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Memorandum

To: David South, Washington State Department of Ecology
Copies: Ken Johnson, Weyerhaeuser Company
From: Brett Beaulieu
Date: November 17, 2011
Project No: Weyer-EW
Re: **Weyerhaeuser Everett West**
Groundwater Compliance Monitoring Plan Addendum

This memorandum is intended to provide the Washington State Department of Ecology (Ecology) with the goals and methods of proposed work elements at the Everett West Site (Site). These work elements have been developed in consultation with Ecology as an addendum to update the existing Groundwater Compliance Monitoring Plan in accordance with Consent Decree No. 94-2-67559-2 (Consent Decree; State of Washington 1994) to meet Weyerhaeuser Company's (Weyerhaeuser's) Consent Decree obligations for groundwater monitoring.

BACKGROUND

The Site is a former kraft pulp mill located adjacent to the Snohomish River in Everett (Figure 1). Weyerhaeuser conducted a voluntary Remedial Investigation/Feasibility Study, negotiated the Consent Decree with Ecology, and implemented the associated Cleanup Action Plan in the early 1990s. Cleanup activities, which consisted primarily of excavation of petroleum-impacted soils, were completed in 1994. At that time, Ecology concluded that remedial activities listed in the Cleanup Action Plan were satisfactorily completed, except for compliance monitoring. Weyerhaeuser then began implementing a groundwater monitoring program in accordance with the requirements of the Consent Decree and associated Groundwater Compliance Monitoring Plan (Emcon 1995; Attachment 1). The specified monitoring program consisted of quarterly monitoring for 3 years, followed by annual monitoring for 2 years. The monitoring network consisted of seven wells, six of which were located at the conditional point of compliance along the shoreline. Monitoring analytes were dissolved arsenic and diesel- and oil-range total petroleum hydrocarbons (TPH-Dx).

In the course of Weyerhaeuser's implementation of the groundwater monitoring program, the continuity of project communications was disrupted by multiple personnel changes at Weyerhaeuser and Ecology. Following the initial 5 years of monitoring, Weyerhaeuser understood the monitoring program to be concluded based on verbal authorization from Ecology, which resulted in a gap in monitoring from 2000 to 2003.[1] As monitoring resumed, deterioration of the monitoring network and further confusion over the status of the monitoring

[1] Letter from Mark Edens to Judy Tuohy, Arts Council of Snohomish County, November 18, 2003.

program resulted in additional gaps in the compliance monitoring data set between 2004 and 2008 (refer to Tables 1 and 2).

Weyerhaeuser, recognizing that the attainment of the groundwater cleanup standard for dissolved arsenic had not been demonstrated, initiated communications with Ecology in an attempt to establish a clear path forward for meeting its obligations under the Consent Decree. The work elements described in this memorandum represent the outcome of those discussions. This memorandum is intended as a proposed addendum to the existing Groundwater Compliance Monitoring Plan, by which Weyerhaeuser will continue to meet its Consent Decree obligations by restoring the monitoring network and monitoring groundwater at the Site. This proposed addendum to the Groundwater Compliance Monitoring Plan is consistent with provisions of the Consent Decree, which called for Weyerhaeuser and Ecology to exchange proposals after the initial 5 years of monitoring to address the need for future monitoring and establish an appropriate monitoring schedule if necessary.

The remainder of this memorandum is organized in the following manner. To update the existing monitoring plan and clarify Weyerhaeuser's remaining obligations for groundwater monitoring under the Consent Decree, a proposed scope of work is described below for restoring the groundwater compliance monitoring network. This section is followed by a description of the revised parameters of the compliance monitoring program. A compliance demonstration for monitoring wells currently in compliance with site cleanup levels (CULs) is then provided to establish a clear record regarding future compliance evaluation requirements. In the final section, the details of a future demonstration of complete attainment of Consent Decree cleanup standards are proposed. All field and analytical methods will be in general accordance with the existing Compliance Monitoring Plan and Sampling and Analysis Plan (Emcon 1995; Attachment 1), unless otherwise indicated.

RESTORATION OF GROUNDWATER MONITORING NETWORK

As shown on Figure 2, the destruction of five shoreline point-of-compliance monitoring wells over time because of site activities has degraded the original network of six shoreline monitoring wells and one upgradient monitoring well. The following activities are proposed to restore the monitoring well network:

- Decommissioning of monitoring wells destroyed by past site activities
- Decommissioning of existing Monitoring Well MW-1301, which will be replaced
- Installation and development of monitoring wells to replace MW-1202, MW-1203, MW-1301, and MW-1501 closer to the point of compliance at the shoreline

Additional details on these work elements are provided below.

Well Decommissioning

The following monitoring wells will be decommissioned in accordance with Washington water well regulations: MW-1201, MW-1202, MW-1203, MW-1301, MW-1302, and MW-1501. Table 3 lists the well construction details and survey coordinates of these wells. The wells will be decommissioned by a well driller licensed by the state of Washington and in accordance with the standards provided in Washington Administrative Code (WAC) 173-160-381.

Searching for each destroyed well, if necessary, will consist of scraping of the upper 6 inches to 1 foot of soil in a 10-foot radius of the surveyed location of the well using a backhoe or excavator. The field method used to locate the surveyed location will be accurate to within 1 foot.

Searching for each well will proceed for up to 2 hours. In the event that a well cannot be located within this time period, the effort to locate the well and its surveyed coordinates will be documented and provided to Ecology and the property owner for their records. Disturbed ground surface will be restored using the excavator bucket to regrade the surface.

Well Installation and Development

Four 2-inch diameter monitoring wells will be installed to replace Monitoring Wells MW-1202, MW-1203, MW-1301, and MW-1501. The four new wells will be designated MW-1202R, MW-1203R, MW-1301R, and MW-1501R. These four monitoring wells are considered sufficiently representative of groundwater with potentially elevated concentrations at the shoreline point of compliance to serve as the updated compliance monitoring network. Future evaluation of groundwater compliance will be based on data collected from these four wells, as described in a later section.

The two wells that will not be replaced, MW-1201 and MW-1302, have attained compliance status, as described in a subsequent section. These wells are not located in areas of concern, based on groundwater monitoring results (refer to Tables 1 and 2). Monitoring Well MW-1201 has never exceeded the dissolved arsenic CUL of 5 micrograms per liter (µg/L). Results indicate that there was only one exceedance of the 1,000 µg/L CUL for TPH-Dx in historical sampling of MW-1201 in 1995. Following this exceedance, TPH-Dx concentrations were less than the CUL for 2 years of quarterly sampling and 2 years of annual sampling. Concentrations of arsenic at MW-1302 have been less than CULs since November 1996, which represents 13 sampling events over 12 years. Concentrations of TPH-Dx at MW-1302 remained less than CULs for 10 events over 4 years following the cleanup action. Concentrations of TPH-Dx at this location and at nearby Monitoring Well MW-1301 spiked briefly in September 2005, which is attributed to a one-time discharge of oily bilge water to the ground in this area around this time. A summary of available information on this discharge from the property owner representative is provided in Attachment 2. Concentrations of TPH-Dx have remained less than the CUL in both MW-1301 and MW-1302 since this event. Because impacts to both wells were similar in magnitude and duration, the replacement well for MW-1301 is considered a suitable location to monitor TPH-Dx concentrations in this area.

The replacement wells will be positioned as close as practical to the bulkhead as depicted in Figure 2. Monitoring wells will be constructed, developed, and surveyed according to standard industry practice and in accordance with all applicable regulations, as summarized below. Underground utilities in the vicinity of borehole locations will be identified and marked prior to drilling. Wells will be drilled using a hollow-stem auger drill rig or equivalent. Soil samples will be collected using a split-spoon sampler and logged by field personnel under the direction of a licensed geologist. All downhole drilling equipment will be decontaminated before use and between drilling locations. If water is added to the borehole to control heaving, only potable water will be used. All residual soil and water collected during drilling and development (investigation-derived waste) will be containerized, characterized, and transported off-site for disposal as necessary.

The wells will be constructed with the same approximate total depth (generally 10 to 15 feet) and screened interval as the wells that they replace. Refer to Table 3 for well construction details of the previous compliance monitoring network. The wells will be constructed of 2-inch Schedule 40 PVC with flush threaded riser, including a threaded end plug and well screen with machined 0.010-inch slots. The annular space around the screen zone of each well will be backfilled with clean #10-20 silica sand, or equivalent. The annular space above the sandpack will be sealed with bentonite chips. Bentonite placed above the water table will be hydrated with potable water. All materials will be placed concurrent with auger withdrawal. The surface of each well will be completed with a flush mounted steel monument and the well secured by a lockable gasket cap. A bollard will also be placed next to each monument to protect and aid in locating it. A bollard will also be installed next to MW-1701.

As-built construction details, including the total depth of each boring and the placement depths of the filter sandpack, bentonite seal, and the surface completion will be measured to the nearest 0.1 foot. A licensed surveyor will locate the wells after installation and survey the top of well casing to the nearest 0.01 foot in the horizontal and vertical directions. Well coordinates will be reported in North American Datum 1983 (NAD 83) Washington State Plane North High Accuracy Reference Network (HARN). Elevations will be reported in North American Vertical Datum (NAVD 88).

Well logs, including soil sample description and as-built construction details, will be prepared after well completion. Well logs will include the Washington State Plane North coordinates of the well and the top of casing elevation. The coordinate and elevation reference systems will be noted on the well log. The well construction drawing will show the distance between the top of casing and the ground surface with an accuracy normally attainable by standard field measuring instruments, such as a roll-up measuring tape.

All newly installed wells will be developed by surging with a bailer or surge block followed by well evacuation. All down-hole well development tools will be decontaminated prior to use for each well. Surging and evacuation will be repeated until evacuated water is visibly clean and essentially sand-free. During well evacuation, water samples will be collected for field determination and documentation of temperature, specific conductivity, and pH. Well development will proceed until field parameters stabilize to within ±10 percent on 3 consecutive measurements or until 10 well volumes have been purged.

ANNUAL COMPLIANCE MONITORING

After the compliance monitoring network has been restored, Weyerhaeuser will resume annual compliance monitoring through the updated program of groundwater sampling described in this section. Groundwater samples will be collected from four shoreline, point-of-compliance wells (MW-1202R, MW-1203R, MW-1301R, and MW-1501R) and analyzed for dissolved arsenic. The sample from MW-1301R will be analyzed for TPH-Dx. The upgradient monitoring well, MW-1701, will no longer be included in the regular groundwater quality monitoring program. Throughout previous monitoring, groundwater from this location has consistently been less than the CUL for dissolved arsenic and TPH-Dx. MW-1701 will be maintained as part of the monitoring network for future potential future use. MW-1701 will be inspected and the groundwater elevation in it measured during each monitoring round. In addition, MW-1701 will be made available to Ecology for sampling by Ecology or their representative upon request.

Arsenic Monitoring

As noted in the 2009 Ecology Periodic Review (Ecology 2009), the attainment of the groundwater cleanup standard for dissolved arsenic has not been demonstrated at the Site. Sampling of groundwater from the four bulkhead point-of-compliance monitoring wells will be conducted annually to monitor for dissolved arsenic and geochemical field parameters.

Groundwater will be sampled in general accordance with the Compliance Monitoring Plan and Sampling and Analysis Plan (Emcon 1995; Attachment 1) with the following exceptions:

- Samples will be collected using standard low-flow methods as summarized here. Groundwater will be discharged at a rate of approximately 0.1 to 0.4 L/min through a water quality instrument equipped with a flow-through cell and calibrated per the manufacturer recommendations. Water levels and field water quality parameters temperature, pH, specific conductance, dissolved oxygen, and oxidation-reduction potential will be collected at intervals of approximately 5 minutes. When a volume greater than the stabilized drawdown volume and extraction tubing volume have been purged and pH, specific conductance, and temperature have stabilized, the well will be considered to contain representative formation water, and no further purging will be required. Stabilization criteria are:
    - o pH ± 0.1 pH units,
    - o specific conductance ± 3 percent,
    - o temperature ± 0.1 ^{o}C.

    Purging will continue until stabilization is obtained, or 30 minutes have elapsed. If a well is purged for 30 minutes and the minimum purge volume has been removed, the well will be sampled. If well yield is extremely low, it may be necessary to purge the well for more than 30 minutes or to purge to dryness and return later to collect the groundwater sample. The total volume of water purged from each well will be recorded on a field sampling sheet.
- To provide for samples representative of groundwater quality in water discharging to the Snohomish River, samples will be collected during a lower-low water tide. Sampling will begin when water level elevations measured in shoreline wells are a approximately 3 feet higher than the stage height of the tidally-influenced Snohomish River, based on published tidal information (NOAA 2011) and site water level data. The order of sampling the wells will be rotated for each sampling event so different wells are sampled at a similar time in the tidal cycle. Based on site water level data and published tidal information, it is estimated that it will take approximately 10 hours for the river stage height to recede from the elevation of groundwater to three feet below groundwater during a lower low water tide. Because river stage height typically exceeds groundwater elevation only briefly each day at higher high water tide, and point-of-compliance wells are located immediately adjacent to the shoreline, it is expected that this timing will prevent river water that may be stored in the bank from being included in the sample. Low-flow sampling methods described above will provide further assurance of a representative sample from the aquifer.
- The sampler(s) will wear new nitrile gloves at each location.

- Samples will be field-filtered using a disposable 0.45 µm filter and submitted for dissolved arsenic analysis to an accredited laboratory using U.S. Environmental Protection Agency (USEPA) Method 200.8[2] with a detection limit of 0.2 µg/L.
- Field equipment rinsate blanks will not be collected during sampling events because a peristaltic pump and flow-through cell with disposable tubing and filters will be utilized instead of reusable sampling equipment. Field duplicate sample blanks will be collected at a rate of one per event.
- The laboratory will submit data supported by enough backup information and quality assurance results to permit a Level 3 independent data validation, if necessary. Analytical results will routinely be subjected to Level 1 data validation to ensure data quality is suitable for compliance evaluation. Validated analytical data and associated groundwater elevation measurements will be entered into the project database and submitted to Ecology's Environmental Information Management (EIM) System following Ecology approval of the results. The project database, a customized relational database based on a Microsoft Structured Query Language (SQL) Enterprise server, will serve as a repository used to organize, analyze, and store project information and data.
- Historic groundwater monitoring data will be submitted to Ecology's EIM System.

TPH-Dx Monitoring

Previous monitoring at the Site has indicated that the remedy has been effective in attaining TPH-Dx CULs in site groundwater, and that the long-term effectiveness of the cleanup has been demonstrated. As described below in a summary of compliance status for TPH-Dx, all site wells have attained compliance for TPH-Dx. To provide additional confirmation of attainment of CULs in the vicinity of the September 2005 spike in TPH-Dx concentrations, Weyerhaeuser will collect additional groundwater samples from this area for TPH-Dx analysis..

Sampling of groundwater from MW-1301R will be conducted annually to monitor for TPH-Dx. Sampling, laboratory analysis, and data validation will be conducted in conjunction with sampling for dissolved arsenic and in general accordance with the Compliance Monitoring Plan and Sampling and Analysis Plan (Emcon 1995; Attachment 1) with the following exception in addition to those noted above:

- The sample will be submitted for TPH-Dx analysis to an accredited laboratory using method NWTPH-Dx with silica gel cleanup. This method provides a detection limit of 100 µg/L for diesel-range hydrocarbons (C-12 through C-24), and a detection limit of 200 µg/L for oil-range hydrocarbons (C-24 through C-38).
- Sampling for TPH-Dx analysis will be discontinued after two events unless the results indicate an exceedance of the CUL. In the event that an exceedance occurs, annual TPH-Dx monitoring will continue in MW-1301R and Ecology and Weyerhaeuser will confer on what further actions are needed to achieve compliance.

[2] USEPA Method 200.8 is a standard method for the analysis of arsenic in groundwater; however, it is prone to an interference when the groundwater is brackish, which sometimes occurs in shoreline wells adjacent to tidal waterways. If brackish conditions are encountered, the sample will be pre-treated to remove the interference using USEPA Methods.

Annual Monitoring Reports

Groundwater monitoring will be reported to Ecology in general accordance with the Compliance Monitoring Plan and Sampling and Analysis Plan (Emcon 1995; Attachment 1) with the following exceptions:

- Reports will be submitted annually. In the event that the monitoring frequency is increased to quarterly (as part of an effort to demonstrate compliance with the Consent Decree cleanup standards, described below), quarterly data reports will be submitted.
- Each report will be submitted electronically as an Adobe Acrobat file (.pdf format). In addition, one hard copy will be submitted. The hard copy will have a disk bound in a pocket containing the Adobe Acrobat file. Ecology may request additional hard copies. Technical electronic files (Excel, Access, AutoCAD, and ArcGIS) will be submitted to Ecology upon request.
- Reports will include the following:
  - Tables and plan figures summarizing analytical results for groundwater sampling.
  - Water level measurement results.
  - Concentration trend plots and evaluation of concentration trends.
  - Comparison of data to CULs.
  - A narrative description of any deviation from the Compliance Monitoring Plan and Sampling and Analysis Plan, including this addendum.
  - Data validation results.
- Data will be managed using the project database as described in the previous section.

The initial annual report following the restoration of the compliance monitoring network will also include documentation of the work performed, including the following:

- A brief description of the scope of work performed, including an explanation of any deviation from this addendum or the existing Compliance Monitoring plan and Sampling and Analysis Plan.
- Documentation of the decommissioning of existing monitoring wells.
- Documentation of the installation of new monitoring wells including well logs, surveyed locations, and a scaled site map with well locations.
- Records of well development.
- Additional field documentation such as photographs or field notes necessary for complete understanding of work activities.

CURRENT GROUNDWATER COMPLIANCE EVALUATION

In this section, the compliance status of the monitoring network being updated is reviewed based on available data. As described below, the compliance evaluation methods described in the Groundwater Compliance Monitoring Plan (Emcon 1995) were followed in accordance with

WAC 173-340-720(9)(c). The results of this review are intended to provide clarity on the compliance status of each well or former well for both dissolved arsenic and total petroleum hydrocarbons. Establishment of well- and analyte-specific compliance status will support a straightforward evaluation of Consent Decree cleanup standards based on the updated groundwater monitoring network, as described in a subsequent section of this memorandum.

Total Petroleum Hydrocarbons

For TPH-Dx, the Site97 module of MTCAStat was used to calculate the upper 95th percent confidence limit (UCL95) for TPH-Dx for each well. TPH-Dx was evaluated as the sum of diesel- and oil-range total petroleum hydrocarbons. The first event in the dataset evaluated is the first quarterly event in 1996, the year that the Groundwater Compliance Monitoring Plan called for time-trend plots to start. Data were evaluated through the most recent sampling event available for each well with both diesel- and oil-range total petroleum hydrocarbons results. This data set is appropriate for compliance evaluation because it is representative of conditions following remediation. The September 2005 results for MW-1301 and MW-1302 were excluded from the evaluation because these temporarily elevated results were associated with a separate release. As detection limits were unknown, detection limits of 25 µg/L and 50 µg/L were assumed for diesel- and oil-range total petroleum hydrocarbons, respectively. Non-detects were assigned half these values. For wells in which the data could not be determined to be normally or lognormally distributed, the highest value was compared with the CUL. A summary of the evaluation and a comparison of the UCL95 with the CUL of 1,000 µg/L is given in Table 4.

As this evaluation indicates, all seven wells in the former groundwater compliance monitoring network have attained compliance status for TPH-Dx. Future evaluations of groundwater compliance will not revisit the status of these seven wells with respect to TPH-Dx except in the circumstances described in Section XXVI.1, “Reopeners,” of Consent Decree 94 2 07559. Because of the elevated TPH-Dx concentrations detected at MW-1301 and nearby MW-1302 in 2005, sampling of MW-1301R will be conducted to assess the compliance status in this area, as both wells were affected by the same release circa 2005.

Dissolved Arsenic

For dissolved arsenic, the Site97 module of MTCAStat was used to calculate the upper 95th percent confidence limit for two compliance wells, MW-1201 and MW-1302; and one upgradient well, MW-1701. The data were analyzed in sets representative of post-remediation conditions. The earliest event used is the first quarterly event in 1996, the year that the Groundwater Compliance Monitoring Plan called for time-trend plots to start. For MW-1302, sufficient recent data were available to allow three quarterly events from 1996 to be omitted from the evaluation. Data were evaluated through the most recent sampling event available for each well. Because detection limits were not known for all results, a detection limit of 0.5 µg/L was assumed for dissolved arsenic. Non-detects were assigned half this value. For wells in which the data could not be determined to be normally or lognormally distributed, the highest value was used for comparison. A summary of the evaluation and a comparison of the UCL95 with the CUL of 5 µg/L dissolved arsenic is given in Table 5.

The evaluation indicates that the two wells evaluated for dissolved arsenic in the former groundwater compliance monitoring network, MW-1201 and MW-1302, have attained compliance status for dissolved arsenic. Future evaluations of groundwater compliance will not

revisit the status of these two wells with respect to dissolved arsenic except in the circumstances described in Section XXVI.1, "Reopeners," of Consent Decree 94 2 07559. Four wells which have not attained compliance for dissolved arsenic (MW-1202, MW-1203, MW-1301, and MW-1501) will continue to be monitored through their replacement monitoring wells under this addendum to the Groundwater Compliance Monitoring Plan. Note that MW-1701 is located upgradient of the conditional point of compliance at the bulkhead and is not a compliance well. This monitoring well will be maintained for measurement of groundwater elevations and potentially for other future use.

FUTURE GROUNDWATER COMPLIANCE EVALUATION

By restoring the groundwater compliance monitoring network and implementing the updated annual groundwater monitoring program, as described in this memorandum, Weyerhaeuser understands that it is meeting its continuing monitoring requirements under the Consent Decree. At an unspecified future time, it is expected that Weyerhaeuser will seek to demonstrate full attainment of Consent Decree cleanup standards.

Compliance Evaluation for Attainment of Consent Decree Cleanup Standards

It is expected that after a number of years, the annual program of sampling four monitoring wells (MW-1202R, MW-1203R, MW-1301R, and MW-1501R) for dissolved arsenic will support a compliance evaluation for dissolved arsenic in these four remaining compliance wells. A successful future demonstration of groundwater compliance for dissolved arsenic in these four wells, combined with the demonstration of compliance provided above, will form the basis for a determination that cleanup standards in the Consent Decree have been achieved. This determination will be supported by 2 years of confirmation of TPH-Dx concentrations at MW-1301R.

When Weyerhaeuser elects to collect data to demonstrate compliance with the dissolved arsenic cleanup level, Weyerhaeuser will notify Ecology and commence collection of eight quarters of dissolved arsenic concentration data. Compliance for dissolved arsenic in Wells MW-1202R, MW-1203R, MW-1301R, and MW-1501R will be based on the most recent eight quarters of consecutively collected data. The data collected will be evaluated using the statistical methods in the current applicable regulation at the time the last quarter of data is collected. The data analysis will compare the statistically relevant concentration parameter against the regulatory CUL concentration for dissolved arsenic (and TPH-Dx, if necessary) current at the time of the comparison.

If it appears compliance will not be achieved after several quarters of data collection, Weyerhaeuser may revert to annual monitoring. When Weyerhaeuser again elects to collect data to demonstrate compliance, the collection of eight quarters of data will commence anew. The data analysis will compare the statistically relevant concentration parameter against the regulatory CUL for dissolved arsenic (and TPH-Dx, if necessary) current at the time of the comparison.

Future Arsenic Cleanup Level Considerations

At the present time, the compliance evaluation of dissolved arsenic in groundwater is based on comparison of the upper 95th percent confidence level to the CUL of 5 µg/L. It is Weyerhaeuser's understanding that area background in the vicinity of the Site is likely greater than 5 µg/L, and that the Site may *never* therefore be able to achieve compliance with this CUL. It is Weyerhaeuser's hope that with additional background arsenic data, a more appropriate CUL will eventually be established.

There are two anticipated scenarios under which Weyerhaeuser may seek to change the CUL in the Consent Decree based on new findings or rules. It is expected that such a change to the CUL in the Consent Decree would not otherwise change the compliance evaluation procedures described in the Groundwater Compliance Monitoring Plan as updated in this memorandum.

In 2010, Ecology began evaluating a revision to the Model Toxics Control Act (MTCA) Method A CUL for arsenic to 10 µg/L, based on a review of statewide groundwater monitoring data. That analysis, based on arsenic sampling of 6,776 drinking water wells collected between 2000 and 2010, found that 10.7 µg/L represents the 90th percentile of the statewide sampling distribution. Concentrations were reportedly higher in Western Washington, and in Snohomish County, than statewide. The proposed change would also be consistent with groundwater CULs in other states, and with the federal drinking water standard for arsenic of 10 µg/L (Ecology 2010, San Juan 2010).

Another potential circumstance that would result in a requested change to the dissolved arsenic CUL in the Consent Decree would be the availability of new studies or data from western Washington or Snohomish County that would provide for the determination of an area background level for dissolved arsenic in accordance with WAC 173-340-709.

SCHEDULE

In accordance with its Consent Decree obligations, Weyerhaeuser seeks to resume regular groundwater monitoring as soon as practicable. The first compliance monitoring event under this addendum will therefore be completed in 2011. Implementation of the scope of work described in this addendum will begin following Ecology approval. It is expected that within approximately 3 to 4 weeks of Ecology approval (and subject to securing a site access agreement from the current property owner), fieldwork will commence for well decommissioning, installation, and development. Groundwater sampling and analysis for the first compliance monitoring event under this addendum will be conducted after a "rest" period of approximately 1 week following well development.

The timing of the initial monitoring event in late 2011 will not necessarily establish the schedule for subsequent annual events. In accordance with the Groundwater Compliance Monitoring Plan, subsequent annual monitoring events will occur in the third quarter of the year, beginning in 2012, or may be scheduled to monitor representative groundwater conditions during a different season of the year in consultation with Ecology.

Annual groundwater monitoring reports will be submitted to Ecology within 120 days of receipt of the final laboratory analytical data. Data for each event will be submitted to the EIM System following Ecology approval of the data report.

REFERENCES

Emcon. 1994. *Draft Report, Phase 1 Site Assessment for Areas 11 through 18, Weyerhaeuser Everett West Site*. Prepared for Weyerhaeuser Company. Revised May.

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ENCLOSURES

Table 1	Dissolved Arsenic Groundwater Results
Table 2	TPH-Dx Groundwater Results
Table 3	Monitoring Well Information
Table 4	TPH-Dx Groundwater Compliance Evaluation Summary
Table 5	Dissolved Arsenic Groundwater Compliance Evaluation Summary
Figure 1	Vicinity Map
Figure 2	Proposed Monitoring Well Locations
Attachment 1	Groundwater Compliance Monitoring Plan for Weyerhaeuser Everett West Site, Everett, Washington (Emcon 1995)
Attachment 2	June 14, 2011 Email from CJ Ebert RE: Previous Fuel and Oil Discharges onto Weyco West Site

Tables

Table 1
Dissolved Arsenic Groundwater Results[1]
(µg/L)

Date	MW-1301	Temporary Well B-4 Adjacent MW-1301	MW-1701	Temporary Well B-3 Adjacent MW-1701	MW-1302	MW-1302 (Duplicate)	Temporary Well B-1 Adjacent MW-1302	MW-1201	MW-1202	Temporary Well B-2 Between MW-1202 and MW-1203	MW-1203	MW-1501
June 1993	**100**		4		**19**			5	**20**		**58**	NS
February 1994	**175**		1		2			1	**16**		3	**9**
May 1995	**54**		ND		**6**			ND	**10**		3	**6**
August 1995	**72**		ND		4			3	**9**		1	4
November 1995	**67**		ND		**16**			3	**8**		**11**	**16**
February 1996	**39**		3		3			3	**8**		3	3
May 1996	**43**		3		3			3	**10**		4	3
August 1996	**74**		ND		**11**			3	**8**		**15**	**11**
November 1996	**50**		ND		ND			ND	**13**		ND	3
February 1997	**17**		ND		ND			ND	**10**		3	ND
May 1997	**45**		ND		ND			ND	**9**		ND	ND
August 1997	**50**		ND		4			3	**8**		4	**6**
November 1997	**45**		ND		3			4	**15**		ND	5
August 1998	**65**		NS		3			ND	**26**		**16**	**12**
August 1999	**32**		NS		ND			ND	ND		5	**19**
September 2004	**21**		NS		ND			NS	NS		NS	**12**
September 2005	**8**		NS		ND							
February 2006	1.1		NS		ND	ND						
September 2006	2		NS		ND	ND						
March 2007	3.2		NS		0.5 U	0.5 U						
April 2008	**9.9**	4.9	2.8	7.8	1.5		2.5			1.5		
September 2008	**11.3**		4									

Notes:

Indicates well was destroyed by site activities.

Bold Indicates result is greater than site cleanup level of 5 µg/L for arsenic.

1 Results are as presented in a letter to Washington State Department of Ecology Site Manager Glynis Carrosino (Pacific Environmental & Redevelopment Corporation 2009).

Abbreviations:

ND Result was less than unknown detection limit.

NS Not sampled.

µg/L Micrograms per liter.

Qualifier:

U Result was less than detection limit provided.

Table 2
TPH-Dx Groundwater Results[1]
(µg/L)

Date	MW-1301		Temporary Well B-4 Adjacent MW-1301		MW-1701		Temporary Well B-3 Adjacent MW-1701		MW-1302			Temporary Well B-1 Adjacent MW-1302		MW-1201		MW-1202		Temporary Well B-2 Between MW-1202 and MW-1203		MW-1203		MW-1501	
	TPH-D	TPH-O	TPH-D	TPH-O	TPH-D	TPH-O	TPH-D	TPH-O	TPH-D	Duplicate TPH-D	TPH-O	TPH-D	TPH-O	TPH-D	TPH-O	TPH-D	TPH-O	TPH-D	TPH-O	TPH-D	TPH-O	TPH-D	TPH-O
June 1993	ND	ND			ND	430			**1,200**		**430**			250	ND	ND	ND			ND	ND	ND	ND
February 1994	160	ND			ND	ND			370		ND			ND	ND	**630**	**380**			ND	ND	ND	ND
May 1995	290	ND			ND	ND			260		ND			ND	ND	240	ND			120	ND	ND	ND
August 1995	ND	ND			ND	ND			320		ND			190	ND	180	ND			170	ND	ND	ND
November 1995	**510**	**730**			ND	690			660		ND			**740**	**470**	**380**	**790**			**960**	**860**	110	330
February 1996	130	250			100	380			**470**		**690**			180	250	460	300			230	280	200	250
May 1996	100	250			100	250			200		380			100	250	100	250			100	250	100	250
August 1996	ND	ND			ND	ND			85		250			210	ND	80	ND			ND	ND	ND	ND
November 1996	170	140			150	400			540		ND			270	380	291	230			230	250	220	220
February 1997	ND	ND			ND	280			310		400			ND	ND	280	230			ND	ND	ND	ND
May 1997	ND	ND			ND	ND			250		280			ND	ND	210	180			120	ND	ND	ND
August 1997	ND	ND			500	ND			250		ND			ND	ND	140	ND			130	ND	ND	ND
November 1997	ND	ND			ND	ND			200		ND			ND	ND	300	300			200	ND	ND	ND
August 1998	ND	ND			NS	NS			100		ND			ND	ND	55	120			ND	ND	ND	ND
August 1999	370	ND			NS	NS			560		ND			360	ND	510	ND			390	ND	440	ND
September 2004	69	ND			NS	NS			220		ND			NS	NS	ND	NS			NS	NS	110	ND
September 2005	**400**	**1,000**			NS	NS			**1,100**		**1,000**												
February 2006	ND	NA			NS	NS			ND	ND	NA												
September 2006	ND	NA			NS	NS			140	180	NA												
March 2007	120	NA			NS	NS			170	190	NA												
April 2008	49 U	19 U	49 U	19 U	51	19 U	51	19 U	48 U		19 U	790	19 U					48 U	19 U				
September 2008	NA	NA			NA	NA																	

Notes:

	Indicates well was destroyed by site activities.
Bold	Indicates sum of TPH-D and TPH-O is greater than the site cleanup level of 1,000 µg/L for total petroleum hydrocarbons.
1	Results are as presented in a letter to Washington State Department of Ecology Site Manager Glynis Carrosino (Pacific Environmental & Redevelopment Corporation 2009).

Abbreviations:

ND	Result was less than unknown detection limit.
NS	Not sampled.
NA	Result not available (Pacific Environmental & Redevelopment Corporation 2009).
TPH-D	Total petroleum hydrocarbons diesel-range.
TPH-Dx	Total petroleum hydrocarbons (diesel- and oil-range).
TPH-O	Total petroleum hydrocarbons oil-range.
µg/L	Micrograms per liter.

Qualifier:

U	Result was less than detection limit provided.

Table 3
Monitoring Well Information[1]

Well ID	Casing Diameter (inches)	Total Depth (feet bgs)	Screened Interval (feet bgs)	Surface Completion	Northing (feet NAD83)[2]	Easting (feet NAD83)[2]
Existing Monitoring Wells						
MW-1301	2	10	3–10	Flush mounted	373987.20	1307725.62
MW-1701	2	9	2–8	Flush mounted	372853.62	1308027.12
Monitoring Wells Presumed Destroyed						
MW-1201	2	15	5–15	Aboveground monument	373554.24	1308299.23
MW-1202	2	15	3–15	Aboveground monument	373746.61	1308192.58
MW-1203	2	10	3–10	Flush mounted	373901.31	1307959.46
MW-1302	2	10	3–10	Flush mounted	374038.00	1307514.34
MW-1501	2	10	3–10	Flush mounted	373938.67	1306922.73

Notes:

Indicates well to be decommisioned.

1 Well information from boring logs presented in Draft Report, Phase 1 Site Assessment for Areas 11 through 18, Weyerhaeuser Everett West Site (Emcon 1994).

2 Coordinate values are reported in feet relative to NAD83 High Accuracy Reference Network State Plane Coordinate System, Washington North Zone.

Abbreviations:

bgs Below ground surface.

NAD83 North American Datum 1983.

Table 4
TPH-Dx Groundwater Compliance Evaluation Summary[1]
(µg/L)

Date	MW-1201	MW-1202	MW-1203	MW-1301	MW-1302	MW-1501	MW-1701
June 1993	275	37.5	37.5 [2]	37.5 [2]	1,630	37.5 [2]	443
February 1994	37.5 [2]	1,010	37.5 [2]	37.5 [2]	395	37.5 [2]	37.5 [2]
May 1995	37.5 [2]	265	145	315	285	37.5 [2]	37.5 [2]
August 1995	215	205	195	37.5 [2]	345	37.5 [2]	37.5 [2]
November 1995	1,210	1,170	1,820	1,240	1,350	440	703
February 1996	430	760	510	380	850	450	480
May 1996	350	350	350	350	450	350	350
August 1996	235	105	37.5 [2]	37.5 [2]	110	37.5 [2]	37.5 [2]
November 1996	650	521	480	310	940	440	550
February 1997	37.5 [2]	510	37.5 [2]	37.5 [2]	590	37.5 [2]	293
May 1997	37.5 [2]	390	145	37.5 [2]	275	37.5 [2]	37.5 [2]
August 1997	37.5 [2]	165	155	37.5 [2]	275	37.5 [2]	525
November 1997	37.5 [2]	600	225	37.5 [2]	225	37.5 [2]	37.5 [2]
August 1998	37.5 [2]	175	37.5 [2]	37.5 [2]	125	37.5 [2]	
August 1999	385	535	415	395	585	465	
September 2004				94	245	135	
September 2005				1,400 [3]	2,100 [3]		
February 2006							
September 2006							
March 2007							
April 2008				34	33.5		
September 2008							61
Distribution	Normal	Normal	Normal	Neither	Normal	Neither	Neither
UCL95	312	535	341		544		
Largest	650	760	510	395	940	465	550
CUL	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Compliance Status	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Notes:

Indicates values are not used for compliance evaluation. The data used are representative of conditions following remediation, beginning with the first quarterly event included in time-trend plots in accordance with the Groundwater Compliance Monitoring Plan (Emcon 1995).

1 Values given in table are the sum of TPH-D and TPH-O results; refer to Table 2. Compliance evaluation conducted in accordance with the Groundwater Compliance Monitoring Plan (Emcon 1995) and WAC 173-340-720(9)(c). MTCAStat Site 97 module is used to determine distribution and calculate UCL95.

2 Values shown represent results less than detection limits; refer to Table 2. Detection limits of 25 µg/L and 50 µg/L were assumed for TPH-D and TPH-O, respectively. Non-detects were assigned half these values.

3 The September 2005 results for MW-1301 and MW-1302 are temporarily elevated concentrations associated with a separate release (refer to Attachment 2). Weyerhaeuser will conduct TPH-Dx monitoring in MW-1301R for additional confirmation of attainment of CULs.

Abbreviations:

CUL Cleanup level.
TPH-D Total petroleum hydrocarbons diesel-range.
TPH-Dx Total petroleum hydrocarbons (diesel- and oil-range).
TPH-O Total petroleum hydrocarbons oil-range.
UCL95 Upper 95 percent confidence limit.
µg/L Micrograms per liter.

Table 5
Dissolved Arsenic Groundwater Compliance Evaluation Summary[1]
(µg/L)

Date	MW-1201	MW-1302	MW-1701
June 1993	5	19	4
February 1994	1	2	1
May 1995	0.25 [2]	6	0.25 [2]
August 1995	3	4	0.25 [2]
November 1995	3	16	0.25 [2]
February 1996	3	3 [3]	3
May 1996	3	3 [3]	3
August 1996	3	11 [3]	0.25 [2]
November 1996	0.25 [2]	0.25 [2]	0.25 [2]
February 1997	0.25 [2]	0.25 [2]	0.25 [2]
May 1997	0.25 [2]	0.25 [2]	0.25 [2]
August 1997	3	4	0.25 [2]
November 1997	4	3	0.25 [2]
August 1998	0.25 [2]	3	
August 1999	0.25 [2]	0.25 [2]	
September 2004		0.25 [2]	
September 2005		0.25 [2]	
February 2006		0.25 [2]	
September 2006		0.25 [2]	
March 2007		0.25 [2]	
April 2008		1.5	2.8
September 2008			4
Distribution	Neither	Neither	Neither
UCL95			
Largest	4	4	4
CUL	5	5	5
Compliance Status	PASS	PASS	PASS

Notes:

Indicates values are not used for compliance evaluation. The data used are representative of conditions following remediation, beginning with the first quarterly event included in time-trend plots in accordance with the Groundwater Compliance Monitoring Plan (Emcon 1995).

1 Compliance evaluation conducted in accordance with the Groundwater Compliance Monitoring Plan (Emcon 1995) and WAC 173-340-720(9)(c). MTCAStat Site 97 module used to determine distribution and calculate UCL95. Refer to Table 1.

2 Values shown represent results less than detection limits; refer to Table 1. A detection limit of 0.5 µg/L was assumed for arsenic. Non-detects were assigned half this value.

3 For MW-1302, sufficient recent data were available to allow three quarterly events from 1996 to be omitted from the evaluation.

Abbreviations:

CUL Cleanup level.

UCL95 Upper 95 percent confidence limit.

Figures

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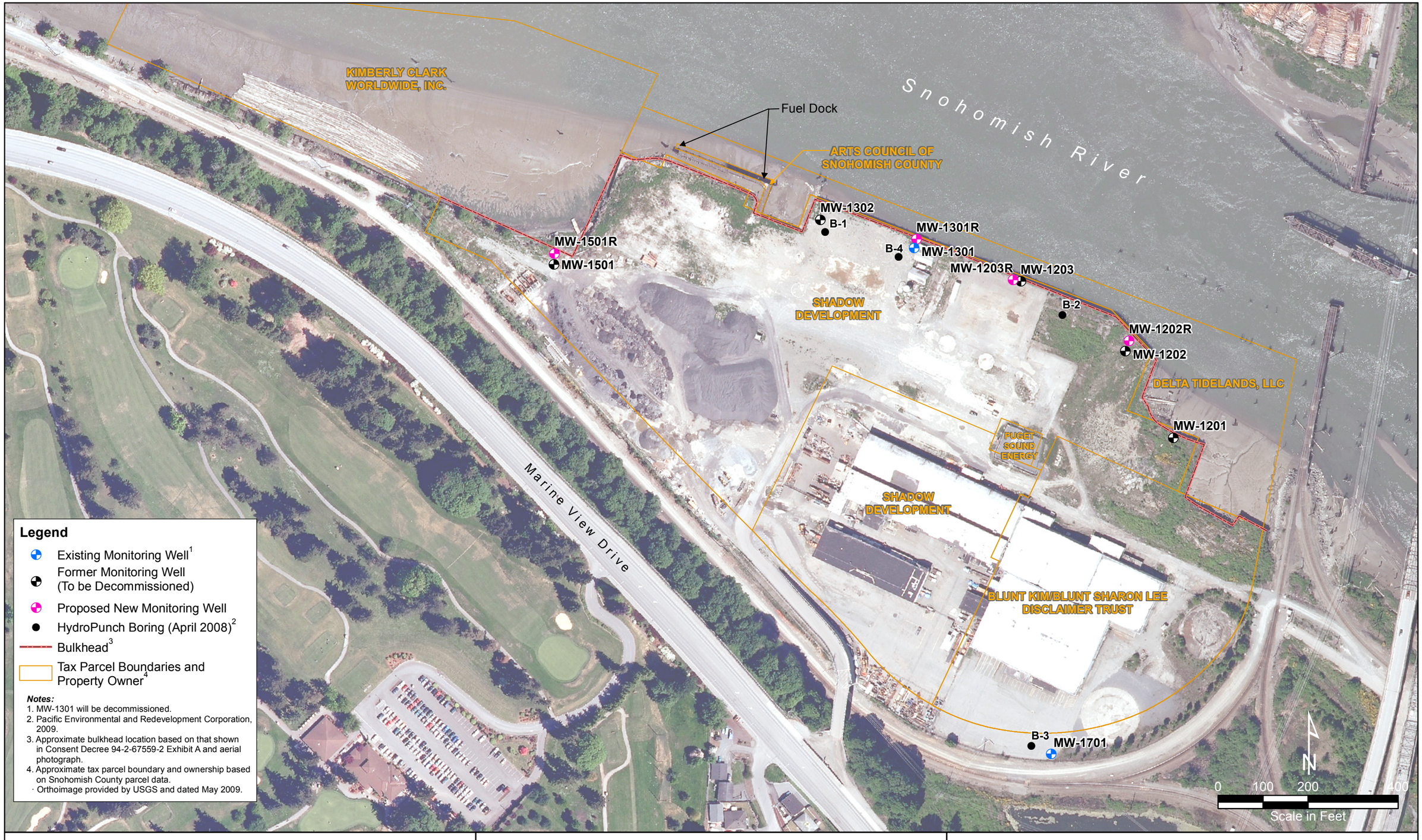
Weyerhaeuser
Everett West Site
Everett, Washington

Figure 1
Vicinity Map

F:\projects\Weyer Everett West\GIS\Task 02\Figure 1 (Vicinity Map).mxd
8/12/2011



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Weyerhaeuser
Everett West Site
Everett, Washington

Figure 2
Proposed Monitoring Well Locations

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8/24/2011

Attachment 1

0010418

GROUNDWATER COMPLIANCE MONITORING PLAN
FOR
WEYERHAEUSER EVERETT WEST SITE

EVERETT, WASHINGTON

Prepared for

Weyerhaeuser Company

March 2, 1995

Prepared by

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18912 North Creek Parkway, Suite 100
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Project 0141-037.73

CONTENTS

TABLES AND ILLUSTRATIONS

Following Report

Tables

Figures

1 INTRODUCTION

This Groundwater Compliance Monitoring Plan was prepared consistent with requirements of the Consent Decree between Weyerhaeuser Company and the state of Washington, Department of Ecology (Ecology), and specifically in accordance with requirements of WAC 173-340-410 and -720. The plan describes procedures to be followed to confirm that cleanup requirements have been achieved at the Weyerhaeuser Everett West Site (West Site).

The West Site consists of 35 acres located on the western portion of Weyerhaeuser Everett property. Several phases of site assessment have taken place. Site assessment activities at the West Site began in July 1992. Based on the findings, the West Site was divided into eight study units, designated Areas 11 through 18. During August 1992, groundwater was sampled from four temporary well points. During June 1993, Phase 1 assessment of Areas 11 through 18 occurred. Seven groundwater monitoring wells and 17 temporary well points were installed. In March 1994, Phase 2 assessment of Areas 12 through 16 occurred. In October 1994, remediation of the West Site began. Soil was removed, and soil samples were collected to confirm complete removal of affected soil. Soil remediation activities were completed by December 5, 1994.

Groundwater Compliance Monitoring Plans address protection, performance, and confirmation monitoring. Protection monitoring procedures confirm that human health and the environment are adequately protected during remedial activities. This was addressed by the *June 1994 Health and Safety Plan*, submitted to Ecology in accordance with the Consent Decree. Performance monitoring procedures confirm attainment of soil and groundwater cleanup standards. Soil performance monitoring has been addressed in the *Draft Remediation Work Plan for Weyerhaeuser Everett West Site*, June 1994. Confirmation monitoring of groundwater will confirm the long-term effectiveness of the West Site remediation.

After the fifth year of performance groundwater monitoring, Weyerhaeuser will review the collected data to confirm achievement of the West Site remediation. Based on the review, Weyerhaeuser may propose modifications to, or a cessation of, groundwater monitoring. Confirmation monitoring will be addressed after performance monitoring completion.

2 PERFORMANCE MONITORING

Performance monitoring will be conducted on a regular basis to determine whether groundwater cleanup standards have been attained. This section contains the procedures used to monitor compliance with groundwater cleanup standards.

2.1 Sampling and Analysis

Groundwater samples will be collected from seven on-site monitoring wells (Figure 1). For each sampling round, analysis will include one duplicate and one field blank sample. All groundwater samples will be analyzed for dissolved arsenic and total petroleum hydrocarbons as diesel (TPH-D), extended (Table 1), as per the Consent Decree. All groundwater samples for the analysis of metals will be field filtered.

The presence of naturally occurring organic (biogenic) material can interfere with standard TPH analysis methods. This interference causes elevated TPH concentrations.

Methods used to collect groundwater samples are summarized in the *Sampling and Analysis Plan* (SAP) (Appendix A). The plan covers preparation for sampling, equipment decontamination, collection procedures, and documentation forms, i.e., chain-of-custody, laboratory methods, and data validation.

2.2 Cleanup Standards

Groundwater cleanup standards, as specified in the Consent Decree, are based on Model Toxic Control Act (MTCA) Method A Groundwater Cleanup Standards.

- The dissolved arsenic standard is 5.0 micrograms per liter (µg/L).
- The TPH-D standard is 1,000 µg/L.

2.3 Points of Compliance

Past groundwater level data indicate groundwater flow is generally towards the Snohomish River. Monitoring wells MW-1201, MW-1202, MW-1203, MW-1301,

MW-1302, and MW-1501 are downgradient wells. All six wells are next to the Snohomish River (Figure 1). These wells will serve as the points of compliance. Monitoring well MW-1701 is on the south side of the site and upgradient from remediation activities. It will be the upgradient monitoring point.

3 DATA ANALYSIS AND EVALUATION

3.1 Data Validation

Data will be evaluated in accordance with United States Environmental Protection Agency (USEPA) data validation guidelines (USEPA , 1988a and b). Data validation will include evaluation of holding times, method blank and field blank results, surrogate recovery data, field and laboratory duplicate results for inorganic analyses, and data completeness. A detailed description is provided in the SAP included as Appendix A.

3.2 Data Evaluation

Groundwater data for TPH and arsenic will be evaluated by using time-trend plots and statistical analyses. Time-trend plots will be developed annually, starting in March 1996. Time-trend plots from the six downgradient wells (MW-1201, MW-1202, MW-1203, MW-1301, MW-1302, and MW-1501) and one background well (MW-1701) will be completed. Visual determination will be used to identify increasing or decreasing trends. If trends are not observed, an appropriate statistical method that meets Ecology's approval will be used. Statistical information for groundwater samples from compliance monitoring wells will be used to determine if concentrations of the compliance constituents exceed the groundwater cleanup standards specified in the Consent Decree. Statistical evaluation of the groundwater data is described in more detail in Section 3.3.

Groundwater data will be compared to site historic TPH-D, extended, and dissolved arsenic reference values on an annual basis. The highest TPH-D, extended, and dissolved arsenic concentrations measured in the seven monitoring wells between January 1993 and February 1994 will be used as the reference values. The TPH-D, extended, reference concentration is 1,200 µg/L as measured in MW-1302. The arsenic reference concentration is 130 µg/L as measured in MW-1301. Per the Consent Decree, if groundwater dissolved concentrations exceed the reference values by a factor of five or more (TPH-D, extended, ≥6,000 µg/L or dissolved arsenic ≥650 µg/L) for four consecutive quarters, Weyerhaeuser will notify Ecology to discuss the appropriate course of action.

3.3 Statistical Methods

Statistical evaluation will be based on comparing data from each well to cleanup standards. For the first three years, the procedure used to compare groundwater data with the cleanup standard will be the highest value in each well. After three years, the upper 95 percent confidence limit will be calculated annually, consistent with *Washington State Department of Ecology, Toxics Cleanup Program, Statistical Guidance for Ecology Site Managers (1992) and its supplements.* This guidance describes, in part, methods used to deal with censored data, determination of population distribution, and comparison of data to cleanup standards. The specific approach will be determined by the data collected. Statistical analysis will start with determination of population distribution. Depending upon the distribution of the data (e.g., normal or lognormal), the upper 95 percent confidence limit will be calculated and compared to the cleanup standard.

4 MONITORING SCHEDULE

The sampling frequency was specified in the Consent Decree. Quarterly groundwater monitoring will occur for three years. After the first three years, annual monitoring will occur for the next two years. The quarterly monitoring schedule will begin in the first quarter of 1995. Annual sampling will occur in the third quarter of 1998 and 1999. For the purposes of this plan, the quarterly sampling periods will be divided as follows:

First Quarter	-	January, February, March
Second Quarter	-	April, May, June
Third Quarter	-	July, August, September
Fourth Quarter	-	October, November, December

After five years (1999), Ecology and Weyerhaeuser will exchange proposals to amend the Consent Decree. At that time, the need for continued groundwater monitoring activities will be addressed, and an appropriate time schedule established if further monitoring is warranted.

5 REPORTING REQUIREMENTS

Results of sampling, laboratory reports, and test results will be transmitted to Ecology in quarterly data reports and an annual evaluation report for the first three years. In years four and five only, an annual evaluation report will be submitted. When reporting quarterly laboratory data, the measured value and the method detection limit achieved will be shown for each sample parameter. Each quarterly report will consist of copies of the raw laboratory data, a summary table of the validated data, and a cover letter. The quarterly reports will be submitted within one month following receipt of a final "quality assured" report from the testing laboratory. The first annual report will be submitted on or before March 30, 1996. The annual report will consist of the following:

- Evaluation of concentration trends
- Comparison of data to historic reference concentrations
- Statistical comparison of data to cleanup standards (after third year)
- Evaluation of water level data
- Sampling discussion
- QA/QC procedures
- Data validation results
- Database print-out and summary tables.
- Statistical evaluation if appropriate
- Trend plots

The data will be managed by using GIS/Key™ by GIS/Solutions, Inc., a computer program linking a hydrochemical database with AutoCAD by Autodesk. The GIS/Key hydrochemical database is an application using Microsoft Fox Pro. GIS/Key can export data in ASCII tables. The data tables can then be formatted into Excel (5.0) tables. The data will be given to Ecology in Excel table format. Tables 2, 3, and 4 are examples of the data format.

REFERENCES

U.S. Environmental Protection Agency. 1988a. *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses.* Prepared for the Hazardous Site Evaluating Division, U.S. Environmental Protection Agency. Prepared by the USEPA Data Review Work Group

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EMCON. 1994. *Health and Safety Plan.* "Appendix A," *in Draft Remediation Work Plan for Weyerhaeuser Everett West Site.* Prepared for Weyerhaeuser Company by EMCON, Bothell.

EMCON. 1995. *Draft Closure Report, Everett West Site.* Prepared for Weyerhaeuser Company by EMCON, Bothell.

Ecology. 1992. *Washington State Department of Ecology Toxics Cleanup Program, Statistical Guidance for Ecology Site Managers.* Washington State Department of Ecology 92-54, August.

TABLES

Table 1

Compliance Monitoring
Groundwater Sampling Parameters

Monitoring Well Designation	Monitoring Well Location	Laboratory Parameters
MW-1201	Downgradient from former Mill D in Area 12.	WTPH-D, dissolved arsenic
MW-1202	Downgradient from former Mill C in Area 12.	WTPH-D, dissolved arsenic
MW-1203	Downgradient from former Mill C and causticizing in Area 12.	WTPH-D, dissolved arsenic
MW-1301	Downgradient from power house in Area 13.	WTPH-D, dissolved arsenic
MW-1302	Downgradient from power house in Area 13.	WTPH-D, dissolved arsenic
MW-1501	Downgradient from former fuel storage in Area 15.	WTPH-D, dissolved arsenic
MW-1701	Upgradient well.	WTPH-D, dissolved arsenic

NOTE: Laboratory analyses include WTPH-D by Ecology Method 8015 (modified) and dissolved arsenic by EPA 7060.

Table 2

Data Base Field Definitions for Site Description File

Field	Type	Width	Definition
REP_DATE	D	10	Reporting date (mm/dd/yyyy).
REP_NAME	C	48	Reporting entity, Weyerhaeuser.
PRJ_NAME	C	48	Everett West Site
STA_TYPE	C	12	Station type groundwater.
STA_USE	C	1	Well use (USGS codes) O=observation.
WTR_USE	C	1	Water use (USGS codes) - W=water quality/level monitoring,
DATA_REL	C	1	Data Reliability (USGS codes) - C=field checked.
STA_ID	C	12	Well ID number.
STATE FIPS	C	2	State FIPS code (WA=53)
COUNTYFIPS	C	3	County FIPS code (Snohomish 063)
STATE CHAR	C	2	State, Washington
COUNTYCHAR	C	16	County, Snohomish
OWN NAME	C	30	Well owner, Weyerhaeuser Company
OWN ADD	C	60	Address of owner
LOC METHD	C	48	Method of determination of station location coordinates, surveyed to known horizontal datum
STPCO NORT	N	12	Northerly state plane coordinates REQUIRED (nearest foot)
STPCO EAST	N	12	Easterly state plane coordinates REQUIRED (nearest foot)
STPCO ZONE	C	1	State plane coordinates: state plane zone REQUIRED (N or S)
LAND-NET	C	20	Well location in township range and 1/4 1/4 section
MAP NAME	C	24	Name of USGS map and scale covering the sampling location (e.g., Yakima 100K, 1977)
BORE_DEP	N	8	Depth of original hole drilled if applicable (nearest 0.01 foot)
WELL_DEP	N	8	Well depth (nearest 0.01 foot)
WTR_ELEV1	N	8	Water level elevation at time of installation
MEAS_ELEV	N	8	Measuring point (reference point) elevation (nearest 0.01 foot)
MEAS_DESC	C	48	Measuring point description to top of PVC casing
DATUM	C	48	Measuring point datum (source of altitude used to survey in the sampling location altitude, i.e., city of Tacoma Sewer Survey 1921)
ALTITUDE	N	8	Approximate land surface elevation XXXXX.XX (ft) at the station location
DEPTOWTR1	N	8	Water depth at time of installation (nearest 0.01 foot)
MOREINT	C	1	More than one open interval (Y/N)
UP_DEPTH	N	8	Depth to top of open interval (ft below measuring point)

Table 2

Data Base Field Definitions for Site Description File

Field	Type	Width	Definition
LOW_DEPTH	N	8	Depth to bottom of open interval (ft below measuring point)
MTD_CON	C	1	Method of construction (USGS WATSTORE codes)
FILT_LEN	N	5	Length of filter pack (nearest 0.01 foot)
FILT_MAT	C	48	Type of filter pack material and size of material (e.g., sand 200 mesh)
DIA_BOR	N	8	Boring diameter (inches)
DIA_CAS	N	8	Casing diameter (inches)
CAS_MAT	C	1	Casing material (USGS WATSTORE codes) P=PVC/plastic
DIA_OPN	N	6	Diameter of open interval (inches)
LEN_OPN	N	6	Length of open interval (nearest 0.01 foot)
TYP_OPN	C	1	Type of open interval (USGS WATSTORE codes) P=perforated/slotted screen
TYP_OMT	C	1	Material type, open interval (USGS WATSTORE codes) P=PVC/plastic
LOG_DOC	C	240	Log data source documents (e.g., remedial investigation report)
LOG_LOC	C	60	Location of well log (e.g., Ecology Southwest Regional Office)
ANDAT_AVAL	C	1	Laboratory or statistical data available (Y/N)
HUCODE	C	8	U.S. Geological Survey Hydrologic Unit Map 1974-Washington

Table 3

Data Base Field Definitions
For Field Sample File

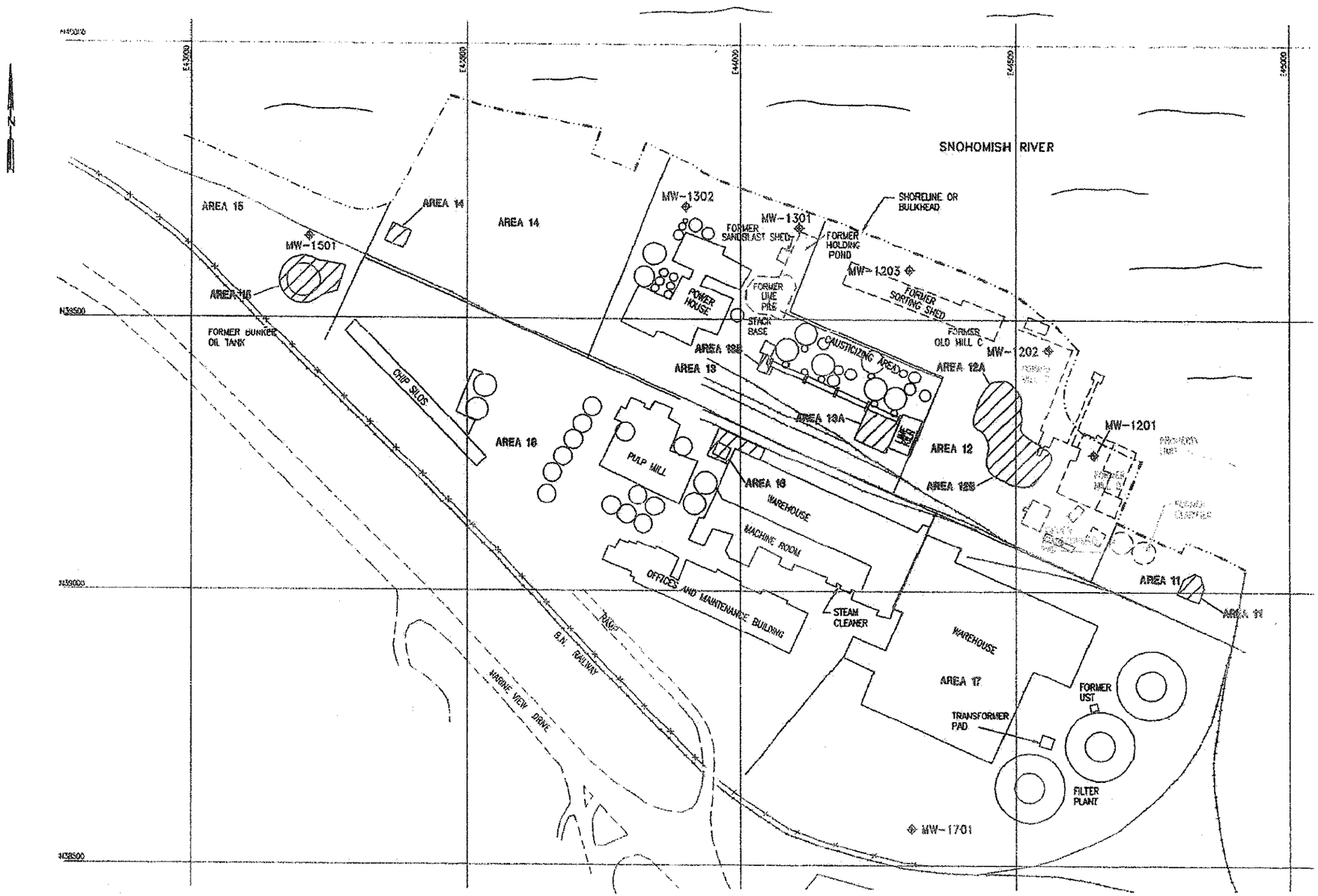
Field	Type	Width	Definition
STA_ID	C	12	Site well ID number or other designation
X_LOCATION	C	12	Surveyed coordinates reported in the State Plane Coordinates (to the nearest foot)
Y_LOCATION	C	12	Surveyed coordinates reported in the State Plane Coordinates (to the nearest foot)
STPLNZONE	C	1	N = North; S = South
LO_DAT_U	C	5	Year of Reference datum either 1929 or 1983 and which system: L Lat Long, or S for State Plane Coordinate System
LOC_DATUM	C	48	Reference datum from map or survey e.g., 1983 North American Datum (see Appendix F, RCW 58.20)
DEPT_WATER	N	8	Depth to water (in 0.01 foot) at time of sampling
UP_DEPTH	N	7	Depth (nearest 0.01 foot) to the top of the interval sampled (e.g., top of well screen or core interval)
LOW_DEPTH	N	7	Depth (nearest 0.01 foot) to the bottom of the interval sampled (e.g., Bottom of well screen or core interval)
WTR_ELEV	N	8	Water level elevation (in 0.01 foot) at the time of sampling
AGENCY	C	8	Ecology
SAMPLE_DAT	D	8	Date of well sampling (mm/dd/yyyy)
SAMP_TIME	C	4	Time of well sampling in military time
SAMPLE_ID	C	8	Sample ID code or number
FILTERED	L	1	Was the sample field filtered? Yes(Y) or No(N)
AN_METHOD	C	15	EPA Analysis method descriptions (i.e., EPA Method 601)
MEAS_ELEV	N	8	Measuring point elevation
MEAS_DESC	C	48	Description of the well measuring point used
DATUM	C	48	Vertical datum used to reference elevations (e.g., MSL and source/date of information)
MATRIX	C	2	Type of sample; water, total 10, water-dissolved 11
SOURCE_COD	C	2	Physical environment sampled (23)
COLLECTMET	C	2	Collection method code (from Appendix C)
FIELD_PH	N	5	The pH value taken at time of sampling (e.g., 11.67)
FIELD_COND	N	7	The conductivity value in umhos
FIELD_TEMP	N	5	The field temperature of the sample degrees Celsius
PURGE_METH	C	1	Purging method: B = Bail, P = Pump
PURGE_VOL	C	2	Number of boring volumes removed prior to sampling (liquid)
PRJ_NAME	C	48	Project, site, or facility name

Table 4

Data Base Field Definitions
For Laboratory Sample File

Field	Type	Width	Definition
STA_ID	C	12	Site well ID number
SAMPLE_DAT	D	8	Date of well sampling (mm/dd/yyyy)
ANALYZ_DAT	D	8	Date the sample was analyzed (mm/dd/yyyy)
SAMPLE_ID	C	12	Sample ID code
LAB_NAME	C	10	Laboratory performing analyses
CONSTITUEN	C	30	Chemical constituent name
CAS_ID	C	12	Chemical Abstract Systems ID
RESULT	N	12	Detected chemical concentration result
UNITS	C	10	Units of measurement (e.g., µg/Kg)
QUAL	C	4	Contract Laboratory Program chemical data qualifiers (such as U,J, R, UJ, etc.)
QA_QUAL	C	4	Qualifier associated with QA review of lab report
FILTERED	L	1	Was the sample field filtered? Yes(Y) or No(N)
AN_MTHOD	C	15	EPA Analysis method descriptions (i.e., EPA Method 601)
MATRIX	C	2	Type of sample: water
PRJ_NAME	C	48	Project, site, or facility name

FIGURES



EMCON Northwest, Inc.

0 200 400

SCALE (ft)

DATE 1/95
DWN. CEC
REV.
APPR.
PROJECT NO.
0141-037.69

Figure 2-1

WEYERHAEUSER EVERETT WEST SITE
EVERETT, WASHINGTON

1=200 1-20-95 G:\DWG\0141\037\61CO2A

APPENDIX A

SAMPLING AND ANALYSIS PLAN FOR EVERETT WEST SITE

CONTENTS

TABLES AND ILLUSTRATIONS

Following Report

Tables

Figures

1 INTRODUCTION

1.1 Purpose

This sampling and analysis plan (1) specifies procedures for field sampling activities described in *The Groundwater Compliance Monitoring Plan* for Weyerhaeuser's West Site, (EMCON 1995), (2) identifies quality assurance (QA) procedures to be implemented during sampling activities and laboratory analyses, and (3) meets the requirements of WAC 173-340-820, the Model Toxics Control Act (MTCA), for sampling and analysis plans.

The groundwater compliance monitoring conducted at the site must provide data of sufficient quality and quantity to determine achievement of groundwater cleanup standards.

1.2 Sampling and Analysis Plan Organization

The sampling plan has been organized into three sections. Section 1 introduces the sampling plan and describes the organization. Section 2 outlines project organization and individual responsibilities. Section 3 describes the investigation activities, including sampling locations, groundwater sampling, sample handling, decontamination, and residuals management. Section 4 addresses quality assurance-quality control procedures to be followed during the investigation.

2 PROJECT ORGANIZATION

Individuals responsible for ensuring the quality of the field operations and the collection of data are identified in this section. Weyerhaeuser will provide oversight of all program activities including the review of the project scope of work, the final project QA objectives, project needs and approve appropriate QA corrective actions.

The project consultant Health and Safety Officer will provide technical assistance as required to resolve on-site health and safety issues requiring corrective action and review and approve the *Site Safety Plan.*

The project consultant will be responsible for the following project-specific tasks:

- Oversee project performance and provide technical expertise to accomplish project objectives, monitor project tasks, and coordinate project activities with Weyerhaeuser.

- Provide technical QA assistance to accomplish project objectives. Provide contacts and approval for methods and laboratory procedures. Monitor compliance with USEPA QA/QC policies. Coordinate field operations and laboratory services.

- Oversee field activities. Monitor whether sampling and field activities conform with procedures and guidelines of the *Sampling and Analysis Plan.*

- Conduct field sampling operations in accord with the approved sampling and analysis plan. Monitor whether QA protocols (including chain-of-custody documentation, sample collection and labeling, sample storage and shipping, and instrument calibration) are followed as required. Recognize and implement necessary corrective actions. Document field operations. Monitor whether health and safety guidelines are followed during sampling. Document any health and safety issues affecting sample collection.

- Provide laboratory support. Perform all required QC sample analyses including laboratory duplicates, blanks, matrix spikes, and performance materials. Initiate and document required corrective action. Perform preliminary review of data for completeness, for transcription, or for laboratory errors. Follow USEPA guidelines and acceptable laboratory practices.

3 FIELD INVESTIGATION ACTIVITIES

3.1 Overview

Field investigation activities will include collecting groundwater and measuring groundwater levels. Seven groundwater monitoring wells will be sampled.

3.1.1 Groundwater Samples

Seven existing groundwater monitoring wells will be sampled once every three months, for the first three years, then annually for the fourth and fifth years.

3.1.2 Field Quality Assurance Samples

Field quality assurance (QA) will be maintained through compliance with the sampling plan, collection of field QA samples, and documentation of sampling plan alterations.

One duplicate groundwater sample will be collected during each sampling event. Duplicate samples will not be labeled as such, but will be submitted to the laboratory as blind samples. Duplicate sample collection locations will be determined in the field and will be selected to represent the range of contamination found at the site.

Field equipment rinsate blanks will be collected during sampling events. One rinsate sample will be collected per sampling round. An equipment rinsate sample will be collected by rinsing distilled water over decontaminated sampling equipment.

3.1.3 Sample Designation

Groundwater samples will be labeled with the monitoring well designation "MW-" preceding the monitoring well number and a date suffix. The date suffix will include the month and year. For example, MW-1501-495 will represent the water sample collected from MW-1501 in April 1995.

For water matrix QA samples, samples will be labeled with a fictitious groundwater sample name. For example MW020010495 will represent a QA sample collected in April 1995.

3.1.4 Groundwater Sampling Procedures

Groundwater sampling will begin the first quarter in 1995. Quarterly groundwater samples will be collected from seven on-site monitoring wells the first three years, then annually for two additional years. The following procedures will be used:

1. Depth to water will be measured before sampling. The water level will be measured to the nearest 0.01 foot from a surveyed notch in the well casing by means of an electric probe. Water depths will be recorded on a groundwater sampling record form (Figure 2). Data for each well will be entered on this form. The form was designed for collection of data necessary for input into the GIS-Key database.

2. The monitoring wells will be purged by using a peristaltic pump, fitted with silicon and Tygon® or polyethylene tubing, or a Grundfos® stainless steel submersible pump, fitted with Tygon® tubing. The purge water will be collected and disposed of appropriately.

3. Temperature, pH, and specific conductance will be measured with a thermometer and a pH-conductivity meter. These parameters will be collected after removal of each pore volume during well purging. Results will be recorded on a groundwater sampling form. The parameters will have to stabilize to within a plus or minus 10 percent difference between consecutive pore volume removals before a sample is obtained. Measurements will be recorded to the following standards:

   - temperature to ±½°C
   - pH to ±0.01 units
   - specific conductance to ±1 µS/cm (measured specific conductance ≤999 µS), ±10 µS/cm (999 µS/cm < specific conductance <10,000 µS/cm), or ±100 µS/cm (measured specific conductance >10,000 µS/cm)

4. The pH-conductivity meter will be calibrated before measurements are taken and approximately every four hours thereafter. Calibration will be recorded in field notebooks.

5. At least three well pore volumes will be purged before collecting groundwater samples for chemical testing. After at least three pore volumes have been purged and field parameters have stabilized, measurements of temperature, pH, and specific conductance will be obtained and recorded. Residuals will be managed as described in Section 3.4.

6. After measuring field parameters, groundwater samples to be analyzed for the following parameters will be collected in the following order:

   - dissolved arsenic
   - total petroleum hydrocarbons as diesel (TPH-D), extended

7. Groundwater samples for dissolved arsenic and TPH-D, extended, will be collected either from the discharge line of the peristaltic pump (before removal of the discharge line and after purging the well), or from the discharge line of a submersible pump. All samples will be field-transferred from the sampling equipment into a container the laboratory has prepared for the given parameters.

8. Groundwater samples collected for dissolved metals testing will be filtered at the time of sample collection by means of a disposable 0.45-micron, in-line filter. The disposable filters will attach directly to the discharge tube of the sampling pump. Each in-line filter will be used only once. Samples collected for TPH-D will not be filtered.

9. Samples will be labeled, handled, and shipped using the procedures described in Section 3.2. Sample custody will be maintained until delivery to the laboratory. All sampling field activity and data will be recorded on a groundwater sampling form (Figure 1 or similar form).

10. QA samples will be collected at the frequency described in Section 4.3.2. Duplicate samples will be collected by alternately filling like containers until both containers are full. Field rinsate blanks will be collected by passing laboratory-grade, distilled, deionized water through the sampling equipment and using the same procedures to collect the rinsate blank as those used to collect the groundwater samples.

11. The sampler(s) will wear new neoprene or vinyl gloves at each sampling location. New Tygon® or polyethylene tubing will be used at each sampling location.

12. All reusable sampling equipment will be decontaminated by using the procedures described in Section 3.3.

13. All samples will be placed on ice in a cooler after collection.

14. Coolers will be transported under chain-of-custody protocol to a laboratory for analysis.

3.1.5 Sampling Procedure Alterations

Any deviations from the general sampling procedures presented here will be brought to the attention of the project managers, and a sample alteration checklist will be filled out (Figure 2).

3.2 Sample Labeling and Chain-of-custody

Sample Labeling. Sample container labels will be completed before or immediately after sample collection. Container labels will include the following information:

- Project name
- Sample number
- Initials of collector
- Date and time of collection
- Analysis requested

Sample Shipping. Water samples will be shipped to the selected laboratory as follows:

- Sample containers will be transported in a sealed, iced cooler or other suitable shipping container.
- Glass bottles in each shipping container will be separated by a shock-absorbing and absorbent material to prevent breakage and leakage.
- Ice or "blue ice," sealed in separate plastic bags, will be placed into each shipping container with the samples.
- All sample shipments will be accompanied by a chain-of-custody-sample analysis request form (Figure 3). The completed form will be sealed in a plastic bag, which will be taped to the inside lid of the shipping container.
- Signed and dated chain-of-custody seals will be placed on all shipping containers.
- The laboratory's name and address and the sampler's name and office (return) address will be placed on each shipping container before shipping.

Chain-of-custody. Once a sample is collected, it will remain in the custody of the sampler or other personnel until shipment to the laboratory. Upon transfer of sample containers to subsequent custodians, a chain-of-custody-analysis request form (Figure 3 or similar form) will be signed by the persons completing the transfer. A signed and dated chain-of-custody seal will be placed on each shipping container before shipping. Upon receipt of samples at the laboratory, the shipping container seal will be broken, and the receiver will read the condition of the samples. Chain-of-custody records will be included in the laboratory report.

3.3 Decontamination

Groundwater sampling equipment will be decontaminated by using the following procedure:

- Tap water rinse
- Nonphosphatic detergent (Liquinox) and tap water wash
- Distilled water rinse
- Methanol solution rinse (1:1 solution of methanol and distilled water)
- Distilled or laboratory-grade deionized water rinse

The electric well probe will be rinsed with distilled water between uses in different monitoring wells. All labels and binding tape will be removed from well materials before steam cleaning or washing.

3.4 Residuals Management

All water and used decontamination solutions will be handled appropriately. Used disposable clothing and equipment will be handled as solid waste. Appropriate personal protective clothing will be worn during residuals transfers because of potential contact with skin and splash hazards. The following residuals management procedures will be used:

- All water generated during sampling of monitoring wells and decontamination will be placed in 55-gallon drums or tanks.

- Drums and tanks will be labeled with the date when filled, the sampling location from which the contents were collected, and a description of the contents (including approximate quantity).

- The treatment or disposal of water generated during sampling will be determined after receipt of laboratory data.

- Disposable clothing and equipment will be placed in plastic bags and disposed of as solid waste.

4 QUALITY ASSURANCE/QUALITY CONTROL

4.1 Quality Assurance Objectives

The overall quality assurance (QA) objective for measurement data is to ensure that data of known and acceptable quality are provided. All measurements will be made to yield accurate and precise results representative of the media and the conditions measured. Chemical analyses will be performed consistent with the requirements of WAC 173-340-830.

Table 2 lists the laboratory methods, reporting units, container type, and maximum holding time.

4.2 Chemical Analysis

All chemical and physical analyses will be performed by Weyerhaeuser Analytical and Testing Services, located in Federal Way, Washington, or their designated subcontractor.

Chemical analyses of water samples include dissolved arsenic and TPH-D, extended.

Routine analysis of environmental samples will be performed using procedures based on the following methods:

- WTPH-D, extended: diesel fuel oil (i.e., C_{12}-C_{24}) petroleum hydrocarbons by gas chromatography-flame ionization detection (GC/FID) (Ecology, 1992)
- Dissolved arsenic by USEPA Method 7060 (USEPA, 1983) by graphite furnace atomic absorption spectroscopy (GFAA)

4.2.1 Field Analyses

Temperature, pH, and conductivity of groundwater samples will be measured in the field during purging and sampling of wells. A mercury thermometer will be used to measure temperature following the procedures specified in Method 180.1 (USEPA, 1983). Specific conductance and pH will be measured by using probes.

4.3 Quality Assurance Procedures

4.3.1 Data Validation and Reporting

Weyerhaeuser Analytical and Testing Laboratory will be required to submit data supported by enough backup information and QA results to permit independent review and validation. The data package requested from the laboratory will correspond to the level of data validation to be performed on the data.

Data validation of dissolved arsenic analyses will use the format of USEPA *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics and Organics Analyses* (USEPA, 1988a, b) to evaluate method-specific QA-QC criteria.

The required laboratory deliverables for Method WTPH-D (extended) will include duplicate sample analysis summaries, method blank results, surrogate recovery results, and results of laboratory sample analyses. For metals analysis, deliverables will include a transmittal letter, results of sample analyses, method blank results, surrogate recovery, and duplicate sample results.

The items to be reviewed for data validation are presented in Table 3. The objective of the data validation is to evaluate sample results to determine data usability. Data qualifiers will be assigned to sample results that do not meet method QA-QC criteria during the data validation review. The data qualifiers may affect the ultimate usability of data for individual samples.

If severe QA problems arise with all or portions of the data, the sources of these problems will be investigated and corrected. Sampling alteration checklists will be reviewed, together with laboratory data, to determine if data quality objectives have been met for the investigation.

4.3.2 Data Precision, Accuracy, and Completeness

Routine procedures for measuring precision and accuracy include use of duplicate analyses and method blanks. The minimum frequencies are as follows:

- Duplicate analysis — One duplicate sample per sampling round
- Method blank metals — at least one method blank will be analyzed for each extraction of digestion batch.

Precision will be expressed as a relative percent difference (RPD):

$$RPD = 100 \times (C_1 - C_2)/C_m$$

where

C_1 = first measured concentration
C_2 = second measured concentration
C_m = mean concentration = $(C_1 + C_2)/2$

Completeness for each set of data received will be measured by dividing the number of valid measurements actually obtained by the number of valid measurements planned, as specified in this plan.

REFERENCES

U.S. Environmental Protection Agency. 1988a. *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses.* Prepared for the Hazardous Site Evaluating Division, U.S. Environmental Protection Agency. Prepared by the USEPA Data Review Work Group

U.S. Environmental Protection Agency. 1988b. *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses.* Prepared for the Hazardous Site Evaluation Division, U.S. Environmental Protection Agency. Prepared by the USEPA Data Review Work Group.

U.S. Environmental Protection Agency. 1983. *Methods for Chemical Analysis of Water and Wastes.* U.S. Environmental Protection Agency Environmental Monitoring and Support Laboratory, Cincinnati, Ohio. EPA-600/4-79-020.

Ecology. 1992. *Washington State Department of Ecology Toxics Cleanup Program, Statistical Guidance for Ecology Site Managers.* Washington State Department of Ecology 92-54, August.

Ecology. 1992. *Total Petroleum Hydrocarbons Analytical Methods For Soil and Water.* "Appendix L," in *Ecology Guidance for Remediation of Releases From Underground Storage Tanks.* April.

TABLES

Table 1

Objective for Measurement Data for Chemical Analyses

Analytical Parameter	Reporting Units	Laboratory Method No.	Container type/ Preservative	Maximum Sample Holding Time
Dissolved arsenic	µg/L	7060	Two 500-ml HDPE bottles; PTFE lined cap/HNO_3 to pH <2	6 months
Petroleum hydrocarbons (diesel, fuel oil, lube oils)	µg/L	WTPH-D (extended)	1-l amber glass bottle; PTFE lined lid/keep on ice (4°C)	7 days/ 30 days

Table 2

Data Validation for Chemical Analyses

The following items will be reviewed for data validation:

- Holding times
- Method blank results
- Equipment rinsate blank results
- Surrogate recovery results for organic analyses
- Field duplicate results
- Laboratory duplicate results for inorganic analyses
- Completeness
- Organic analyses
- Copies of signed chain-of custody forms

FIGURES

Figure 1

WEYERHAEUSER GROUNDWATER SAMPLING RECORD

Company ☐ ES&T/WTC ☐ ES&T/NB	Project No.	Site ID
	Facility	Date (m/d/y)

Site Description ☐ Monitoring Well ☐ Extraction Well ☐ Irrigation Well ☐ Spring ☐ Borehole ☐ Probe Other:

Air Temp: ☐ °C ☐ °F Weather:

Well Locked? ☐ yes ☐ no Damaged/Repairs Needed:

☐ TOC ☐ MP Description:

TOC/MP Stickup: ☐ ft ☐ m above/below ground Well Inside Diameter (ID): ☐ 2-inch ☐ 4-inch Other:

Site Remarks (neaby wells pumping, tide, stream stage, etc.)

Water Level Data Measurement Units: ☐ ft ☐ m Well or Borehole Total Depth (TD) from MP or TOC:

☐ E-Tape, #_____ ☐ Steel Tape ☐ Other	Initial	Confirmation	At Start of Purging	At End of Purging			Remarks
Time (hh:mm)							
Depth to Water							
Tape Correction							
Water Level (WL)							
Product Thickness							
Product Recovery ☐ gallons ☐ liters							

Measure water level from fixed measuring point (MP) or top of well casing (TOC). Record water depth to nearest 0.01 ft or 0.002 m, with minus (-) sign if level is above MP or TOC. If no mark on MP or TOC, measure water level from north side of casing. Measure static or pre-purging water level twice; record initial and confirmation measurements and measurement times (in 24-hour clock format). MP/TOC Stickup measurement is from ground surface to nearest 0.1 ft or 0.01 m. Depth to Water codes: N - not measured; D - dry; O - obstructed; P - pumping; F - flowing (artesian well); R - recently pumped; C - cascading. Water Level (WL) = Depth to Water - Tape Correction factor. Record free product presence at time of water level measurement; use "S" for free product thickness if sheen observed. If free product removed from well, record volume removed in gallons or liters, list product type in "Remarks" column.

Field WQ Data Purge Depth: ☐ Grab ☐ Bailer ☐ Pump Description:

Casing Volume: [_____(TD) - _____(WL)] • [_____(Well ID)]^2 • [_____(Conversion Factor)] = _____ ☐ gal ☐ liters

Conversion Factor = 0.0408 for feet and gallons; 0.1544 for feet and liters; 0.5066 for meters and liters; Well ID in inches

Well Goes Dry While Purging ☐

						(Final)	Meter Type	Remarks
☐ Cum. Vol. Purged ☐ Pumping Rate								
Time Measured (hh:mm)								
pH ☐ Temp. Compensated								
Temperature ☐°C ☐°F								
Dissolved Oxygen mg/l								
☐ SC or ☐ EC µS/cm								
Turbidity ☐ NTU								
Color/Tint								
Odor								

Record time purging starts and ends in Water Level Data section. Cum. Vol Purged: cumulative volumed removed before sampling, in gallons or liters. Pumping Rate is gpm or Lpm, depending on box checked in casing volume calculation. Use "Final" column above for recording sample field measurements, total volume purged befored sampling or aveerage pumping rate during purging. Record equipment calibration methods, decontamination procedures, equipment failures, purge water disposal method, etc. in daily field notes. SC: Specific Conductance corrected for temperature (µS/cm at 25°C); EC: Electrical Conductivity not corrected for temperature (µS/cm). µS/cm = µmho/cm. 1 gallon (US) = 3.785 L = 0.833 Imperial gallon

Sample Data Sample Depth: ☐ Grab ☐ Bailer ☐ Pump Description:

Field Sample ID (unique ID on bottles)	Result Code	Date (m/d/y)	Time (hh:mm)	Bottles (total to lab)	Filtered (0.45 µm)	Lab ID	Case ID	SDG ID	Remarks
	P0								

Sample ID may be up to 15 characters. **Sample Result Code, Date, and Time must be entered.** Result Codes: P0, Primary Sample; D#, Duplicate Sample; S#, Split Sample (sent to second lab); BF#, Field Blank; BR#, Equipment Rinsate; BT#, Trip Blank; SF#, Field Spike (# = 1 to 9). Lab ID (up to 5 characters) is name of laboratory that will analyze the sample. Case ID (up to 5 characters) and SDG ID (sample delivery group, up to 15 characters) are required for blanks. Case ID may be the lab service request number or yy-mm. SDG may be lab's SDG, a cooler ID number, or mmddyy. Enter sample preservation and handling data on chain-of-custody form. Also record detailed information about duplicate, split, rinsate, spike, and/or blank sample collection/handling in daily field notes.

Sampled By (print)	Signature

Date Entered into Database_____ By_____ Page ___ of ___

Figure 2
Sampling Alteration Checklist

Sample program identification: _____

Material to be sampled: _____

Measurement variable: _____

Standard procedure for analysis: _____

_____

Reference: _____

_____

_____

Variation from standard procedure: _____

_____

_____

_____

_____

Reason for variation: _____

_____

_____

_____

Resultant change in field sample procedure: _____

_____

_____

_____

Special equipment, material, or personnel required: _____

_____

_____

Author's name: _____ Date: _____

Approval: _____ Title: _____

Date: _____

Weyerhaeuser

Analytical & Testing Services

Sample Analysis Request/Chain of Custody Form

Date _____

Page ___ of ___

Facility

Project No.:

Charge To:

Project Manager:

Sampler Name (print):

Recorded By (signed):

Sampled by:
- ☐ Facility
- ☐ ES&T/WTC
- ☐ ES&T/NB

Other:

Address:

Phone #:

Method	Field Sample ID (15 characters max.)	Date (m/d/y)	Time (hh:mm)	Depth (ft / m)	Matrix: Water	Matrix: Soil/Sed	Matrix: Oil	Preservative: HCl	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: $Na_2S_2O_3$	Preservative:	Preservative: Filtered	Number of Containers	Analyses Requested (circle/write in parameters): pH SC TDS TSS Color Tan/Lig	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	TPH: 418.1 8015M	Ca Mg Na K Fe Mn	NH_3 HCO_3 CO_3 Cl NO_3 NO_2 SO_4	As Ba Cd Cr Cu Pb Hg Se Ag Zn	TCLP: Metals VOA SVOA Pest Herb	AOX TOC COD	Notes

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

Remarks/Detection Limit Requirements

☐ Samples on Ice/Blue Ice

Lab Turn Around Time

☐ 24 Hours ☐ 48 Hours

☐ 7 Days ☐ 14 Days

Date Due:

Reporting and QA/QC Requirements

RESULTS TO:

cc:

☐ CLP Package

☐ NPDES Permit

☐ Other QA/QC: _____

☐ Electronic Report

Laboratory

☐ A&T/WTC ☐ A&T/NB

☐ Other:

Lab SR#:

Case ID:

SDG ID:

Sample Chain of Custody and Shipping Method Record

Relinquished By Sampler (signature):	Date	Time	Received By (signature):	Shipping Method
Relinquished By (signature):	Date	Time	Received By (signature):	Airbill No.
Relinquished By (signature):	Date	Time	Received For Laboratory By (signature):	
			Samples Received Intact:	Cooler Temp: °C

A&T/WTC: 32901 Weyerhaeuser Way South, Federal Way, WA 98003 (206-924-6872)

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

wo_003.xls 1/5/95

Figure 4

Attachment 2

From:	Johnson, Ken
To:	Brett Beaulieu; Teri A. Floyd
Subject:	FW: Weyerhaeuser West Site
Date:	Wednesday, June 15, 2011 3:44:05 PM
Attachments:	pastedGraphic.tiff ATT00001..txt

-----Original Message-----
From: CJ Ebert [mailto:cjebert@harbormountaindev.com]
Sent: Tuesday, June 14, 2011 3:54 PM
To: Johnson, Ken
Subject: Re: Weyerhaeuser West Site

RE: Previous Fuel and Oil Discharges onto Weyco West Site:

I have been associated with this site since 2001 and having assisted in the acquisition of the properties and also the long term lease to a multinational aggregate materials company. I have worked with DOE and other governmental agencies towards properly removing the three abandoned vessels from the site.

During the years from 2002 through 2008 there were three vessels; a tug, a small barge and a former US Navy Submarine Net Tender that were abandoned/moored in the "cut area" of the bulkhead of this property. These vessels became a popular "dumping ground" for oily bilge-water deposited by other vessel owners seeking the ability to get rid of their problems illegally. These vessels typically would come by at night, with a high tide and pump into the bilges of these vessels

I do know that sometime during 2004, individuals claiming to be "owners" of the vessels "pumped out" the bilge-water from these abandoned vessels onto the uplands of the site and also into a sump that was part of the old Weyco drainage system. I know this to be true as I saw both the the oily residue and could smell it as well.

Following this action, the TPH levels spiked significantly in the MW's near where the oil/water was discharged.

I hope this bit of history is helpful.

Thanks,

C.J.