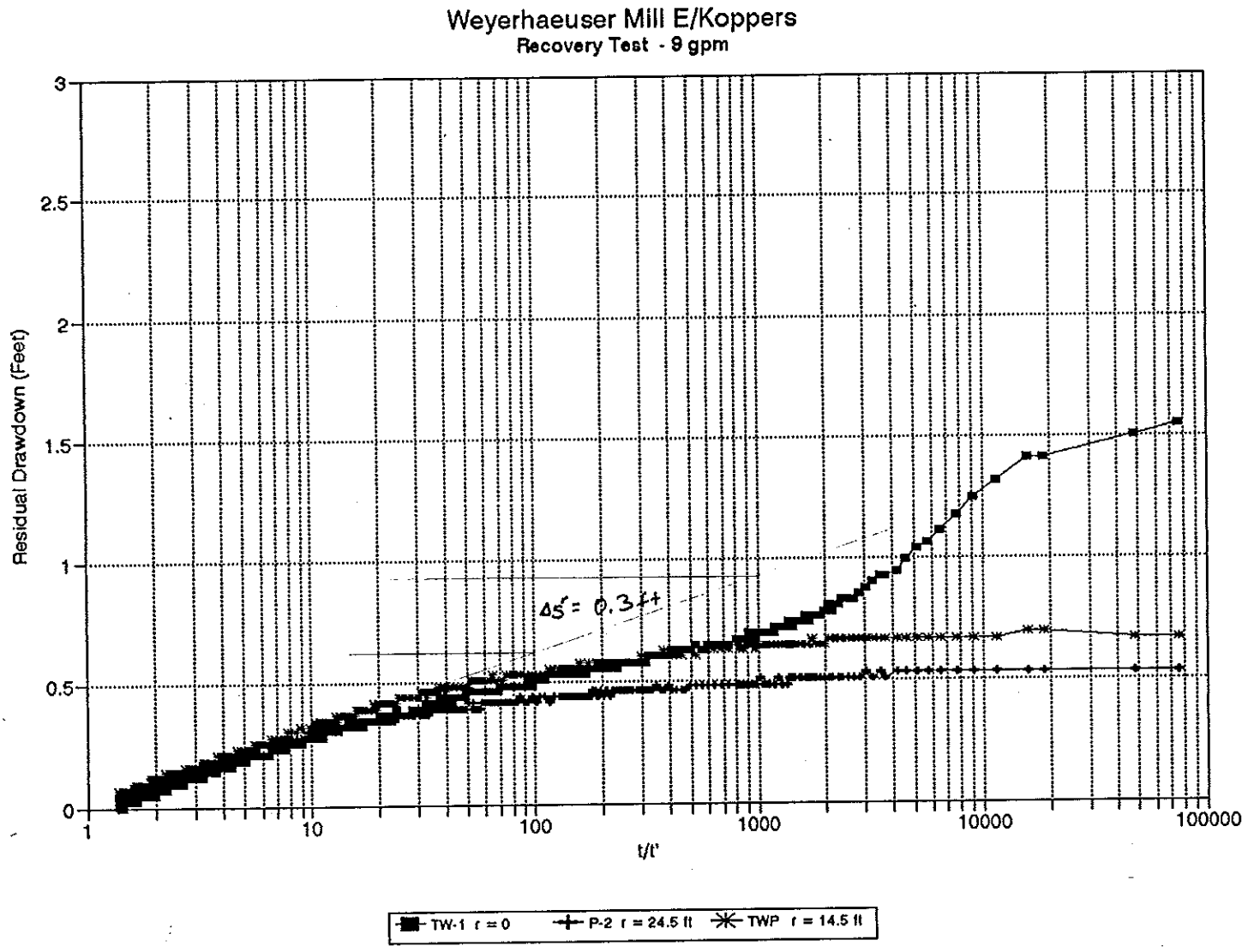

10
1
0.1
0.01
S (ft)
0.01
0.1
1
10
100
10
t (min)
Late
Late
Early
Actual Data
Best Fit Line

Figure 4


Weyerhaeuser Mill E/Koppers
Recovery Test - 9 gpm
Residual Drawdown (Feet)
3
2.5
2
1.5
1
0.5
0
1
10
100
1000
10000
100000
t/t'
Δs = 0.3 ft
TW-1 r = 0
P-2 r = 24.5 ft
TWP r = 14.5 ft

APPENDIX B

GEOLOGIC CONTOUR MAPS AND STRATIGRAPHIC SUMMARY TABLES

Table B-1

Summary of Stratigraphic Depths

Boring Location	Depth to Upper Sand (ft)	Depth to Groundwater (ft)	Depth to Upper Silt (ft)	Depth to Lower Sand (ft)
SB-1	2.5	4.5	8.5	12
SB-2	2	3.5	7.5	15
SB-3	2.5	3.5	7	12.5
SB-4	2.5	3	6.5	19.5
SB-5	1	3.5	10.2	19.3
SB-6	2	4	6	14.5
SB-7	1.5	5.5	9	13
SB-8	2.5	3.5	7	8[a]
SB-9	2.5	4	7	8.75[a]
SB-10	3	4	6.5	7.5[a]
SB-11	2	4	8.25	8.5[a]
SB-12	2	4	5.5	11
SB-13	2.5	5	10	11[a]
SB-14	3.5	5	7.25	12.5
SB-15	2.75	4.5	9	10
SB-16	2	3	5.75	10
SB-17	2.5	2.5	4.5	21.5
SB-18	3.5	4.5	7	19.5
SB-21	2	3	7.5	18.5
SB-22	3.5	4	7	7.5[a]
SB-23	4	4	12	12.5[a]
SB-24	3.5	3	5.5	17
SB-25	1	3	5.5	6.5[a]
SB-26	1	4	7	9.5[a]
SB-36	2	3.5	9.7	—
SB-37	0.5	3.5	7.5	—
SB-38	2	3.5	9.5	—
SB-39	1.5	3.5	7.5	—
SB-40	2	3	5.4	—
MW-23	1.5	5	8.5	13.5[a]
HC-11D	3	4	5	12.5
HC-24	0.5	2	6	9[a]
HC-25	0	0.5	6	8[a]
HC-26	0.5	2	6	8[a]
MW-27	3.5	3.5	11.5	16[a]
MW-28	4	4.5	5.25	6.5[a]
MW-30	2	4.5	9	12
MW-31	2	4	8	11
MW-9D	2.5	4	7	11
MW-32	3	5.2	7	8[a]
MW-33	2.5	5	9.25	9.5[a]
MW-34	1.5	2.5	4	5[a]
MW-35	1	2.5	7	8[a]
MW-6D	1.5	4.5	7	12
MW-23D2	2	4.5	7	12.6
P-1	1.5	4.5	9	10[a]
P-2	1.5	4.5	12	13[a]

Table B-1

Summary of Stratigraphic Depths

Boring Location	Depth to Upper Sand (ft)	Depth to Groundwater (ft)	Depth to Upper Silt (ft)	Depth to Lower Sand (ft)
TW-1	1.5	5	12	13.5[a]
TP-18	—	—	—	—
TP-19	0.5	3.5	—	—
TP-20	2	3.5	—	—
TP-21	1.5	3.5	—	—
TP-22	2	—	2.25	—
TP-23	1.5	4	—	—
TP-24	2.5	3.5	—	—
TP-25	2.5	3.5	—	—
TP-26	2.5	3,5	—	—
TP-27	2	3.5	—	—
TP-28	0	1	2.5	—
TP-29	0	0.5	2.5	—
TP-30	0	0.5	2.5	—
TP-31	0	0.5	3.5	—
TP-32	1.5	4	—	—

[a] Base of Upper Silt not seen; value is the boring completion depth.

Table B-2

Summary of Stratigraphic Thickness

Location	Total Thickness Grade/Mixed Fill (ft)	Total Thickness Upper Sand (ft)	Saturated Thickness Upper Sand[a] (ft)	Total Thickness Sand Upper Silt (ft)
SB-1	2.5	6	4	3.5
SB-2	2	5.5	4	7.5
SB-3	2.5	4.5	3.5	5.5
SB-4	2.5	4	3.5	13
SB-5	1	9.2	6.7	9.1
SB-6	2	4	2	8.5
SB-7	1.5	7.5	3.5	4
SB-8	2.5	4.5	3.5	1[a]
SB-9	2.5	4.5	3	1.75[a]
SB-10	3	3.5	2.5	1[a]
SB-11	2	6.25	4.25	0.25[a]
SB-12	2	3.5	1.5	5.5
SB-13	2.5	7.5	5	1[a]
SB-14	3.5	3.75	2.25	5.25
SB-15	2.75	6.25	4.5	1
SB-16	2	3.75	2.75	3.75[b]
SB-17	2.5	2	2	17
SB-18	3.5	3.5	2.5	12.5
SB-21	2	5.5	4.5	11
SB-22	3.5	3.5	3	0.5[b]
SB-23	4	8	8	0.5[b]
SB-24	3.5	2	2	11.5
SB-25	1	4.5	2.5	1[b]
SB-26	1	6	3	2.5[b]
SB-36	2	7.7	–	–
SB-37	0.5	7	–	–
SB-38	2	7.5	–	–
SB-39	1.5	6	–	–
SB-40	2	3.4	–	–
MW-23	1.5	7	35	5[b]
HC-11D	3	2	1	7.5
HC-24	0.5	5.5	4	3[b]
HC-25	0	6	5.5	2[b]
HC-26	0.5	5.5	4	2[b]
MW-27	3.5	8	8	4.5[b]
MW-28	4	1.25	0.75	1.25[b]
MW-30	2	7	4.5	3
MW-31	2	6	4	3
MW-9D	2.5	4.5	3	4
MW-32	3	4	1.8	1[b]
MW-33	2.5	6.75	4.25	0.25[b]
MW-34	1.5	2.5	1.5	1[b]
MW-35	1	6	4.5	1[b]
MW-6D	1.5	5.5	2.5	5
MW-23D2	2	5	2.5	5.6

Table B-2

Summary of Stratigraphic Thickness

Location	Total Thickness Grade/Mixed Fill (ft)	Total Thickness Upper Sand (ft)	Saturated Thickness Upper Sand[a] (ft)	Total Thickness Sand Upper Silt (ft)
P-1	1.5	7.5	4.5	1[b]
P-2	1.5	10.5	7.5	1[b]
TW-1	1.5	10.5	7	1.5[b]
TP-18	–	–	–	–
TP-19	0.5	–	–	–
TP-20	2	–	–	–
TP-21	1.5	–	–	–
TP-22	2	0.25	–	–
TP-23	1.5	–	–	–
TP-24	2.5	–	–	–
TP-25	2.5	–	–	–
TP-26	2.5	–	–	–
TP-27	2	–	–	–
TP-28	0	2.5	–	–
TP-29	0	2.5	–	–
TP-30	0	2.5	–	–
TP-31	0	3.5	–	–
TP-32	1.5	–	–	–

[a] Measured in July 1992
[b] Base of Upper Silt not seen; value is the minimum thickness.

Table B-3

Summary of Stratigraphic Elevations

Location	Elevation Top of Grade/Mixed Fill (ft msl)	Elevation Base of Grade/Mixed Fill (ft msl)	Elevation Base of Upper Sand (ft msl)	Elevation Base of Upper Silt (ft msl)
SB-1	8.63	6.13	0.13	-3.37
SB-2	8.02	6.02	0.52	-6.98
SB-3	8.24	5.74	1.24	-4.26
SB-4	7.53	5.03	1.03	-11.97
SB-5	7.50	6.50	-2.70	-11.80
SB-6	7.95	5.95	1.95	-6.55
SB-7	8.52	7.02	-0.48	-4.48
SB-8	8.49	5.99	1.49	0.49[a]
SB-9	8.49	5.99	1.49	-0.26[a]
SB-10	7.88	4.88	1.38	0.38[a]
SB-11	8.29	6.29	0.04	-0.21[a]
SB-12	7.91	5.91	2.41	-3.09
SB-13	8.47	5.97	-1.53	-2.53[a]
SB-14	8.19	4.69	0.94	-4.31
SB-15	7.89	5.14	-1.11	-2.11
SB-16	7.04	5.04	1.29	-2.46[a]
SB-17	6.68	4.18	2.18	-14.82
SB-18	8.33	4.83	1.33	-11.17
SB-21	7.82	5.82	0.32	-10.68
SB-22	8.69	5.19	1.69	1.19[a]
SB-23	8.00	4.00	-4.00	-4.50[a]
SB-24	7.53	4.03	2.03	-9.47
SB-25	8.49	7.49	2.99	1.99[a]
SB-26	7.87	6.87	0.87	-1.63[a]
SB-36	8.29	6.29	-1.41	—
SB-37	7.11	6.61	-0.39	—
SB-38	8.56	6.56	0.94	—
SB-39	8.53	7.03	1.03	—
SB-40	7.87	5.87	2.47	—
MW-23	8.66	7.16	0.16	-4.84[a]
HC-11D	6.73	3.73	1.73	-5.77
HC-24	6.29	5.79	0.29	-2.71[a]
HC-25	6.56	6.56	0.56	-1.44[a]
HC-26	7.40	6.90	1.40	-0.60[a]
MW-27	6.96	3.46	-4.54	-9.04[a]
MW-28	8.64	4.64	3.39	2.14[a]
MW-30	8	6.00	-1.00	-4.00
MW-31	7.68	5.68	-0.32	-3.32
MW-9D	8.56	6.06	1.56	-2.44
MW-32	8.37	5.37	1.37	0.37[a]
MW-33	8.56	6.06	-0.69	-0.94
MW-34	7.5	6.00	3.50	2.50[a]
MW-35	6.88	5.88	-0.12	-1.12[a]
MW-6D	8.62	7.12	1.62	-3.38
MW-23D2	9	7.00	2.00	-3.60
P-1	8.36	6.86	-0.64	-1.64[a]
P-2	7.97	6.47	-4.03	-5.03[a]

Table B-3

Summary of Stratigraphic Elevations

Location	Elevation Top of Grade/Mixed Fill (ft msl)	Elevation Base of Grade/Mixed Fill (ft msl)	Elevation Base of Upper Sand (ft msl)	Elevation Base of Upper Silt (ft msl)
TW-1	8.33	6.83	-3.67	-5.17[a]
TP-18	7.82	—	—	—
TP-19	7.82	7.32	—	—
TP-20	6.73	4.73	—	—
TP-21	8.29	6.79	—	—
TP-22	7.11	5.11	4.86	—
TP-23	7.11	5.61	—	—
TP-24	7.93	5.43	—	—
TP-25	7.93	5.43	—	—
TP-26	7.99	5.49	—	—
TP-27	7.99	5.99	—	—
TP-28	6.56	—	4.06	—
TP-29	6.56	—	4.06	—
TP-30	6.29	—	3.79	—
TP-31	6.29	—	2.79	—
TP-32	7.87	6.37	—	—

NOTE: msl = mean sea level

[a] Base of Upper Silt not seen; value is the deepest encountered observation.

[b] Elevations at TP-18 to TP-32 and SB-36 to SB-40 are interpolated between measured elevations of adjacent sample locations.

APPENDIX C

PHYSICAL AND CHEMICAL SOIL PARAMETERS

Table C-1

Summary of Physical and Chemical Soil Parameters

Sample Number	Geologic Unit	TOC %	CEC [Na (meq/100g)]	Atterberg Limits			pH	Grain Size (weight percent)			
				Liquid Limit	Plastic Limit	Plasticity Index		Gravel	Sand	Silt	Clay
SB-8-3	Upper Sand	0.21 J	3.3				6.2				
SB-10-3	Upper Sand	1.2 J	3.5				7.5				
SB-11B-1	Upper Sand	1.4	4.8				7.5				
SB-12-1	Upper Sand	0.62 J	7.2				6.7				
SB-13-4	Upper Sand							3.2	96.2	0.6	0.0
SB-14	Upper Sand										
SB-10-4	Upper Silt	1.9 J	21	34	33	1	7.3				
SB-12-3	Upper Silt	5.5	40	54	47	7	6.6				
SB-21-5	Upper Silt	3		52	41	11					
MW-9D-4	Lower Sand							1.6	96.0	2.4	0.0
MW-23D2-10	Lower Sand	0.37									
MW-23D2-11G	Lower Sand							2.7	95.7	1.4	0.2
MW-30D-5	Lower Sand							0.0	97.4	2.6	0.0
MW-30D-6	Lower Sand	0.1 J	3				6.8				

NOTE: J = Estimated.

APPENDIX D

SNOHOMISH RIVER SEDIMENT REVIEW RESULTS

MEMORANDUM

TO: File DATE: July 17, 1992

FROM: John Virgin

RE: Review of Dredging Records for the Snohomish River

Hiram Arden of the U.S. Army Corps of Engineers (USACE) in Seattle was contacted. He provided historical dredging files for the Snohomish River for review.

Historical dredging records included contract information (costs, contractors) in separate files covering the years from 1931 to 1964, 1966, 1967, 1969, 1970-71, 1974, and 1976-77. Also available in a notebook was dredging and contract information covering the years from 1980 through 1988. Most of the dredging information for the years 1931 to 1977 was incomplete. Maintenance dredging of the Snohomish River channel from the Norton Terminal to the upstream settling basin (upstream of the I-5 bridge) is conducted every 2-3 years. The Snohomish River channel, shown on copies of drawings obtained from the Corps, is maintained at a depth of 35 feet from the mouth at Jetty Island upstream to approximately the 14th Street boat basin, and then at a depth of 8 feet upstream. The upstream and downstream settling basins are nominally dredged to a depth of 40 ft.

Included in the files were grain size profiles for the dredge material, which showed generally fine to medium Sand (SP). Total organic carbon (TOC) analysis showed concentrations less than 2 percent.

Hiram Arden provided the following information:

- The most recent dredging that occurred in the channel reach opposite the Weyerhaeuser property was in 1986
- Nearshore sediment along the west bank of the Snohomish (i.e., within approximately 50 yards of the Weyerhaeuser bulkhead) are not dredged by USACE. Sediments tend to accumulate along the right (west) bank, but the Corps does not dredge in this area because the boat channel is near the other bank.
- The dredge material does not undergo chemical analyses, only analysis for conventional parameters (i.e., TOC, total volatile solids, grain size).

- Typically, the dredge material is disposed of in upland and nearshore disposal sites, or used as fill. DNR has a disposal site along the east bank of the Snohomish River (on Smith Island) between Dagmars Landing and the I-5 bridge, the City of Everett accepted dredge material at a disposal site between their WWTP lagoons and the Snohomish River, and dredge material has been used as fill at the Airport facility (between the Kenmore Pre-Mix site and the Highway 99 bridge on Smith Island).

The most recent dredging that occurred in the Snohomish River was in 1988. Approximately 350,000 cubic yards of material were dredged from the upstream settling basin, and in the main channel off the upstream entrances to Steamboat and Union sloughs. This material was disposed of at the city disposal area and at the DNR facility.

Dave Fox, who works in the USACE Dredge Material Management Program (Puget Sound Dredge Disposal Analysis [PSDDA]) was also contacted regarding potential sediment chemistry information. He indicated that the Corps has not conducted chemical analysis of the sediments in the lower Snohomish River for their dredging operations.

In *Everett Harbor Action Program: Evaluation of Potential Contaminant Sources* (Tetra Tech, 1988), a dredging summary is presented in Appendix F. This table presents a summary of the dredging history of Everett Harbor and the Snohomish River from 1969 through 1988.

MEMORANDUM

TO: File DATE: July 21, 1992

FROM: John Virgin

RE: Review of Sediment Sampling Information

This memo presents a summary from the review of *Everett Harbor Action Program: Analysis of Toxic Problem Areas* prepared by PTI Environmental Services and Tetra Tech, Inc., 1988, for the USEPA Office of Puget Sound.

Sediment Samples were collected from 8 stations (shown on attached Figure ES-2) in the lower Snohomish River. Sediment sample analyses are shown on Table 7 (attached) and included semivolatile and volatile organic compounds (per a standard USEPA method analyses for these variables), metals (Sb, As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, and Zn), and conventionals (TOC, total nitrogen, water soluble sulfides, and grain size).

The analytical information was separated by study area and study areas were evaluated. This led to generalization for individual sampling stations. The sediment chemistry data was compared to reference area data, and significant problems were denoted by the elevation above reference (EAR).

Information presented in the study for the Snohomish River sampling stations included the following:

- Grain size was "relatively coarse" except for stations SR-04 and SR-05 (>60 percent fines) and SR-07 (96 percent fine grained)
- TOC was less than 1 percent except for Stations SR-04, SR-05, and SR-07.
- Sulfides (indicative of sulfate reducing [poorly oxygenated] conditions, found at high levels in areas of organic rich, high oxygen demand sediments) were low (<120 mg/kg) except at Station SR-07 (600 mg/kg)
- Copper and lead exceeded the maximum reference area concentrations at Station SR-07, and zinc and arsenic exceeded the maximum reference area concentration at Stations SR-07, SR-04, and SR-05
- Low molecular weight and high molecular weight PAH (LPAH and HPAH), 4-methylphenol, and di-n-octyl and butyl benzyl phthalates were detected at the

Snohomish River Stations, all at relatively low concentrations (in comparison to other Everett Harbor stations)

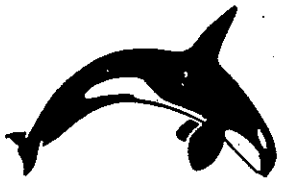
Sampling stations for other historical studies are shown on Figure 31. None of the other studies collected sediment samples at locations that would provide information or impact the Former Mill E/Koppers facility evaluation.

The action assessment matrix (Table 35, attached), shows that stations SR-05 and SR-07 showed elevated levels of LPAH, HPAH, phenol, and zinc. In addition, Stations SR-05 showed elevated concentrations of 4-methylphenol, benzoic acid, and dehydroabietic acid (a resin compound), and Station SR-07 also showed elevated concentrations of copper. Because of the way the data is presented (i.e., as a ration exceeding the HAET or EAR), it was not possible to evaluate the concentrations relative to the Puget Sound Sediment Quality Management Standards. In any event, the stations showing elevated concentrations were not in the area of the former Mill E/Koppers site.

Information that may prove useful to the project is included as an attachment.

EPA 910/9-88-241

C.2



Puget Sound Estuary Program

EVERETT HARBOR ACTION PROGRAM:

Analysis of Toxic Problem Areas

TC-3338-26
FINAL REPORT

September 1988

Prepared by
PTI Environmental Services
and
Tetra Tech, Inc.

Prepared for
U.S. Environmental Protection Agency
Region X - Office of Puget Sound
Seattle, Washington

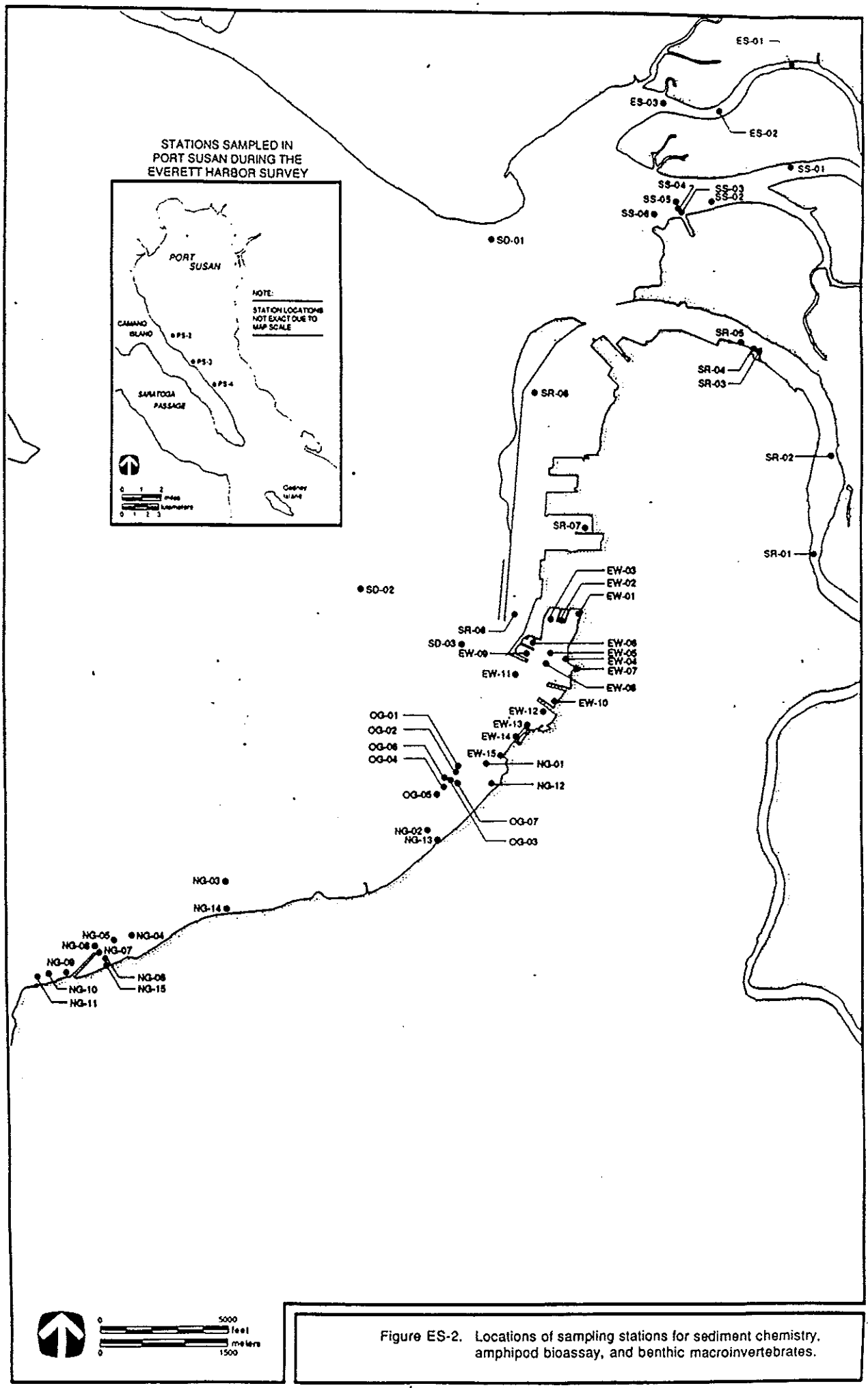


Figure ES-2. Locations of sampling stations for sediment chemistry, amphipod bioassay, and benthic macroinvertebrates.

TABLE 7. (Continued)

Station	Semivolatile Organic Compounds[a]	Metals[b]	Conventionals[c]	Volatile Organic Compounds[d]	Resin Acids and Chlorinated Phenolic Compounds	Amphipod Bioassay	Benthic Infauna
SR-01	X	X	X			X	
SR-02	X	X	X	X		X	
SR-03	X	X	X		X		
SR-04	X	X	X		X	X	
SR-05	X	X	X		X		
SR-06	X	X	X				
SR-07	X	X	X			X	X
SR-08	X	X	X			X	X
SS-01	X	X	X			X	
SS-02	X	X	X		X		
SS-03	X	X	X	X	X	X	
SS-04	X	X	X		X		
SS-05	X	X	X		X		
SS-06	X	X	X		X		

[a] EPA priority pollutant acid/base/neutral organic compounds, PCBs, and pesticides (see Table 1 for complete list of target chemicals).

[b] EPA priority pollutant metals, except beryllium and thallium. Tributyltin was analyzed at Stations SR-07 and PS-02 only.

[c] Total organic carbon, total nitrogen, water-soluble sulfides, and grain-size composition.

[d] EPA priority pollutant volatile compounds.

[e] Intertidal station.

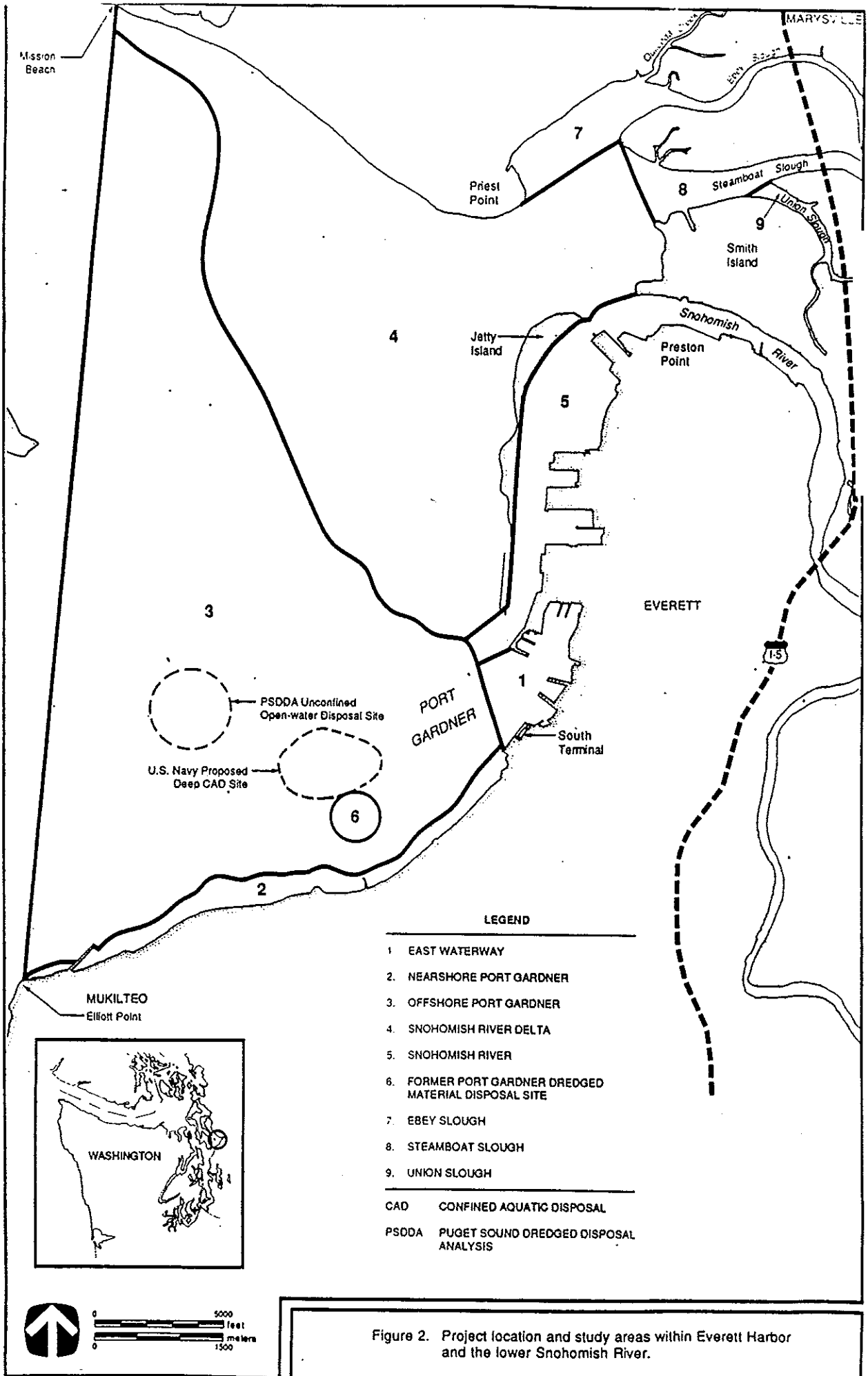


Figure 2. Project location and study areas within Everett Harbor and the lower Snohomish River.

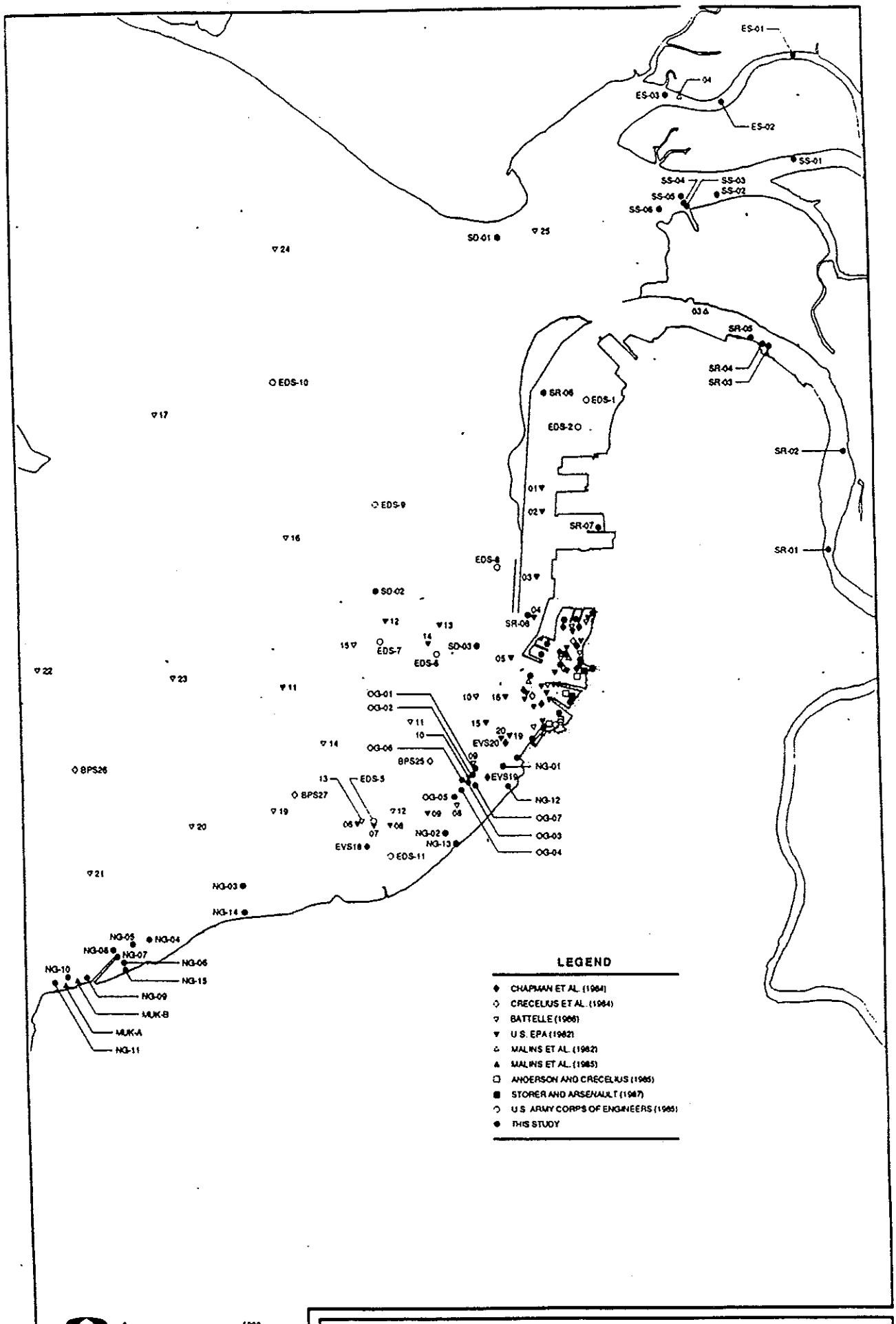


Figure 31. Locations of sampling stations from historical studies of sediment chemistry in Everett Harbor.

MEMORANDUM

TO: File DATE: January 22, 1993

FROM: John Virgin

RE: Document Review — Weyerhaeuser Everett Former Mill E/Koppers Facility Sediment Data

The following information was gathered from the report: *Everett Harbor Action Program: Evaluation of Potential Contaminant Sources,* prepared by Tetra Tech, Inc., 1988.

Eight major point and non-point source categories were identified: landfills, industrial dischargers, wastewater treatment plants, combined sewer overflows, surface run-off, groundwater, atmospheric deposition, and spills. The information relating to the Snohomish River, one of 8 study segments in the Everett Harbor area was reviewed. This segment covered the main navigable channel of the Snohomish River downstream of the I-5 bridge, and included the eastern boundary of the site. The only problem areas identified within the study segment were stations SR-05, located near the Kraft Mill outfall, and station SR-07, located near the Everett Marina. Two stations for sampling were located offshore from the Former Mill E/Koppers Facility, neither of which showed elevated concentrations of contaminants.

Three CSOs were identified as discharging into the Snohomish River upstream or near the site. While these may have historically impacted the site, observations of recent activity in the Snohomish River indicate that the City of Everett may be routing the CSOs to the WWTP. Dilution by river water would probably minimize any potential impacts from these CSOs on site sediments. The Everett WWTP outfall is located upstream and across the river approximately 200 yards from the site. Results for metals analysis of sediment samples collected from the Everett WWTP (exact location unknown) were presented, and included the following:

Sample Identification: Element	Snohomish River (Dagmars Marina)	Snohomish River (Control Site)
Copper	17 mg/kg	19 mg/kg
Chromium	20 mg/kg	19 mg/kg
Lead	1.5 mg/kg	1.2 mg/kg

These concentrations may not be directly comparable due to different analytical methods for analysis, collection method, and other uncertainties.

The most interesting potential sources identified in the report are two wood treatment facilities. These include Buse Timber located on Smith Island, and Canyon Lumber located upstream near the entrance to Steamboat and Union Sloughs, along Everett Avenue. Samples were collected from both of these facilities and analyzed for tetrachlorophenol (TCP) and pentachlorophenol (PCP). All of the eight samples collected from this study of the wood treatment facilities showed both TCP and PCP. TCP concentrations ranged from .0068 mg/kg to 47.5 mg/kg, and PCP concentrations ranged from .041 mg/kg to 240 mg/kg. Although not directly proximate to the site, these two sites are potential sediment contaminant sources for pentachlorophenol.

APPENDIX E

ZONING MAP

CITY OF
EVERETT
WASHINGTON
ZONING MAP

ORDINANCE NO. 1671-89
EFFECTIVE JAN. 13, 1990
AS AMENDED
FOR REFERENCE ONLY

800 400 0 800 1600 2400 3200 400

SCALE 1" = 800

T + 29 - N

A-1	Agricultural Use
R-S	Suburban Residential
R-S-1	Smaller Lot Suburban Residental
R-1	Single Family Detached Low Density
R-1-A	Single Family Attached
R-2	Single Family Detached Medium Density
R-2-A	Single Family Attached Medium Density
R-3-L	Multiple Family Low Density
R-3	Multiple Family Medium Density
R-4	Multiple Family High Density
R-5	Core Residential
B-1	Neighborhood Shopping
B-2	Community Business
B-2-B	Office
B-3	Central Business District
C-1	General Commercial
C-1R	Regional Commercial-Office
C-2	Heavy Commercial-Light Industrial
M-M	Business Park
M-1	Office and Industrial Park
M-2	Heavy Manufacturing
M-S	Maritime Services
W-C	Waterfront Commercial
UFFD	Urban Flood Fringe District
RFFD	Rural Flood Fringe District
FWD	Floodway District
PRD	Planned Residential Devel. Overlay Zone
PD	Planned Development Overlay Zone
C-O	Clinic-Office Overlay Zone
D	Design Overlay Zone
H	Historic Overlay Zone
O	Office Overlay Zone
C	Clinic Overlay Zone

EVERETT CITY LIMITS

PORT GARDNER BAY

JETTY ISLAND

C-2 WITH CONTRACT

EVERETT CITY LIMITS

W.

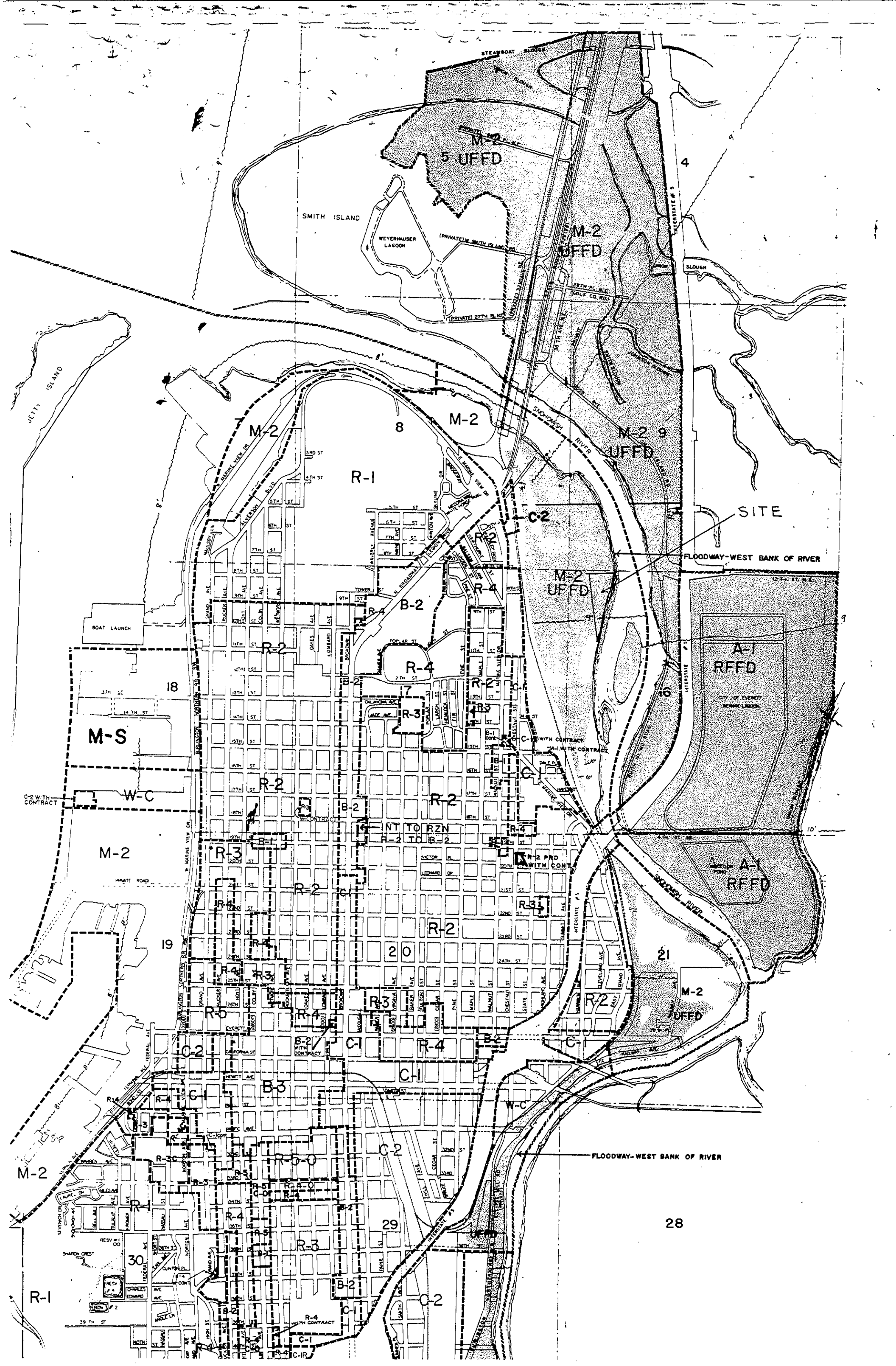
EVERETT NUMBERING MERIDIAN

M-2

R-1

25

PIGEON CREEK


STEAMBOAT SLOUGH
M-2
5 UFFD
SMITH ISLAND
WEYERHAUSER LAGOON
(PRIVATE) W. SMITH ISLAND RD.
(PRIVATE) 27TH PL. N.E.
M-2
UFFD
4
SLOUGH
JETTY ISLAND
7
M-2
8
M-2
9
M-2
UFFD
SNOHOMISH RIVER
R-1
C-2
SITE
FLOODWAY-WEST BANK OF RIVER
M-2
UFFD
BOAT LAUNCH
R-2
R-4
B-2
R-4
R-4
R-2
18
M-S
W-C
C-2 WITH CONTRACT
M-2
HEWITT AVE
R-2
B-2
R-2
INT TO RZN
R-2 TO B-2
R-3
R-2
R-4
R-2 PRD WITH CONT.
R-2
R-4
R-3
19
20
21
M-2
UFFD
R-5
R-4
R-3
R-2 EAST
C-2
B-2 WITH CONTRACT
C-1
R-4
B-2
C-1
C-1
B-3
W-C
C-2
FLOODWAY-WEST BANK OF RIVER
M-2
R-5-O
R-4-O
R-1
R-4
29
28
30
R-3
B-2
C-2
R-1
R-4 WITH CONTRACT
C-1
C-1R

APPENDIX F

DATA VALIDATION, ENTRY, AND STATISTICAL EVALUATIONS

DATA VALIDATION, ENTRY, AND STATISTICAL EVALUATIONS

Sample analysis and reporting were conducted following procedures presented in the SAP (EMCON, 1992). Data validation was conducted following procedures presented in *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics and Organics Analyses* (USEPA 1988a,b) for volatile and semivolatile organic compounds, pesticides/PCBs, and inorganics analyses. Based on compound detections, the list of volatile organic compounds for analysis was shortened to include only benzene, toluene, ethylbenzene, and xylenes for quarterly groundwater monitoring after rounds one and two. Based on USEPA Contract Laboratory Program (CLP) specifications, tentatively identified compound (TIC) results were provided with volatile and semivolatile organic compound analyses for the initial soil sampling and rounds one, two, and three groundwater monitoring. Because the results for TICs were not used for site evaluation purposes, the TIC results were not validated.

Additional sample analyses, tested using other USEPA and Ecology methods as specified by the SAP, were reviewed for compliance with method specific QA/QC criteria. Data qualifiers assigned to sample results during data validation are as follows:

- U (undetected) — organics. The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
- U (undetected) — inorganics. The material was analyzed for, but was not detected above the level of the associated value. The associated value is the sample detection limit.
- J (estimated) — The associated value is an estimated quantity.
- UJ (undetected, estimated) — The material was analyzed for, but was not detected. The sample quantitation limit or sample detection limit is an estimated quantity.
- R (unusable) — The data are unusable; compound may or may not be present. Resampling and reanalysis is necessary for verification.
- N (tentatively identified) — Presumptive evidence of the presence of the material.

Because volatile and semivolatile organic compound analyses were conducted and reported using USEPA CLP conventions, results for undetected organic compounds were reported as undetected at the sample quantitation limit, which was greater than the method detection limit (MDL). Sample results reported at a concentration less than the quantitation limit but greater than the MDL were assigned an estimated data qualifier by the laboratory. These estimated data qualifiers were retained during data validation and data base entry.

Data quality, as represented by precision, accuracy, representativeness, comparability, and completeness, was evaluated against the data quality objectives (DQOs) presented in the work plan and SAP. Precision was determined through evaluation of field and laboratory replicate and matrix spike/matrix spike duplicate results. The frequency of field replicate sample collection during soil, sediment, and water sampling was 10 percent. The overall precision of the replicate data was judged to meet DQOs. A limited number of samples did not meet DQOs for precision; they were indicative of a complex mixture of contaminants in a heterogeneous matrix.

Data accuracy was evaluated using matrix spike, blank, surrogate compound, and laboratory control sample results. Sample data accuracy was judged to meet data quality objectives. Frequency of field rinsate blank collection was less than that identified in the SAP for the initial soil, sediment, and Round 1 groundwater sampling. Data qualifiers assigned to sample results based on blank contamination surrogate compound recoveries, and laboratory control sample results are discussed in the data validation reports (Appendix F).

Matrix spike results indicated that some sample matrices contained high concentrations of a variety of compounds that may have led to bias in sample results for other classes of compounds. For example, samples with high concentrations of diesel contamination sometimes showed a negative bias for the recovery of semivolatile organic compounds due to interference effects on compound recoveries. Laboratory control sample (LCS) results were used to evaluate the accuracy of analytical methods for semivolatile organic compounds and metals. Results were within DQOs for all LCS results except one semivolatile organic compound analysis, indicating acceptable laboratory accuracy.

Representativeness and comparability DQOs for the sample results were achieved by using standardized collection and analysis techniques for all sample matrices and reporting results in standardized formats. Data completeness met DQOs for all analysis techniques except toxicity characteristic (TC) semivolatile organic compound analysis of soil samples and TPH-diesel analysis of seep samples. Data for one of nine TC semivolatile organic compound analyses were rejected, resulting in completeness of 89 percent for this variable. Through a field sampling team oversight, TPH-diesel analyses were not requested for seep water samples. Based on the eight analyses of TC semivolatile organic compounds for soil, and TPH-gasoline results for seeps, which did not indicate the presence of these contaminants, completeness of 89 percent for the TC

semivolatile organic compounds and 50 percent for seep water TPH did not affect the overall RI assessment. A further discussion of data quality is presented in the data validation reports.

Data Entry

Data summary tables were compiled from the laboratory data summary forms, and data entry QA/QC procedures were standardized to eliminate errors in transcription of data. Standardized data entry procedures required a minimum of three reviews for all tables. The first data entry review was conducted by the data entry operator after all data for an analysis type and sample matrix (e.g., soil sample VOCs) were entered. The data entry operator conducted a 100-percent review of all sample concentrations and qualifiers for accuracy. The second check for data transcription error was conducted by an independent reviewer, who was responsible for checking 100 percent of the data entered into the table, including sampling information. The third check was conducted by reviewing 10 percent of the sample concentrations and qualifiers against the laboratory data summary forms.

Statistical Evaluations

Statistical summaries of data were calculated following guidelines presented in *Statistical Guidance for Ecology Site Managers* (Ecology, 1992). During preparation of the statistical summaries, the data qualifiers that were assigned to sample results during data validation were treated as follows:

- U — One-half the value was used.
- J — The full value was used.
- UJ — One-half the value was used when the detection frequency was less than 50 percent, the full value was used when the detection frequency was greater than or equal to 50 percent.

Following CLP protocols, the sample quantitation limits for organics analyses and MDLs for inorganics analyses were reported for all samples. The actual concentrations may have been between zero and a value just below the quantitation limit or MDL. MDLs were determined by repetitive analysis of very low concentration solutions and statistical determination of the lowest concentration the method is capable of resolving. Sample quantitation limits were established at approximately three times the MDLs and represent the lowest concentration that can be correctly quantitated based on analysis of calibration standards. As an example, the MDL for fluoranthene is 3.82 μg/l. Water sample results for an undetected analysis of fluoranthene were reported at 10 μg/l, since the lowest calibration standard concentration was 10 μg/l. If fluoranthene was detected at a

concentration between 3.82 and 10 μg/l, an estimated qualifier was assigned by the laboratory because the value was less than the quantitation limit, but greater than the MDL. Therefore, for purposes of statistical evaluation, if a value was reported as undetected, one-half the reported quantitation limit (for organic compounds) or MDL (for inorganic analytes) was used (WAC 173-340-708[11][e], 173-340-720[8][g], 173-340-730[7][f], 173-340-740[7][g]). For organic analyses, sample results were reported using quantitation limits, and one-half the quantitation limit was used for statistical evaluation. The use of one-half the quantitation limit for organics analyses, versus one-half the MDL, results in a more conservative (i.e., higher) average. As a further conservative approach, organic results reported at concentrations greater than the MDL, but less than the quantitation limit, were assigned the reported value. This approach reduces the possibility of underestimating average concentrations by using zero and overestimating concentrations by using the quantitation limit or MDL. One departure from this approach was used for dioxin/furan results, where the results for undetected values were assigned a value of zero.

Statistical calculations were performed only for parameters with greater than two detected values. The minimum and maximum values reported are for detected concentrations. Calculation of average concentration was performed using values modified by the data qualifiers as defined above.

Upper 95 percent confidence limits (UCL 95) on the mean were calculated based on Ecology (1992) methods. Data distributions (i.e., normal, lognormal, or neither) were tested using probability plots on SYSTAT® software and Ecology's MTCASTAT software. Organic analytes showed relatively large numbers of non-detected values at low concentrations and varying numbers of detected values at relatively high concentrations resulting in a large estimate of sample variance. For some organic analytes, the reported concentrations were greater than method detection limits, but less than quantitation limits. These two conditions (large sample variance and concentrations reported below sample quantitation limits) sometimes resulted in an UCL 95 greater than the maximum detected concentration. When the data distribution was neither normal nor lognormal, or the calculated UCL 95 was greater than the maximum detected concentration, the maximum value was substituted for the UCL 95.