Chlor-Alkali Plant

Compliance Monitoring Plan

Prepared for

Weyerhaeuser Company
Longview, Washington

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1 Introduction

This Compliance Monitoring Plan presents the monitoring requirements identified for the Weyerhaeuser Company's Chlor-Alkali Plant (site). In accordance with the Model Toxics Control Act (MTCA; WAC 173-340-410), this Compliance Monitoring Plan sets forth the specific requirements intended to confirm the long-term effectiveness of the Cleanup Action Plan (CAP) for the site.

Based on the results of the RI/FS, Washington State Department of Ecology (Ecology) prepared the CAP for the Site (Ecology 2004). The CAP specifies the cleanup standards and cleanup action to be implemented at the Site. The selected remedial alternative includes implementating institutional controls and groundwater monitoring. This alternative meets MTCA requirements and represents an effective and appropriate cleanup action. The key elements of the CAP include:

- Limiting site access: Access to the site will continue to be restricted through maintenance and inspections of fencing and gates.
- Institute deed restrictions: Deed restrictions in the form of a Restrictive Covenant have been placed on the property so that future use will remain industrial. Deed restrictions also prevent the use of unconfined alluvial zone or basalt zone groundwater in the vicinity of the Chlor-Alkali Plant.
- Limiting infiltration: Asphalt paving throughout the site will be maintained to limit infiltration.
- Groundwater monitoring: A long-term groundwater monitoring plan will be developed for Ecology approval and implementation at the site. Should monitoring indicate contaminant levels do not continue to decline (or if they are shown to increase) over time, then other active, engineered alternatives may be reconsidered.

The Agreed Order between the State of Washington and Weyerhaeuser (Ecology 2004) serves as the legal mechanism for implementation of the CAP.

This Compliance Monitoring Plan is organized as follows:

- Section 2 presents a brief description of the site and its history, the nature and extent of contamination at the site, and the cleanup standards for the site
- Section 3 presents the approach for implementing the institutional and engineering controls for the site.
- Section 4 presents the long-term monitoring plan for the site.

Additionally, the sampling and analysis plan for groundwater monitoring is included as Attachment A, the Health and Safety Plan as Attachment B, and the Soil and Groundwater Management Plan as Attachment C.

2 Site Description

This section presents an overview of the site history and site investigation results for the former Chlor-Alkali plant. More detailed discussions may be found in the remedial investigation and feasibility study reports for the Site (CH2M HILL, 1995; CH2M HILL, 2001a; CH2M HILL, 2001b) and the CAP (CH2M HILL, 2004).

2.1 Site Location

The Weyerhaeuser Chlor-Alkali Plant is located on the north shore of the Columbia River approximately two miles southwest of the City of Longview, in Cowlitz County in southwest Washington. The Chlor-Alkali Plant is bordered by other Weyerhaeuser facilities and the property where the plant is located is zoned heavy industrial. Deed restrictions are in place requiring the property to remain industrial. The location of the plant site and its general features are presented in Figures 1 and 2, respectively.

The topography of the plant site is flat and overlies a remnant of Mt. Coffin, an isolated basalt erosional peak that was leveled and covered with a thin layer of fill before the plant was built.

2.2 Site History

The Site produced chlorine and sodium hydroxide for use by the pulp and paper industry. Chlorine production using the mercury electrolytic cell process began in 1958, following construction of the No. 1 Cell Room. The plant was expanded in 1966 with the addition of a second cell room (the No. 2 Cell Room) and a liquefaction building. Chlorine production in the No. 1 Cell Room ceased in 1975. A year later, the mercury cells in the No. 2 Cell Room were converted to diaphragm cells (a non-mercury based process). The No. 1 Cell Room was demolished in 1991 and the No. 2 Cell Room continued to operate until 1999, when it, too, was shut down.

As a result of the operations prior to 1976, mercury was released to the environment from equipment and process leaks and spills. In March 1999, Weyerhaeuser shut down chlorine production at the Chlor-Alkali Plant. The plant is being maintained as an industrial facility and will likely be redeveloped for other industrial use in the future.

2.3 Site Physical Characteristics

2.3.1 Site Geology

The site is located on the floodplain of the Columbia River. In general, a surficial layer of dredged sand fill obtained from the river overlies Columbia River alluvium. Flows of the Columbia River Basalt Group underlie the alluvium. Over the years, dredged sediment and gravel fill have been placed across portions of the site at a thickness of between two and 20 feet. Alluvium underlying the fill consists of silt, sandy silt, and silty sand. Fine-grained alluvial deposits predominate to a depth of approximately 200 feet, where the alluvium becomes generally a coarse-grained mixture of sand, gravel, and cobbles.

Basalt at the site is encountered at variable depths because of the buried remnant of Mt. Coffin, ranging from less than five feet at the Mt. Coffin remnant to greater than 300 feet elsewhere. The low-permeability basalt that makes up the remnant of Mt. Coffin influences groundwater flow directions in the southern portion of the site.

2.3.2 Site Groundwater

Groundwater occurs in saturated portions of the alluvium and basalt at the site. Groundwater occurring in alluvium is referred to as alluvial (or alluvial zone) groundwater, and groundwater occurring in basalt as basalt (or basalt zone) groundwater. Unlike other sites, these zones do not exist in a "layer cake" arrangement at the site. Instead, the buried, but steep, relief associated with the remnant of Mt. Coffin allows basalt groundwater and alluvial groundwater to occur side-by-side in the southern portion of the site. A cross-sectional view of the site's subsurface based on the existing site monitoring wells is shown in Figure 3. Groundwater in both of these zones discharges to the Columbia River, which controls the base level of the local and regional hydrologic systems.

Groundwater occurs in the upper part of the fill and alluvium deposits under unconfined conditions at depths of eight to 15 feet below ground surface (bgs) in the west area and 2.5 to 4.5 feet bgs in the former No. 1 Cell Room area. Groundwater elevations in the upper, finer-grained part of the alluvium, as determined by site monitoring wells, are controlled by seasonal variations in precipitation and, to a lesser extent, by fluctuations in the Columbia River stage. Figure 4 depicts the location of existing monitoring wells at the site.

In general, groundwater elevations tend to be highest in the spring and lowest in the late summer or early fall. Figures 5, 6, and 7 present hydrographs showing seasonal (dry and wet, respectively) groundwater elevations at monitoring wells throughout the site. Groundwater levels appear to be influenced by precipitation to a greater degree than by Columbia River stage. Based on the RI findings, the hydraulic gradient in the alluvium ranges from 0.04 to 0.008, the hydraulic conductivity is estimated at 28 feet per day, and the horizontal groundwater flow velocity ranges from 1 to 6 feet per day.

The direction of groundwater flow varies across the site but is generally towards the river. In the central and western portions of the site, groundwater generally flows to the west-southwest. In the eastern portion of the site, groundwater in the alluvium flows around the less permeable, buried remnant of Mt. Coffin, with south-southeasterly flow east of Mt. Coffin and west to southwesterly flow west of Mt. Coffin. The area where the elevation of

basalt exceeds 10 feet (that is, basalt is present within 10 feet of the surface) exhibits a greater effect on shallow groundwater flow, as observed in the RI. Based on the RI findings, the hydraulic gradient in the basalt zone is estimated at 0.03, the hydraulic conductivity is estimated at 6×10^{-3} foot/day, and the horizontal groundwater flow velocity is estimated at approximately 0.004 foot/day.

Below a depth of approximately 200 feet, groundwater occurs in a productive, confined alluvial aquifer that serves as a source of process water for local industry. The total thickness of this aquifer is poorly documented, but is at least 130 feet thick.

2.3.3 Surface Water

The Columbia River forms the southeast boundary of the Site (Figure 1). No other surface waters are present either on the Site or nearby although an earthen ditch conveys storm water from the Maintenance Building, the Hog Fuel Storage Bin and the vicinity of the fresh water intake pipelines.

2.4 Nature & Extent of Contamination

The mercury released to the environment at the Chlor-Alkali Plant was elemental, inorganic, and has relatively low mobility. Elemental mercury is very dense and readily sinks under gravity through openings in media through which it travels (large pores, fractures, joints, etc.). Mercury stops moving when it encounters a pore or fracture too small for it to enter. The residual mercury will then slowly dissolve into groundwater or soil pore water. In the unsaturated zone, mercury also will enter the vapor phase. Because of its density, high surface tension, presence as a separate-phase liquid, and accumulation in basalt fractures, active mercury remediation at the site is inherently complex and difficult.

Based on the site's physical and geochemical conditions, methyl mercury, which is created by microbial action in anaerobic, chemically reducing environments, is not expected to exist at the site. Use of mercury at the plant ceased in 1976, and all of the processes and equipment using mercury have been either converted to another type of process or removed. As a result, there are no remaining sources of mercury at the site other than that residual from the earlier releases.

Information about the releases to soil and ground water described below.

2.4.1 Soil

The RI Report presented the following conclusions regarding the nature and extent of mercury remaining in site soil:

- The average concentration of mercury in the liquefaction and loading areas, the west area, and the stormwater drainage ditch is 3 milligrams per kilogram (mg/kg).
- In the brine spill area, the No. 2 Cell Room, and the brine treatment, caustic storage, and staging areas, the average concentration of mercury is 18 mg/kg.
- Mercury concentrations are highest (average concentrations are 46 mg/kg) within the areas of the former No. 1 Cell Room and surface impoundments.

2.4.2 Groundwater

The distribution of mercury in the two water-bearing zones (alluvial groundwater and basalt groundwater) is predominantly a result of their proximity to historical sources (particularly, the former No. 1 Cell Room and former surface impoundment area) and of groundwater flow.

A groundwater monitoring program was initiated at the site in 1991 and continued on a quarterly basis through April 1997. Subsequently, sampling has been conducted semiannually. The monitoring program includes 21 wells located across the site. Site groundwater sampling results have shown that mercury concentrations are generally below detection limits in all areas of the site except at the former No. 1 Cell Room and former surface impoundment area. In these areas, recent groundwater sampling indicates that mercury concentrations in alluvial and basalt groundwater range from below the detection limit of 0.0002 mg/L up to 0.160 mg/L.

Results from the RI also included the following information:

- Mercury concentrations in groundwater are remaining steady or decreasing with time. The rate of decrease is slowest in the area of the former No. 1 Cell Room and the former surface impoundments. Except for in these areas, mercury concentrations are at or below the drinking water maximum contaminant level (MCL) of 0.002 mg/L for mercury.
- Potential explanations for the slow decrease in mercury concentrations in the area of the former No. 1 Cell Room include the following:
  - The amount of groundwater flux (and therefore the rate of flushing) is limited because the asphalt cap reduces rainfall infiltration, and the permeability of the basalt and alluvium fill above the basalt is very low.
  - It is possible that small amounts of elemental mercury may be present below the water table as isolated globules in basalt fractures. If present, these globules could serve as an ongoing source of dissolved mercury in basalt groundwater.
- Although transient fluctuations in mercury concentrations may occur as a result of unusually high groundwater levels and rainfall conditions, concentrations in groundwater are not expected to increase substantially over time. The original mercury sources were removed from the plant more than 25 years ago. Additional mercury sources were addressed in subsequent removal actions as described in the RI Work Plan (CH2M HILL, 1995). Furthermore, results from soil and groundwater sampling suggest that leaching of mercury from soil to groundwater by infiltration and percolation of precipitation is not a major factor influencing mercury concentrations in groundwater.
- Mercury is not present in groundwater upgradient of the former No. 1 Cell Room and former surface impoundment area based on semiannual groundwater sampling at monitoring wells CH-7 and CH-8 collected since 1998.
- The basalt portion of the shallow aquifer contains higher mercury concentrations than the alluvial aquifer, but transmits less groundwater flow. Therefore, mercury flux contributed by the basalt aquifer constitutes a relatively insignificant amount of mercury to the surrounding groundwater and Columbia River.

2.4.3 Surface Water

Surface water characterization at the Chlor-Alkali Plant consisted of samples collected from the Columbia River (adjacent to and upstream and downstream of the plant) and stormwater samples from the facility's eastern drainage ditch—the only drainage that discharges directly to the river. This data was collected prior to the final removal action (removal of the Former #1 Cell Room and paving of that area). None of the mercury concentrations exceed the chronic federal water quality criteria for surface water.

2.4.4 Sediments

Sediment samples show no significant difference in mercury concentrations as measured among upstream, adjacent, and downstream locations. None of the concentrations exceed Washington State Sediment Management Standards.

2.5 Site Cleanup Standards

Under MTCA cleanup regulation (WAC 173-340), the CAP established cleanup standards for soil and groundwater at the site. The two components of cleanup standards are cleanup levels (CULs) and points of compliance (POCs). A cleanup level represents a concentration at which a particular hazardous substance does not threaten human health or the environment. Under MTCA, cleanup requirements are affected by property use, applicable regulations, environmental features, and technology limitations. These factors are important considerations when determining appropriate cleanup levels. Once cleanup levels are determined, POCs are designated at locations where cleanup levels should be met.

This section presents the MTCA cleanup levels and POCs for soil and groundwater that have been determined appropriate for the Site (Ecology 2004). Because surface water does not exceed applicable criteria and chemical concentrations in sediments are equal to or less than the current and proposed sediment management standards, CUL and POCs for surface water and sediment are not required.

2.3.2 Site Cleanup Levels

As determined in the RI Report (CH2M HILL, 2001a), only mercury has been identified as a hazardous substance subject to MTCA cleanup requirements. The process used to determine the site-specific CUL is presented in the CAP (Ecology 2004). The MTCA cleanup levels established for soil and groundwater at the Site are presented below.

2.3.2.1 Soil

The following MTCA cleanup methods have been determined to be applicable to the Site soils:

- The MTCA Method A mercury soil cleanup level of 2 mg/kg for industrial properties. This concentration is based on protection of groundwater (WAC 173-340-745, Table 745-1).

- The current MTCA Method C: Industrial Land Use mercury soil cleanup level of 1,050 mg/kg. This cleanup level is based on direct contact by industrial workers (CLARC 3.1, November 2001). Use of this cleanup level would require institutional controls to ensure that exposure to affected soil remains consistent with the industrial exposure assumptions.

Under WAC 173 340-720, Ecology may establish more stringent cleanup level concentrations to protect groundwater. The proposed MTCA cleanup level for mercury in site soil is presented in Table 1; this cleanup level is as stringent as concentrations obtained from the applicable criteria (see 173-340-700 (3)(a) and (4)(a)).

2.3.2.2 Groundwater

Groundwater beneath the site occurs in saturated portions of the alluvial and bedrock basalt zones and discharges to the Columbia River.

Groundwater in the vicinity of the Chlor-Alkali Plant is not used as a drinking water source. Because groundwater discharges to the river, a Class A water body (WAC 173-201A), protection of surface water is required. No exceedances of surface water criteria have been detected in the Columbia River adjacent to or immediately downstream of the site.

Characteristic uses for Class A water bodies include: domestic, industrial, and agricultural water supply; stock watering; fish and shellfish habitat; wildlife habitat; recreation; commerce; and navigation. An applicable or relevant and appropriate requirement (ARAR) value can be used as a MTCA groundwater or surface water cleanup level if it is sufficiently protective of human health and the environment. MTCA Method B cleanup levels for groundwater are considered to be appropriate for the Chlor-Alkali Plant groundwater because they establish concentrations that are protective of nearby surface waters (WAC 173-340-730(3)(b)(i)(B)). Method B groundwater cleanup levels were developed from the following sources:

- Drinking water levels, including ARARs such as MCLs and maximum contaminant level goals (MCLGs)
- Surface water levels, including water quality criteria published under WAC 173-201A, *Water Quality Standards for Surface Waters of the State of Washington*

Table 1 presents the applicable cleanup criteria for chemicals detected in site groundwater. Both drinking water and surface freshwater criteria are presented. The final Method B cleanup level should be the most stringent concentration obtained from the applicable criteria. Table 1 also presents the selected cleanup level for groundwater at the site.

TABLE 1

MTCA CLEANUP LEVELS

Applicable Criteria for Soil

Constituent	Unit	Method C Industrial	Method A and Method C to Protect Groundwater	Lowest Proposed Final CUL to Protect Groundwater
Mercury	mg/kg	1,050	2	2

Applicable Criteria for Groundwater

Constituent	Unit	MCL	MCLG	Hazard Quotient	MTCA Method B	Acute AWQC	Chronic AWQC	Proposed Final CUL
Mercury	µg/L	2	2	0.417	4.8	2.1	0.012	**0.012***

*0.012 µg/L = 0.000012 mg/L
AWQC = ambient water quality criteria

2.3.3 Points of Compliance

MTCA defines POC(s) as the point or points where cleanup levels shall be attained. Based on the results of the preliminary cleanup level development, the following POCs have been identified for soil and groundwater at the site.

2.3.3.1 Soil

The soil cleanup levels for the site are based on the protection of groundwater and, therefore, the point of compliance is established in soils throughout the site. Ecology's expectations regarding the POC for soil cleanup levels to protect groundwater are achieved by consideration of containment provided by the surface cover currently existing at the site (Ecology 2004). Section 3 presents the proposed compliance monitoring approach related to institutional and engineering controls.

2.3.3.2 Groundwater

As identified in the CAP, the recommended alternative for the site includes a long term groundwater monitoring program for the site. The groundwater monitoring is intended to confirm the long-term effectiveness of the remedy by monitoring to document that mercury concentrations in groundwater are stable or decreasing at the site. As provided for under 173-340-720(8)(d)(i) and (e), these groundwater monitoring well locations represent the conditional POC for groundwater at the site. The long-term groundwater monitoring program is presented in Section 4.

3 Institutional and Engineering Controls

The CAP (Ecology 2004) includes several institutional and engineering controls to ensure that human health and the environment are adequately protected by the CAP. These controls include:

- Limiting site access: Access to the site will continue to be restricted through maintenance and inspections of fencing and gates .
- Institute deed restrictions: Deed restrictions will be placed on the property so that future use will remain industrial. Deed restrictions will also prevent the use of unconfined alluvial zone or basalt zone groundwater (as described in Section 2.3.2) in the vicinity of the Chlor-Alkali Plant.
- Limiting infiltration: Asphalt paving throughout the site will be maintained to minimize infiltration.

As part of the compliance monitoring plan, Weyerhaeuser will monitor to ensure that controlled site access is maintained for the Chlor-Alkali Site. Additionally, Weyerhaeuser will monitor to ensure that impervious surfaces within the area are maintained similar to current conditions. To provide a baseline of current conditions, the extent of impervious areas will be documented and presented with the first compliance monitoring report.

Weyerhaeuser has placed a Restrictive Covenant on the site to ensure that future land use will remain industrial and to prevent the use of unconfined alluvial zone or basalt zone groundwater at the Chlor-Alkali Plant. Because this is an active industrial area, the Agreed Order (Ecology 2004) allows Weyerhaeuser to conduct maintenance and demolition activities at this site. To ensure worker and environmental protection at the site, a Soil Management Plan has been prepared to provide guidelines for subsurface work that may be conducted within the plant site. The Soil Management Plan is included as Attachment C.

4 Groundwater Monitoring Plan

This section presents the long-term groundwater monitoring program for the site. As identified in the CAP, the recommended alternative for the site includes the development and implementation of a long-term groundwater monitoring program for the site. This is a "conformational monitoring" program, and, as such, is intended to "confirm the long-term effectiveness of the interim action or cleanup action once cleanup standards and, if appropriate, remediation levels or other performance standards have been attained"[WAC 173-340-410(1)(c)]. More specifically, this groundwater monitoring is intended to confirm the long-term effectiveness of the remedy by monitoring to document that mercury concentrations in groundwater beneath the site are stable or decreasing.

This long-term groundwater monitoring plan was developed in accordance with MTCA Compliance Monitoring Requirements (WAC 173-340-410) and the Guidance on Sampling and Data Analysis Methods (Ecology, 1995). This section presents the groundwater monitoring program for the site, including the data collection and data evaluation approaches. The sampling and analysis plan for the site is included as Attachment A.

4.1 Historic Groundwater Monitoring Activities

Figure 4 presents the locations of groundwater monitoring wells at the site. A groundwater monitoring program was initiated in 1991 and continued on a quarterly basis through April 1997. Subsequently, sampling has been conducted on semiannually at 17 wells and annually at 4 wells. Monitoring well HLA-4A, which had been dry during recent years, was abandoned in January 2004 prior to construction of a roadway in that area.

Tables 2, 3, and 4 present historic groundwater monitoring data since 1991 for the monitoring wells at the site. Figures 5, 6, and 7 present time series graphs of analytical results and water levels at the monitoring wells during this period. Removal of the Former #1 Cell Room and construction of the asphalt cap occurred in 1991 and was the final major removal action conducted for the site. Monitoring wells at the site may be divided into four groups:

HLA shallow "A" wells: These wells are located in the area of the Former No. 1 Cell Room and are screened in the alluvial fill material that overlies the basalt zone in this area. Following removal of the cell room, a shallow stormwater collection network was installed in the alluvium and the area was paved with an asphalt cap. These wells have been frequently dry during recent years. Mercury has been detected at these wells when samples can be retrieved.

HLA-basalt "B" wells: These wells are located in the area of the Former No. 1 Cell Room and are screened within the basalt zone. Mercury concentrations measured at these wells are typically lower than mercury concentration in the overlying alluvial fill.

MW Wells: These wells include MW-1, MW-2, MW-3, and MW-4, and are located in the western portion of the site. The groundwater flow direction in this area is toward the south and the Columbia River. Mercury has only been detected sporadically at these wells.

CH Wells: Monitoring wells CH-1 through CH-8 are wells screened within the alluvial aquifer. The groundwater flow directions in these areas range from south to southeast toward the Columbia River. Wells CH-7 and CH-8, located upgradient of the Site are background monitoring wells where mercury has never been detected above reporting limits. Mercury has been consistently detected at monitoring wells CH-1 through CH-5, but only sporadically detected at well CH-6 (4 of the 28 monitoring events).

4.2 Proposed Monitoring Well Network

The proposed groundwater monitoring network is similar to the current monitoring network. The two proposed changes to the monitoring network are the elimination of well HLA-2A and the replacement of well CH-5. Both HLA-2A and CH-5 are located in areas

where site development is expected to begin in late 2004. Additionally, well CH-5 requires replacement due to significant silt accumulation in the well. It is proposed that a replacement for well CH-5 (CH-5R) be installed directly north of the current location of the well.

4.3 Proposed Sampling Frequency

Since 1997, groundwater monitoring has been conducted semi-annually at 18 wells (the CH and HLA wells) and annually at 4 wells (the MW wells). The proposed monitoring frequencies for the long-term monitoring program were identified based on the location of the wells relative to the source area and the historic mercury results, including analytical results and the duration and frequency of historic groundwater monitoring at these wells. The proposed monitoring frequencies for the site (discussed below) are consistent with Ecology's guidance for long-term monitoring frequency (Ecology, 1995). This guidance suggests that, when concentrations have stabilized at the site, the monitoring frequency may be based on the duration over which groundwater monitoring has been ongoing at the site. Per this guidance, Ecology's suggested monitoring frequency is:

Duration of Monitoring	Monitoring Frequency
first 5 years	quarterly
years 5-10	semi-annual
years 10-15	annual
years 15-20	once in years 17 and 20
after 20 years	every 5 years

Table 5 summarizes the current and proposed groundwater monitoring frequency for the site. The basis for the proposed monitoring frequencies is discussed below.

HLA and CH wells: Groundwater samples will be collected at wells within and downgradient of the former Chlor-Alkali Plant (wells HLA-1A, -2A, -3A, -6A, -1B, -3B, -6B, -7B, and CH-1, CH-2, CH-3, CH-4, CH-5R , CH-6) annually each March or April. Annual sampling will occur at this time because historic monitoring data indicates that mercury concentrations are typically higher in the late winter/early spring than in the fall. Additionally, the shallow alluvial fill wells overlying the basalt (HLA "A" wells) are more likely to have sufficient water for sample collection during the late winter/early spring. The CH wells, which were installed in fall 1991, are in their 13th year of groundwater monitoring. The HLA wells, which were installed in early 1991, are beginning their 14th year of groundwater monitoring.

MW Wells: Groundwater samples will be collected at the western monitoring wells (MW-1, MW-2, MW-3, and MW-4) every two years beginning in the Spring of 2005. Mercury has never been detected above reporting limits in well MW-1, and only sporadically detected at the other wells. During the past 10 years (23 monitoring events), mercury has only been detected during 2 events at MW-2 and MW-4, and during 3 events at MW-3. These wells, which were installed in 1987, are in their 17th year of groundwater monitoring.

Upgradient Wells: Groundwater samples will be collected at wells CH-7 and CH-8 every two years beginning in the Spring of 2005. These wells, which are located upgradient of the

Site, are background monitoring wells where mercury has never been detected above reporting limits. These wells, which were installed in 1998, are in their 6th year of groundwater monitoring.

Groundwater levels at all monitoring wells will be measured prior to beginning groundwater sampling for each regular monitoring event.

4.4 Data Evaluation / Decision Criteria

Following receipt and validation of monitoring results, (discussed in Sampling and Analysis Plan; Attachment A) , the data will be evaluated to document that the remedy for the site is effective. This data evaluation will include two steps: 1) trend evaluation to identify whether trends in the data are apparent; and 2) comparison of recent analytical data with historic monitoring data. An overview of these two steps is presented below.

The trend analysis is to determine whether the data reflect that mercury concentrations are decreasing, stable or increasing at the site. The Kendall test will be used to identify whether statistically significant trends are present in recent data. Trend tests are inappropriate for data with less than 10 to 12 observations (Millard, 2001); however, including all possible results in a time series reduces test sensitivity to pick up current trends. Therefore, the trend test to be conducted is based on the results of the most recent 12 sampling events per well. As additional data is collected, subsequent evaluations will be based on rolling intervals such that current data replace the earliest results in the trend evaluations.

As is common with statistical methods, trend test results must be considered within the context of the relative magnitude of change and in the context of historic concentration levels. This will involve comparing the analytical results for each monitoring event with historical monitoring data (from 1991 through March 2004) at each monitoring well. Table 6 provides a summary of historic analytical data over this period. The recent monitoring data will be compared with average, maximum, and 95th percentile concentrations. Additionally, time series graphs similar to Figures 5, 6, and 7) will be presented to assist in evaluating monitoring event results.

Monitoring data will be evaluated to determine if mercury concentrations are significantly increasing at the site. The evaluation, which takes into account the magnitude of detected concentrations, indications of trend at each well, and the overall site condition, will be used to develop recommendations following each annual monitoring event. These recommendations will be included in the annual monitoring report (discussed below).

As set forth in the CAP, this long-term monitoring plan will be reviewed as often as necessary based on ongoing monitoring results. At least every five years, Weyerhaeuser and Ecology will meet at the request of either party to discuss the status of the site.

4.5 Reporting

An annual compliance monitoring report will be prepared and submitted to Ecology within two months of receiving validated long-term groundwater monitoring data. The annual report will include:

- Tables summarizing laboratory analytical results and water levels at each well
- Time series figures presenting analytical and water levels, including the most recent results
- Laboratory data and data quality evaluation
- Data evaluation and discussion, including statistical summaries and the results of trend analysis
- Handling of investigation derived waste
- Notable changes in site conditions, including changes to site access and impervious surfaces
- Conclusions and recommendations related to ongoing compliance monitoring program at the site.

5 References

CH2M HILL. *Remedial Investigation and Feasibility Study Work Plan, Chlor-Alkali Plant, Longview, Washington.* 1995.

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Table 2
Groundwater Analytical Results for HLA Wells
Former No. 1 Cell Room Area
Weyerhaeuser Company - Longview, Washington

Well No.	Sample Collection Date	Dissolved Mercury Concentration (mg/L)	pH [H+]	Specific Conductance (umhos/cm)
HLA-1A	02/04/91	0.5690	9.7 (a)	843
	02/28/91	0.4360	10.2 (a)	750 (b)
	04/12/91	0.4020	9.8 (a)	440 (b)
	06/11/91	0.4450	9.7 (a)	620 (b)
	11/06/91	0.3000	9.68	928
	01/20/92	0.1260	9.47	856
	04/20/92	0.3520	9.90	573
	07/22/92	0.2790	8.91	1,290
	11/16/92	(c)	(c)	(c)
	02/02/93	0.3380	9.32	666
	04/23/93	0.2250	8.87	436
	07/23/93	0.3110	8.44	772
	11/22/93	(c)	(c)	(c)
	01/25/94	0.1800	8.61	624
	04/27/94	0.4700	8.96	344
	07/20/94	(c)	(c)	(c)
	11/16/94	0.4050	9.57	690
	01/12/95	0.4070	9.21	692
	04/13/95	0.1810	9.68	528
	07/20/95	0.2600	9.04	1,610
	11/30/95	0.2120	9.75	734
	01/18/96	0.1870	9.85	562
	04/11/96	0.3090	9.81	557
	07/18/96	0.6860	9.35	885
	11/13/96	0.5290	9.57	619
	01/16/97	0.6500	9.76	470
	04/14/97	0.2410	10.12	530
	08/13/97	0.0275	8.61	1,798
	03/11/98	0.0594	10.29	518
	10/06/98	(c)	(c)	(c)
	03/24/99	0.1600	9.94	520
	09/22/99	(c)	(c)	(c)
	03/28/00	0.1490	9.20	462
	09/21/00	(c)	(c)	(c)
	03/20/01	(c)	(c)	(c)
	09/25/01	(c)	(c)	(c)
	03/11/02	(c)	(c)	(c)
	09/18/02	(c)	(c)	(c)
	03/25/03	(c)	(c)	(c)
	09/23/03	(c)	(c)	(c)
	03/05/04	0.123	8.13	1,080

Table 2
Groundwater Analytical Results for HLA Wells
Former No. 1 Cell Room Area
Weyerhaeuser Company - Longview, Washington

Well No.	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]		Specific Conductance (umhos/cm)	
HLA-1B	01/30/91	0.3340		11.1	(a)	1,370	
	02/27/91	0.1140		11.2	(a)	1,800	(b)
	04/11/91	0.1520		10.9	(a)	1,600	(b)
	06/11/91	0.1060		11.1	(a)	2,550	(b)
	11/06/91	0.1200		10.90		2,980	
	01/20/92	0.0187		10.82		2,420	
	04/20/92	0.0532		10.82		2,040	
	07/22/92	0.0695		10.57		2,250	
	11/18/92	0.0220		10.24		2,410	
	02/02/93	0.2310		10.79		2,170	
	04/23/93	0.0192		10.74		2,350	
	07/23/93	0.1090		10.88		2,320	
	11/22/93	0.0362		10.34		2,010	
	01/25/94	0.0651		10.62		2,060	
	04/27/94	0.0280		10.71		2,075	
	07/20/94	0.0390		10.48		2,050	
	11/16/94	0.1520		10.42		1,885	
	01/12/95	0.0581		10.44		1,610	
	04/13/95	0.0408		10.54		1,720	
	07/20/95	0.0898		10.80		1,540	
	11/30/95	0.1660		10.71		1,645	
	01/18/96	0.1590		10.81		1,465	
	04/11/96	0.1510		10.71		1,555	
	07/18/96	0.1360		10.60		1,275	
	11/13/96	0.1880		10.78		1,685	
	01/16/97	0.1320		10.64		1,218	
	04/14/97	0.1530		11.07		1,455	
	08/13/97	0.1560		10.60		1,570	
	03/11/98	0.1460		10.99		1,437	
	10/07/98	0.1250	J	10.37		1,785	
	03/24/99	0.0135		10.33		1,522	
	09/22/99	0.0770	J	10.49		1,631	
	03/28/00	0.0246		10.49		1,569	
	09/21/00	0.0095		10.08		1,672	
	03/20/01	0.1200	J	9.96		1,738	
	09/25/01	0.1130		9.68		2,020	
	03/12/02	0.1290	J	9.98		1,882	
	09/19/02	0.140		10.06		1,905	
	03/26/03	0.135		9.56		2,000	
	09/24/03	0.188		10.13		2,100	
	03/05/04	0.134		10.11		2,167	

Table 2
Groundwater Analytical Results for HLA Wells
Former No. 1 Cell Room Area
Weyerhaeuser Company - Longview, Washington

Well No.	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]		Specific Conductance (umhos/cm)	
HLA-2A	02/04/91	0.0327		5.1	(a)	794	
	03/01/91	0.0314		6.7	(a)	750	(b)
	04/11/91	0.0446		6.6	(a)	4,000	(b)
	06/11/91	0.0256		7.4	(a)	760	(b)
	11/06/91	0.0662		6.64		4,190	
	01/20/92	0.0915		6.82		1,990	
	04/20/92	0.1690		6.67		2,400	
	07/22/92	0.1900		6.99		1,610	
	11/18/92	0.0845		6.69		2,080	
	02/03/93	0.0629		7.02		1,830	
	04/23/93	0.0639		7.05		2,880	
	07/23/93	0.0789		6.54		2,240	
	11/22/93	0.0968		6.69		1,825	
	01/26/94	0.0678		6.75		1,835	
	04/27/94	0.0620		6.91		1,230	
	07/20/94		(c)		(c)		(c)
	11/16/94	0.0210		7.23		5,640	
	01/12/95	0.0294		7.48		242	
	04/12/95	0.0221		6.93		1,320	
	07/20/95	0.0281		6.89		1,840	
	11/30/95	0.0533		7.45		387	
	01/18/96	0.0272		6.74		1,520	
	04/11/96	0.0482		6.61		1,600	
	07/18/96	0.1750		6.80		2,020	
	11/13/96	0.2270		6.38		4,580	
	01/16/97	0.0517		6.51		12,380	
	04/14/97	0.0411		6.80		1,314	
	08/13/97	0.0696		6.39		1,518	
	03/11/98	0.0420		6.68		1,901	
	10/07/98	0.1420	J	6.75		1,530	
	03/25/99	0.0007		6.90		893	
	09/21/99	0.0320	J	6.28		1,840	
	03/28/00	0.0112		7.20		2,061	
	09/19/00	0.0020		7.11		1,269	
	03/20/01		(c)		(c)		(c)
	09/25/01		(c)		(c)		(c)
	03/11/02		(c)		(c)		(c)
	09/18/02		(c)		(c)		(c)
	03/25/03		(c)		(c)		(c)
	09/24/03		(c)		(c)		(c)
	03/03/04		(c)		(c)		(c)

Table 2
Groundwater Analytical Results for HLA Wells
Former No. 1 Cell Room Area
Weyerhaeuser Company - Longview, Washington

Well No.	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]		Specific Conductance (umhos/cm)	
HLA-3A	02/04/91	0.0192		9.7	(a)	4,910	
	03/01/91	0.0199		8.0	(a)	10,000	(b)
	04/11/91	0.0127		9.4	(a)	10,000	(b)
	06/11/91	0.0156		9.0	(a)	14,500	(b)
	11/06/91	0.0054		8.81		16,400	
	01/24/92	0.0058		8.93		16,000	
	04/20/92	0.0005	U	9.09		9,700	
	07/22/92	0.0225		8.73		4,890	
	11/16/92		(c)		(c)		(c)
	02/03/93	0.0148		9.78		7,035	
	04/23/93	0.0025		8.86		17,400	
	07/22/93	0.0033		9.21		13,000	
	11/22/93	0.0030		8.40		12	(d)
	01/26/94	0.0057		9.15		7,780	
	04/27/94	0.0020		9.72		11,000	
	07/20/94	0.0044		8.85		9,150	
	11/16/94	0.0152		9.05		10,800	
	01/12/95	0.0083		9.41		7,630	
	04/13/95	0.0086		9.21		9,740	
	07/20/95	0.0130		9.48		8,790	
	11/30/95	0.0124		9.61		967	(d)
	01/18/96	0.0070		9.44		9,770	
	04/11/96	0.0403		9.13		10,200	
	07/18/96	0.1900		9.30		17,300	
	11/13/96	0.0155		9.55		22,900	
	01/16/97	0.0190		9.17		9,560	
	04/14/97	0.0252		9.32		8,720	
	08/13/97	0.0062		9.21		19,050	
	03/10/98	0.0038		9.61		12,050	
	10/07/98	0.0056		9.51		11,630	
	03/23/99	0.0130		9.70		13,180	
	09/22/99	0.0077	J	9.06		7,540	
	03/28/00	0.0040		9.10		13,620	
	09/20/00	0.0048			NR		NR
	03/20/01	0.0024	J	7.80		4,469	
	09/25/01		(c)		(c)		(c)
	03/12/02	0.0071	J	9.69		3,020	
	09/18/02		(c)		(c)		(c)
	03/26/03	0.0080		9.36		780	
	09/24/03		(c)		(c)		(c)
	03/04/04	0.0235		9.51		864	

Table 2
Groundwater Analytical Results for HLA Wells
Former No. 1 Cell Room Area
Weyerhaeuser Company - Longview, Washington

Well No.	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]		Specific Conductance (umhos/cm)	
HLA-3B	02/04/91	0.0039		8.2	(a)	31,500	
	03/06/91	0.0052				37,000	(b)
	04/12/91	0.0045		7.9	(a)	24,000	(b)
	06/11/91	0.0044		7.6	(a)	38,500	(b)
	11/06/91	0.0029		7.50		65,000	
	01/24/92	0.0035		7.44		35,800	
	04/26/92	0.0005	U	7.33		46,800	
	07/22/92	0.0029		7.15		46,600	
	11/18/92	0.0027		7.22		39,800	
	02/03/93	0.0020		7.49		55,200	
	04/23/93	0.0022		7.34		47,000	
	07/23/93	0.0017		7.49		28,500	
	11/22/93	0.0015		7.24		1,830	(d)
	01/26/94	0.0016		7.29		34,100	
	04/27/94	0.0012		7.30		36,000	
	07/20/94	0.0014		7.02		44,800	
	11/16/94	0.0026		7.03		52,000	
	01/12/95	0.0012		7.06		50,000	
	04/13/95	0.0014		7.19		35,300	
	07/20/95	0.0011		7.13		43,100	
	11/30/95	0.0013		7.20		43,500	
	01/18/96	0.0011		7.31		38,500	
	04/11/96	0.0011		7.36		35,500	
	07/18/96	0.0018		6.78		40,800	
	11/13/96	0.0028		7.37		44,300	
	01/16/97	0.0045		6.44		30,640	
	04/14/97	0.0037		6.83		36,980	
	08/13/97	0.0073		6.96		39,150	
	03/10/98	0.0050*		6.74		37,100	
	10/07/98	0.0066		7.31		38,620	
	03/23/99	0.0028		8.10		35,500	
	09/22/99	0.0039	J	6.72		36,600	
	03/28/00	0.0035		6.85		37,940	
	09/20/00	0.0036		6.98		29,970	
	03/20/01	0.0031	J	6.30		37,930	
	09/26/01	0.0030		6.87		38,890	
	03/12/02	0.0033	J	6.64		32,760	
	09/20/02	0.0023		6.54		31,090	
	03/26/03	0.0018		6.95		30,490	
	09/24/03	0.0021		6.70		28,800	
	03/04/04	0.0023		6.84		25,800	

Table 2
Groundwater Analytical Results for HLA Wells
Former No. 1 Cell Room Area
Weyerhaeuser Company - Longview, Washington

Well No.	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]		Specific Conductance (umhos/cm)	
HLA-4A Decommissioned in January 2004.	02/04/91	0.0723		6.7	(a)	409	(b)
	02/28/91	0.0037		8.3	(a)	360	(b)
	04/11/91	0.0008		7.1	(a)	850	(b)
	06/11/91	0.0050		7.8	(a)	980	(b)
	11/06/91	0.0011		7.28		903	
	01/20/92	0.0005	U	7.04		976	
	04/20/92	0.0012		7.04		542	
	07/20/92		(c)		(c)		(c)
	11/16/82		(c)		(c)		(c)
	02/02/93	0.0082		7.70		648	
	04/23/93	0.0009		7.58		544	
	07/22/93		(c)		(c)		(c)
	11/22/93		(c)		(c)		(c)
	01/26/94	0.0006		7.47		451	
	04/26/94		(c)		(c)		(c)
	07/20/94		(c)		(c)		(c)
	11/15/94		(c)		(c)		(c)
	01/12/95	0.0040		7.02		262	
	04/13/95	0.0037		7.27		284	
	07/20/95		(c)		(c)		(c)
	11/30/95	0.0093		7.50		268	
	01/18/96	0.0034		7.21		225	
	04/11/96	0.0034		7.33		215	
	07/18/96		(c)		(c)		(c)
	11/13/96	0.0042		6.87		288	
	01/16/97	0.0017		6.43		144	
	04/14/97	0.0048		6.89		149	
	08/13/97		(c)		(c)		(c)
	03/11/98	0.0005	U	6.85		132	
	10/06/98		(c)		(c)		(c)
	03/24/99	0.0002	U	6.76		67	
	09/22/99		(c)		(c)		(c)
	04/03/00	0.0002	U	6.27		121	
	09/21/00		(c)		(c)		(c)
	03/20/01		(c)		(c)		(c)
	09/25/01		(c)		(c)		(c)
	03/12/02		(c)		(c)		(c)
	09/18/02		(c)		(c)		(c)
	03/25/03		(c)		(c)		(c)
	09/23/03		(c)		(c)		(c)

Table 2
Groundwater Analytical Results for HLA Wells
Former No. 1 Cell Room Area
Weyerhaeuser Company - Longview, Washington

Well No.	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]		Specific Conductance (umhos/cm)	
HLA-6B	02/04/91	0.0005	U	7.7	(a)	18,700	
	02/27/91	0.0007		7.9	(a)	20,000	(b)
	04/11/91	0.0015		7.9	(a)	10,000	(b)
	06/11/91	0.0015			NR		NR
	11/06/91	0.0012		7.86		11,900	
	01/23/92	0.0005		7.50		15,700	
	04/20/92	0.0018		7.71		11,100	
	07/22/92	0.0006		7.55		18,400	
	11/18/92	0.0005	U	7.35		15,500	
	02/03/93	0.0005	U	7.72		23,700	
	04/23/93	0.0005	U	7.69		18,700	
	07/23/93	0.0005	U	7.57		14,000	
	11/23/93	0.0005	U	7.64		26,300	
	01/26/94	0.0005	U	7.38		21,900	
	04/27/94	0.0005	U	7.48		22,000	
	07/20/94	0.0005	U	7.36		26,400	
	11/16/94	0.0005	U	7.36		28,700	
	01/12/95	0.0005	U	7.47		23,500	
	04/13/95	0.0005	U	7.63		12,600	
	07/20/95	0.0005	U	7.79		10,300	
	11/30/95	0.0005	U	7.51		17,400	
	01/18/96	0.0005	U	7.67		14,800	
	04/11/96	0.0005	U	7.94		10,200	
	07/18/96	0.0006		7.75		6,630	
	11/13/96	0.0005	U	7.96		16,500	
	01/16/97	0.0005	U	7.43		10,000	
	04/14/97	0.0019		7.66		8,420	
	08/13/97	0.0011		7.73		5,370	
	03/10/98	0.0021		7.92		1,857	
	10/07/98	0.0030		8.33		3,056	
	03/23/99	0.0002	U	7.51		12,880	
	09/22/99	0.0002	R	6.88		17,870	
	03/28/00	0.0002	U	7.01		15,430	
	09/21/00	0.0002	U	7.42		9,770	
	03/20/01	0.0002	UJ	7.44		8,580	
	09/25/01	0.0003		7.66		5,480	
	03/12/02	0.0004	J	7.80		3,772	
	09/19/02	0.0006		7.83		2,958	
	03/26/03	0.0005		7.79		2,900	
	09/24/03	0.0008		8.07		2,194	
	03/04/04	0.0009		8.12		1,917	

Table 2
Groundwater Analytical Results for HLA Wells
Former No. 1 Cell Room Area
Weyerhaeuser Company - Longview, Washington

Well No.	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]		Specific Conductance (umhos/cm)	
HLA-7B	01/31/91	0.1040		10.3	(a)	2,380	
	02/26/91	1.8000		10.4	(a)	380	(b)
	04/11/91	0.4980		10.2	(a)	2,000	(b)
	06/11/91	0.1170		10.1	(a)	4,850	(b)
	11/06/91	0.1030		10.62		5,140	
	01/21/92	0.0376		10.49		2,160	
	04/20/92	0.0358		10.58		3,190	
	07/23/92	0.0164		10.37		3,910	
	11/17/92	0.0120		10.36		3,850	
	02/02/93	0.0272		10.67		3,540	
	04/23/93	0.0217		10.65		3,350	
	07/23/93	0.0186		10.96		3,080	
	11/23/93	0.0125		10.85		2,280	
	01/26/94	0.0421		11.00		2,430	
	04/26/94	0.0107		11.03		1,640	
	07/20/94	0.0144		10.95		2,020	
	11/15/94	0.0212		10.79		1,670	
	01/11/95	0.0334		10.68		1,680	
	04/12/95	0.0412		10.61		1,660	
	07/19/95	0.0628		10.58		1,620	
	11/29/95	0.0716		10.23		1,690	
	01/17/96	0.0679		10.32		1,600	
	04/10/96	0.0496		10.21		1,790	
	07/17/96	0.0397		10.40		1,800	
	11/12/96	0.0330		10.42		2,020	
	01/15/97	0.0285		10.63		2,183	
	04/14/97	0.0340		10.61		2,034	
	08/13/97	0.0278		10.25		1,997	
	03/10/98	0.0015		8.71		1,115	
	10/08/98	0.0102	J	9.73		1,289	
	03/23/99	0.0030		10.34		1,255	
	09/22/99	0.0008	J	9.57		4,948	
	03/27/00	0.0005		9.18		7,444	
	09/20/00	0.0005		9.30		5,999	
	03/21/01	0.0006	J	9.40		5,040	
	09/26/01	0.0013		9.53		4,650	
	03/12/02	0.0056	J	9.70		2,069	
	09/18/02	0.010		9.80		1,736	
	03/27/03	0.0113		9.69		1,709	
	09/23/03	0.0236		9.65		748	
	03/04/04	0.0215		10.08		1,680	

Notes:

U = Value below Laboratory Method Reporting Limit.

J = Estimated value. NR = value not reported.

(a) Data collected in the field using methodology other than EPA Method 150.1.

(b) Data collected in the field using methodology other than EPA Method 120.1.

(c) Not analyzed because well was dry during sampling.

(d) Value questionable because significantly different from historical data record.

1. After 1992, values presented are averages of parent and duplicate samples. Prior to this time, only parent sample values were reported.

Source: HLA, 1991d for February through June 1991. CH2M HILL, November 1991 through September 2003.

Table 3
Groundwater Analytical Results for CH Wells
Central Process Area and Former Surface Impoundment Area
Weyerhaeuser Company - Longview, Washington

Site Location	Well Number	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]	Specific Conductance (umhos/cm)	
Central Process Areas	CH-1	11/06/91	0.0004	U	7.10	4,220	
		01/31/92	0.0005	U	7.20	3,790	
		04/20/92	0.0006		7.71	3,120	
		07/21/92	0.0010		9.29	3,780	
		11/18/92	0.0005	U	8.63	3,400	
		02/01/93	0.0008		7.63	3,630	
		04/23/93	0.0006		7.47	3,790	
		07/23/93	0.0007		7.68	3,710	
		11/22/93	0.0005	U	7.10	4	(a)
		01/25/94	0.0005		7.77	3,850	
		04/27/94	0.0005	U	7.61	4,290	
		07/20/94	0.0005	U	7.24	4,430	
		11/15/94	0.0005	U	7.10	4,830	
		01/12/95	0.0005	U	7.14	3,840	
		04/12/95	0.0006		7.56	3,620	
		07/20/95	0.0006		7.78	3,490	
		11/29/95	0.0018		8.01	2,010	
		01/17/96	0.0018		7.82	1,800	
		04/10/96	0.0015		7.86	2,010	
		07/17/96	0.0008		7.71	3,100	
		11/13/96	0.0016		7.70	2,680	
		01/15/97	0.0020		7.56	2,183	
		04/14/97	0.0022		8.00	1,580	
		08/13/97	0.0016		7.80	1,718	
		03/11/98	0.0011		7.81	1,705	
		10/06/98	0.0007		7.98	1,175	
		03/25/99	0.0004		7.70	1,258	
		09/21/99	0.0016	J	7.40	1,141	
		03/28/00	0.0018		7.43	948	
		09/19/00	0.0008		7.32	1,271	
		03/22/01	0.0011	J	7.24	1,333	
		09/25/01	0.0002	U	6.84	3,486	
		03/13/02	0.0002	U	6.67	4,189	
		09/20/02	0.0006		8.79	2,709	
		03/25/03	0.0015		7.61	2,897	
		09/24/03	0.0008		7.75	267	(a)
		03/05/04	0.0011		7.88	2,784	

Table 3
Groundwater Analytical Results for CH Wells
Central Process Area and Former Surface Impoundment Area
Weyerhaeuser Company - Longview, Washington

Site Location	Well Number	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]	Specific Conductance (umhos/cm)
Central Process Areas (continued)	CH-5	11/06/91	0.0020		6.38	1,640
		01/23/92	0.0027		6.43	3,190
		04/20/92	0.0033		6.72	1,400
		07/23/92	0.0018		7.06	2,190
		11/17/92	0.0005	U	9.10	1,770
		02/02/93	0.0044		9.36	1,910
		04/23/93	0.0006		8.49	2,020
		07/23/93	0.0027		7.38	2,300
		11/22/93	0.0012		7.10	1,160
		01/25/94	0.0005	U	6.91	700
		04/26/94	0.0005	U	7.78	1,460
		07/20/94	0.0008		7.26	1,340
		11/15/94	0.0005	U	6.26	4,180
		01/12/95	0.0005		6.79	1,430
		04/12/95	0.0019		7.24	2,020
		07/19/95	0.0069		7.89	4,260
		11/30/95	0.0083		9.00	1,670
		01/17/96	0.0042		7.26	1,750
		04/10/96	0.0086		9.42	1,800
		07/18/96	0.0090		8.66	1,110
		11/13/96	0.0091		9.71	1,320
		01/15/97	0.0061		10.21	1,248
		04/14/97	0.0006		7.43	3,830
		08/13/97	0.0014		6.81	2,082
		03/11/98	0.0005	U	6.96	1,503
		10/07/98	0.0022		8.76	852
		03/25/99	0.0002	U	7.30	3,723
		09/21/99	0.0002	R	6.89	2,041
		03/29/00	0.0002	U	6.94	1,035
		09/19/00	0.0004		7.11	1,478
		03/19/01	0.0012	J	6.52	415
		09/25/01	0.0003		6.06	325
		03/13/02	0.0008	J	6.67	362
		09/19/02	0.0028		6.71	522
		03/25/03	0.0044		8.77	553
		09/23/03	0.0004		6.20	173
		03/05/04	0.0011		6.88	203

Table 3
Groundwater Analytical Results for CH Wells
Central Process Area and Former Surface Impoundment Area
Weyerhaeuser Company - Longview, Washington

Site Location	Well Number	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]	Specific Conductance (umhos/cm)
Central Process Areas (continued)	CH-6	11/06/91	0.0005	U	6.17	65,200
		01/23/92	0.0005	U	6.17	48,200
		04/20/92	0.0005	U	6.28	68,200
		07/21/92	0.0005	U	6.22	78,200
		11/18/92	0.0005	U	5.90	119,000
		02/03/93	0.0008	U (b)	6.45	173,000
		04/23/93	0.0008	U (b)	6.10	159,000
		07/23/93	0.0005	U	6.38	78,900
		11/23/93	0.0005	U	6.68	220,000
		01/26/94	0.0040	U (b)	6.44	95,400
		04/26/94	0.0020	U (b)	6.90	115,000
		07/20/94	0.0008	U (b)	6.52	228,000
		11/16/94	0.0005	U	7.10	107,000
		01/12/95	0.0005	U	6.24	157,000
		04/12/95	0.0005	U	6.13	173,000
		07/19/95	0.0005	U	6.61	114,000
		11/29/95	0.0020	U (b)	6.35	19,600
		01/17/96	0.0005	U	7.24	190,000
		04/11/96	0.0005	U	6.51	200,000
		07/17/96	0.0005	U	6.65	208,000
		11/12/96	0.0020	U (b)	6.55	200,000
		01/15/97	0.0005	U	6.74	199,000
		04/14/97	0.0006		6.74	162,000
		08/13/97	0.0005	U	6.51	189,000
		03/11/98	0.0010		6.55	185,500
		10/08/98	0.0002	U	6.48	169,500
		03/25/99	0.0003		6.71	198,400
		09/21/99	0.0002	J	6.84	133
		03/29/00	0.0002	U	6.03	67,200
		09/19/00	0.0002	U	5.98	62,500
		03/22/01	0.0002	UJ	5.74	60,400
		09/26/01	0.0002	U	6.45	67,300
		03/13/02	0.0002	U	6.67	61,100
		09/20/02	0.0002	U	5.96	60,100
		03/27/03	0.0002	U	5.98	62,300
		06/24/03	0.0002	U	6.06	67,400
		03/03/04	0.0002	U	--	87,300

Table 3
Groundwater Analytical Results for CH Wells
Central Process Area and Former Surface Impoundment Area
Weyerhaeuser Company - Longview, Washington

Site Location	Well Number	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]	Specific Conductance (umhos/cm)
Former Surface Impoundment Area	CH-2	11/07/91	0.0434		6.65	326
		01/20/92	0.0005	U	6.80	434
		04/20/92	0.0005	U	6.93	298
		07/21/92	0.0012		7.09	277
		11/18/92	0.0018		6.90	650
		02/02/93	0.0024		7.00	400
		04/23/93	0.0023		7.22	311
		07/23/93	0.0102		6.90	298
		11/22/93	0.0006		6.84	243
		01/25/94	0.0048		6.86	297
		04/27/94	0.0011		6.95	259
		07/20/94	0.0008		6.76	262
		11/15/94	0.0040		6.97	326
		01/11/95	0.0009		6.70	266
		04/13/95	0.0012		7.03	212
		07/20/95	0.0018		7.01	210
		11/30/95	0.0039		7.22	244
		01/18/96	0.0013		7.55	204
		04/11/96	0.0034		7.13	212
		07/18/96	0.0054		7.07	209
		11/13/96	0.0045		7.01	306
		01/16/97	0.0033		6.56	172
		04/14/97	0.0045		6.98	206
		08/13/97	0.0032		6.44	254
		03/11/98	0.0005	U	7.10	191
		10/08/98	0.0009		8.64	269
		03/24/99	0.0002		6.80	220
		09/22/99	0.0013	J	6.90	312
		03/28/00	0.0005		6.80	208
		09/21/00	0.0013		6.87	238
		03/20/01	0.0002	UJ	7.34	174
		09/25/01	0.0006		6.20	199
		03/11/02	0.0016	J	6.87	168
		09/19/02	0.0008		6.78	193
		03/27/03	0.0016		6.99	153
		09/24/03	0.0026		7.18	192
		03/05/04	0.0005		6.94	159

Table 3
Groundwater Analytical Results for CH Wells
Central Process Area and Former Surface Impoundment Area
Weyerhaeuser Company - Longview, Washington

Site Location	Well Number	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]	Specific Conductance (umhos/cm)
Former Surface Impoundment Area (continued)	CH-3	01/20/92	0.0035		7.20	3,970
		04/20/92	0.0026		7.56	1,980
		07/23/92	0.0013		7.58	2,700
		11/17/92	0.0007		7.76	2,150
		02/02/93	0.0051		7.49	3,690
		04/23/93	0.0031		7.42	5,120
		07/23/93	0.0024		7.51	1,930
		11/23/93	0.0016		7.77	1,480
		01/26/94	0.0033		7.39	1,880
		04/26/94	0.0033		7.52	1,760
		07/20/94	0.0024		7.52	1,790
		11/15/94	0.0027		7.67	1,380
		01/11/95	0.0030		7.40	2,070
		04/12/95	0.0031		7.54	2,890
		07/19/95	0.0044		7.58	2,500
		11/29/95	0.0043		7.42	2,970
		01/17/96	0.0037		7.39	1,945
		04/10/96	0.0040		7.42	2,135
		07/17/96	0.0036		7.55	1,940
		11/12/96	0.0037		7.34	2,085
		01/15/97	0.0035		7.34	2,650
		04/14/97	0.0036		7.58	2,130
		08/13/97	0.0033		7.26	2,145
		03/10/98	0.0032		7.54	1,860
		10/07/98	0.0020		7.70	1,810
		03/23/99	0.0034		7.57	1,833
		09/21/99	0.0023	J	7.53	1,665
		03/27/00	0.0035		7.43	1,659
		09/20/00	0.0030		7.38	1,499
		03/21/01	0.0035	J	7.50	1,343
		09/24/01	0.0032		7.32	1,445
		03/11/02	0.0042	J	7.51	1,451
		09/19/02	0.0025		7.48	1,304
		03/27/03	0.0027		7.45	1,325
		09/24/03	0.0023		7.66	1,370
		03/04/04	0.0027		7.50	1,319

Table 3
Groundwater Analytical Results for CH Wells
Central Process Area and Former Surface Impoundment Area
Weyerhaeuser Company - Longview, Washington

Site Location	Well Number	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]	Specific Conductance (umhos/cm)
Former Surface Impoundment Area (continued)	CH-4	11/07/91	0.0013		7.60	1,580
		01/21/92	0.0017		7.20	2,030
		04/22/92	0.0018		7.33	1,970
		07/23/92	0.0015		7.32	2,460
		11/17/92	0.0006		7.31	2,510
		02/02/93	0.0014		7.26	2,840
		04/23/93	0.0012		7.32	3,180
		07/23/93	0.0013		7.06	3,100
		11/23/93	0.0009		7.52	2,480
		01/26/94	0.0010		7.22	2,410
		04/26/94	0.0008		7.30	2,350
		07/20/94	0.0007		7.29	2,260
		11/15/94	0.0009		7.37	2,230
		01/11/95	0.0008		7.20	2,850
		04/12/95	0.0008		7.20	2,640
		07/19/95	0.0010		7.25	2,150
		11/29/95	0.0010		7.26	2,500
		01/17/96	0.0010		6.99	2,370
		04/10/96	0.0019		7.13	3,310
		07/17/96	0.0015		7.15	2,470
		11/12/96	0.0017		6.95	2,140
		01/15/97	0.0010		7.01	2,380
		04/14/97	0.0015		7.25	2,220
		08/13/97	0.0008		7.04	2,280
		03/10/98	0.0007		7.10	2,313
		10/08/98	0.0006		7.45	1,472
		03/23/99	0.0006		7.19	1,580
		09/21/99	0.0006	J	7.05	1,522
		03/27/00	0.0005		6.86	1,548
		09/20/00	0.0003		6.78	1,517
		03/21/01	0.0005	J	6.89	2,122
		09/26/01	0.0004		6.94	2,180
		03/12/02	0.0006	J	6.86	3,220
		09/18/02	0.0003		6.98	1,672
		03/26/03	0.0005		6.92	2,780
		09/23/03	0.0004		6.99	1,887
		03/04/04	0.0004		7.18	2,010

Table 3
Groundwater Analytical Results for CH Wells
Central Process Area and Former Surface Impoundment Area
Weyerhaeuser Company - Longview, Washington

Site Location	Well Number	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H+]	Specific Conductance (umhos/cm)
Background Well Northeast site	CH-7	10/06/98	0.0002	U	6.89	697
		03/24/99	0.0002	U	6.97	730
		09/22/99	0.0002	R	6.88	703
		03/29/00	0.0002	U	6.97	526
		09/21/00	0.0002	U	6.71	487
		03/20/01	0.0002	UJ	6.78	712
		09/25/01	0.0002	U	6.54	1,001
		03/11/02	0.0002	U	6.68	274
		09/19/02	0.0002	U	6.67	178
		03/26/03	0.0002	U	6.72	309
		09/24/03	0.0002	U	7.04	283
		03/03/04	0.0002	U	--	293
Background Well Northeast site	CH-8	10/06/98	0.0002	U	6.86	302
		03/24/99	0.0002	U	6.58	150
		09/22/99	0.0002	R	6.89	242
		03/28/00	0.0002	U	6.67	260
		09/20/00	0.0002	U	6.79	242
		03/20/01	0.0002	UJ	4.92	1,181
		09/24/01	0.0002	U	6.39	229
		03/12/02	0.0002	U	6.21	186
		09/19/02	0.0002	U	6.52	202
		03/25/03	0.0002	U	6.33	240
		09/23/03	0.0002	U	6.85	197
		03/04/04	0.0002	U	6.80	213

Notes:
U = Not detected at or above the Laboratory Method Reporting Limit.
J = Sample result is an estimate.
(a) Value questionable because significantly different from historical data record.
(b) Method Reporting Limit is elevated because sample required dilution.

1. After 1992, values presented are averages of parent and duplicate samples. Prior to this time, only parent sample values were reported.

Table 4
Groundwater Analytical Results for MW Wells - West Area
Weyerhaeuser Company - Longview, Washington

Well ID	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H^+]	Specific Conductance (umhos/cm)
MW-1	08/05/87	0.0002	U	NA	NA
	09/03/87	0.0005	U	NA	NA
	11/04/87	0.0002	U	NA	NA
	01/12/88	0.0005	U	NA	NA
	03/07/88	0.0008	U	NA	NA
	05/09/88	0.0002	U	NA	NA
	07/07/88	0.0010	U	NA	NA
	08/05/88	0.0001	U	NA	NA
	12/30/88	0.0002	U	NA	NA
	03/22/89	0.0005	U	NA	NA
	06/23/89	0.0005	U	NA	NA
	08/23/89	0.0005	U	NA	NA
	10/09/89	0.0008	U	NA	NA
	11/01/89	0.0005	U	NA	NA
	12/28/89	0.0005	U	NA	NA
	04/02/90	0.0005	U	NA	NA
	06/29/90	0.0005	U	NA	NA
	08/24/90	0.0005	U	NA	NA
	10/04/90	0.0005	U	NA	NA
	01/09/91	0.0005	U	NA	NA
	10/04/91	0.0005	U	6.74	741
	11/05/91	0.0005	U	6.86	640
	01/20/92	0.0005	U	6.95	1,860
	04/20/92	0.0005	U	7.15	1,540
	07/21/92	0.0005	U	6.88	1,190
	11/17/92	0.0005	U	7.03	798
	02/01/93	0.0005	U	7.02	972
	04/23/93	0.0005	U	7.05	759
	07/23/93	0.0005	U	6.87	956
	11/22/93	0.0005	U	6.79	1,190
	01/25/94	0.0005	U	7.13	493
	04/26/94	0.0005	U	7.02	1,030
	07/20/94	0.0005	U	6.82	1,000
	11/15/94	0.0005	U	6.75	588
	01/11/95	0.0005	U	6.87	307
	04/12/95	0.0005	U	6.90	339
	07/19/95	0.0005	U	7.32	813
	11/29/95	0.0005	U	7.21	175
	01/17/96	0.0005	U	6.81	2,110
	04/10/96	0.0005	U	7.13	448
	07/18/96	0.0005	U	7.00	474
	11/12/96	0.0005	U	6.57	576
	01/16/97	0.0005	U	6.37	262
	04/14/97	0.0002	U	6.60	280
	08/13/97	0.0005	U	6.53	583
	03/11/98	0.0005	U	6.96	360
	10/07/98	0.0002	U	6.98	575
	03/24/99	0.0002	U	6.55	470
	03/29/00	0.0002	U	6.69	525
	03/22/01	0.0002	UJ	6.50	470
	03/13/02	0.0002	U	6.24	393
	03/25/03	0.0002	U	6.66	502
	03/03/04	0.0002	U	--	249

Table 4
Groundwater Analytical Results for MW Wells - West Area
Weyerhaeuser Company - Longview, Washington

Well ID	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H^+]	Specific Conductance (umhos/cm)
MW-2	08/05/87	0.0002	U	NA	NA
	09/03/87	0.0005	U	NA	NA
	11/04/87	0.0002	U	NA	NA
	01/12/88	0.0020		NA	NA
	03/07/88	0.0008	U	NA	NA
	05/09/88	0.0008	U	NA	NA
	07/07/88	0.0010	U	NA	NA
	08/05/88	0.0001	U	NA	NA
	12/30/88	0.0002	U	NA	NA
	03/22/89	0.0005	U	NA	NA
	06/23/89	0.0005	U	NA	NA
	08/23/89	0.0005	U	NA	NA
	10/09/89	0.0008	U	NA	NA
	11/01/89	0.0005	U	NA	NA
	12/28/89	0.0005	U	NA	NA
	04/02/90	0.0005	U	NA	NA
	06/29/90	0.0005	U	NA	NA
	08/24/90	0.0005	U	NA	NA
	10/04/90	0.0005	U	NA	NA
	01/09/91	0.0005	U	NA	NA
	10/04/91	0.0005	U	7.12	19,800
	11/05/91	0.0005	U	6.73	24,200
	01/20/92	0.0005	U	6.50	18,800
	04/20/92	0.0005	U	6.68	12,000
	07/20/92	0.0005	U	6.75	21,600
	11/16/92	0.0005	U	7.45	13,600
	02/01/93	0.0005	U	7.00	21,800
	04/23/93	0.0005	U	6.96	15 (a)
	07/23/93	0.0005	U	6.63	14,400
	11/22/93	0.0005	U	6.90	10 (a)
	01/25/94	0.0005	U	6.87	9,680
	04/26/94	0.0005	U	7.08	8,010
	07/20/94	0.0005	U	7.32	10,500
	11/15/94	0.0009		7.39	1,820
	01/11/95	0.0005	U	9.57	7,270
	04/12/95	0.0005	U	6.89	8,310
	07/19/95	0.0005	U	6.99	8,010
	11/29/95	0.0005	U	6.98	2,280
	01/17/96	0.0005	U	6.57	9,600
	04/10/96	0.0005	U	6.55	8,800
	07/17/96	0.0005	U	7.26	4,030
	11/12/96	0.0005	U	6.84	4,710
	01/16/97	0.0005	U	6.67	4,301
	04/14/97	0.0005		6.78	3,602
	08/13/97	0.0005	U	7.07	3,832
	03/10/98	0.0005	U	6.28	32,700
	10/06/98	0.0002	U	7.34	9,290
	03/24/99	0.0002	U	6.38	6,980
	03/29/00	0.0002	U	6.59	1,443
	03/21/01	0.0002	UJ	6.77	2,000
	03/13/02	0.0002	U	6.82	1,964
	03/28/03	0.0002	U	6.90	1,433
	03/03/04	0.0002	U	--	2,262

Table 4
Groundwater Analytical Results for MW Wells - West Area
Weyerhaeuser Company - Longview, Washington

Well ID	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H^+]	Specific Conductance (umhos/cm)
MW-3	08/05/87	0.0040		NA	NA
	09/03/87	0.0005	U	NA	NA
	11/04/87	0.0002	U	NA	NA
	01/12/88	0.0030		NA	NA
	03/07/88	0.0008	U	NA	NA
	05/09/88	0.0008	U	NA	NA
	07/07/88	0.0010	U	NA	NA
	08/05/88	0.0001	U	NA	NA
	12/30/88	0.0015		NA	NA
	03/22/89	0.0005	U	NA	NA
	06/23/89	0.0005	U	NA	NA
	08/23/89	0.0005	U	NA	NA
	10/09/89	0.0008	U	NA	NA
	11/01/89	0.0005	U	NA	NA
	12/28/89	0.0010	U	NA	NA
	04/02/90	0.0005	U	NA	NA
	06/29/90	0.0005	U	NA	NA
	08/24/90	0.0040	U	NA	NA
	10/04/90	0.0005	U	NA	NA
	01/09/91	0.0005	U	NA	NA
	10/04/91	0.0005	U	7.92	443,000
	11/05/91	0.0005	U	7.53	321,000
	01/20/92	0.0005	U	6.76	11,100
	04/20/92	0.0005	U	8.33	170,000
	07/21/92	0.0005	U	7.73	127,000
	11/16/92	0.0005	U	7.69	117,000
	02/01/93	0.0005	U	7.09	109,000
	04/23/93	0.0005	U	7.30	9,840
	07/23/93	0.0005	U	7.25	67,900
	11/22/93	0.0005	U	7.53	30 (a)
	01/25/94	0.0040	U (b)	6.87	9,720
	04/26/94	0.0020	U (b)	6.75	9,180
	07/20/94	0.0008	U (b)	7.63	288,000
	11/15/94	0.0005	U	7.34	1,060
	01/11/95	0.0005	U	7.28	127,000
	04/12/95	0.0005	U	6.96	48,700
	07/19/95	0.0005	U	6.78	96,200
	11/29/95	0.0005	U	7.05	315
	01/17/96	0.0005	U	7.13	1,070
	04/10/96	0.0005	U	7.38	2,070
	07/17/96	0.0005	U	6.76	93,300
	11/12/96	0.0005	U	6.06	166,000
	01/16/97	0.0005	U	6.34	3,355
	04/14/97	0.0005		7.01	2,224
	08/13/97	0.0005	U	6.19	104,200
	03/10/98	0.0005	U	6.63	3,600
	10/07/98	0.0011		7.06	175,900
	03/24/99	0.0002	U	6.71	2,175
	03/29/00	0.0002	U	7.07	15,690
	03/11/01	0.005	J	7.20	39,490
	03/13/02	0.0002	U	6.67	4,012
	06/26/03	0.0002	U	6.65	1,391
	03/03/04	0.0002	U	--	3,420

Table 4
Groundwater Analytical Results for MW Wells - West Area
Weyerhaeuser Company - Longview, Washington

Well ID	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H^+]	Specific Conductance (umhos/cm)
MW-4	08/05/87	0.0390		NA	NA
	09/03/87	0.0330		NA	NA
	11/04/87	0.0310		NA	NA
	01/12/88	0.0120		NA	NA
	03/07/88	0.0120		NA	NA
	05/09/88	0.0026		NA	NA
	07/07/88	0.0050		NA	NA
	08/05/88	0.0210		NA	NA
	12/30/88	0.0028		NA	NA
	03/22/89	0.0069		NA	NA
	06/23/89	0.0064		NA	NA
	08/23/89	0.0042		NA	NA
	10/09/89	0.0150		NA	NA
	11/01/89	0.0170		NA	NA
	12/28/89	0.0061		NA	NA
	04/02/90	0.0007		NA	NA
	06/29/90	0.0017		NA	NA
	08/24/90	0.0028		NA	NA
	10/04/90	0.0010		NA	NA
	01/24/91	0.0008		NA	NA
	10/04/91	0.0007		10.32	6,190
	11/05/91	0.0007		10.47	7,360
	01/20/92	0.0005	U	9.38	1,230
	04/28/92	0.0005	U	9.53	2,120
	07/20/92	0.0005	U	9.55	6,370
	11/16/92	0.0005	U	9.03	3,170
	02/01/93	0.0005	U	10.25	6,090
	04/22/93	0.0005	U	7.68	469
	07/23/93	0.0005	U	9.86	5,520
	11/23/93	0.0005	U	7.91	1,460
	01/25/94	0.0005	U	7.86	704
	04/26/94	0.0005	U	9.52	2,130
	07/20/94	0.0005	U	8.84	1,300
	11/15/94	0.0005	U	9.46	1,980

Table 4
Groundwater Analytical Results for MW Wells - West Area
Weyerhaeuser Company - Longview, Washington

Well ID	Sample Collection Date	Dissolved Mercury Concentration (mg/L)		pH [H^+]	Specific Conductance (umhos/cm)
MW-4 (continued)	01/11/95	0.0005	U	9.57	883
	04/12/95	0.0005	U	8.96	1,660
	07/19/95	0.0005	U	9.33	1,740
	11/29/95	0.0005	U	8.64	966
	01/17/96	0.0005	U	7.36	850
	04/10/96	0.0005	U	7.50	1,000
	07/17/96	0.0005	U	8.60	1,260
	11/12/96	0.0005	U	7.74	1,390
	01/16/97	0.0005	U	6.67	366
	04/14/97	0.0004		8.60	950
	08/13/97	0.0005	U	9.19	1,597
	03/11/98	0.0005	U	9.45	930
	10/06/98	0.0027		10.39	3,012
	03/25/99	0.0002	U	8.99	735
	03/29/00	0.0002	U	9.52	876
	03/21/01	0.0002	UJ	9.91	1,235
	03/13/02	0.0002	U	6.67	843
	03/26/03	0.0002	U	9.09	541
	03/03/04	0.0002	U	–	710

Notes:
J = Estimated value.
U = Not detected at or above the Laboratory Method Reporting Limit.
NA = Laboratory data not available for pH and electrical conductivity.
(a) Value questionable because significantly different from historical data record.
(b) Method detection limit was elevated because sample required dilution.
1. Beginning 1999, MW wells sampled at an annual frequency.
2. After 1992, values presented are averages of parent and duplicate samples. Prior to this time, only parent sample values were reported.

Table 5
Summary of Recent and Proposed Monitoring Programs
Weyerhaeuser Company - Longview, Washington

Well	Units	Location	Duration of Monitoring	Monitoring Frequency (1997 To Date)	Proposed Monitoring Frequency
HLA-1A	alluvial fill	Former #1 Cell Room Area	in 14th year (since Feb. 1991)	semi-annual (spring/fall)	annual (spring)
HLA-1B	basalt	Former #1 Cell Room Area		semi-annual (spring/fall)	annual (spring)
HLA-2A (A)	alluvial fill	Former #1 Cell Room Area		semi-annual (spring/fall)	--
HLA-3A	alluvial fill	Former #1 Cell Room Area		semi-annual (spring/fall)	annual (spring)
HLA-3B	basalt	Former #1 Cell Room Area		semi-annual (spring/fall)	annual (spring)
HLA-4A (B)	alluvial fill	Former #1 Cell Room Area		semi-annual (spring/fall)	--
HLA-6A	alluvial fill	Former #1 Cell Room Area		semi-annual (spring/fall)	annual (spring)
HLA-6B	basalt	Former #1 Cell Room Area		semi-annual (spring/fall)	annual (spring)
HLA-7B	basalt	Former #1 Cell Room Area		semi-annual (spring/fall)	annual (spring)
CH-1	alluvium	upgradient	in 14th year (since Fall 1991)	semi-annual (spring/fall)	annual (spring)
CH-2	alluvium	upgradient		semi-annual (spring/fall)	annual (spring)
CH-3	alluvium	downgradient		semi-annual (spring/fall)	annual (spring)
CH-4	alluvium	downgradient		semi-annual (spring/fall)	annual (spring)
CH-5 (C)	alluvium	central plant		semi-annual (spring/fall)	--
CH-5R (C)	alluvium	central plant		--	annual (spring)
CH-6	alluvium	downgradient		semi-annual (spring/fall)	annual (spring)
CH-7	alluvium	background well	in 6th year (since Oct. 1998)	semi-annual (spring/fall)	bi-ennial years(D)
CH-8	alluvium	background well		semi-annual (spring/fall)	bi-ennial years(D)
MW-1	alluvium	western area	in 17th year (since Aug. 1987)	annual (spring)	bi-ennial years(D)
MW-2	alluvium	western area		annual (spring)	bi-ennial years(D)
MW-3	alluvium	western area		annual (spring)	bi-ennial years(D)
MW-4	alluvium	western area		annual (spring)	bi-ennial years(D)

(A) Well located in area where above-grade construction is planned. Well will be abandoned at that time.
(B) Well abandoned in January 2004.
(C) CH-5 is located in area where redevelopment is planned. CH-5 will be abandoned and replaced by a new well (CH-5R).
(D) beginning spring 2005

Table 6
Summary Statistics for Mercury in Groundwater (mg/L) Beginning 1991
Weyerhaeuser Company - Longview, Washington

Well	Number of Detections	Number of Samples	Frequency of Detection	Range of Non-Detect Concentrations		Range of Detected Concentrations		Mean*	Median*	Standard Deviation*	95 UCL*
				Minimum	Maximum	Minimum	Maximum				
HLA-1A	29	29	1.00			0.0275	0.686	0.3110	0.3	0.1685	0.3642
HLA-1B	41	41	1.00			0.0095	0.334	0.1086	0.12	0.0673	0.1263
HLA-2A	33	33	1.00			0.0007	0.227	0.0664	0.0517	0.0555	0.0828
HLA-3A	36	37	0.97	0.0005	0.0005	0.002	0.19	0.0156	0.008	0.0306	0.0241
HLA-4A	17	21	0.81	0.0002	0.0005	0.0006	0.0723	0.0062	0.0034	0.0154	0.0120
HLA-3B	40	41	0.98	0.0005	0.0005	0.0011	0.0073	0.0028	0.0027	0.0015	0.0032
HLA-6B	18	40	0.45	0.0002	0.0005	0.0003	0.003	0.0007	0.0005	0.0006	0.0009
HLA-7B	41	41	1.00			0.0005	1.8	0.0847	0.0236	0.2856	0.1598
CH-1	27	37	0.73	0.0002	0.0005	0.0004	0.0022	0.0009	0.0007	0.0005	0.0011
CH-2	33	37	0.89	0.0002	0.0005	0.0002	0.0434	0.0032	0.0013	0.0071	0.0052
CH-3	36	36	1.00			0.0007	0.0051	0.0031	0.0032	0.0009	0.0033
CH-4	37	37	1.00			0.0003	0.0019	0.0009	0.0008	0.0005	0.0011
CH-5	29	36	0.81	0.0002	0.0005	0.0003	0.0091	0.0026	0.0013	0.0028	0.0034
CH-6	4	37	0.11	0.0002	0.004	0.0002	0.001	0.0007	0.0005	0.0007	0.0009
CH-7	0	11	0.00	0.0002	0.0002			0.0002	0.0002		
CH-8	0	11	0.00	0.0002	0.0002			0.0002	0.0002		
MW-1	0	53	0.00	0.0001	0.001			0.0004	0.0005	0.0002	0.0005
MW-2	3	53	0.06	0.0001	0.001	0.0005	0.002	0.0005	0.0005	0.0003	0.0006
MW-3	5	53	0.09	0.0001	0.004	0.0005	0.005	0.0009	0.0005	0.0011	0.0011
MW-4	24	53	0.45	0.0002	0.0005	0.0004	0.039	0.0045	0.0005	0.0087	0.0065

* includes all detects and non-detect results at their reporting limit concentration

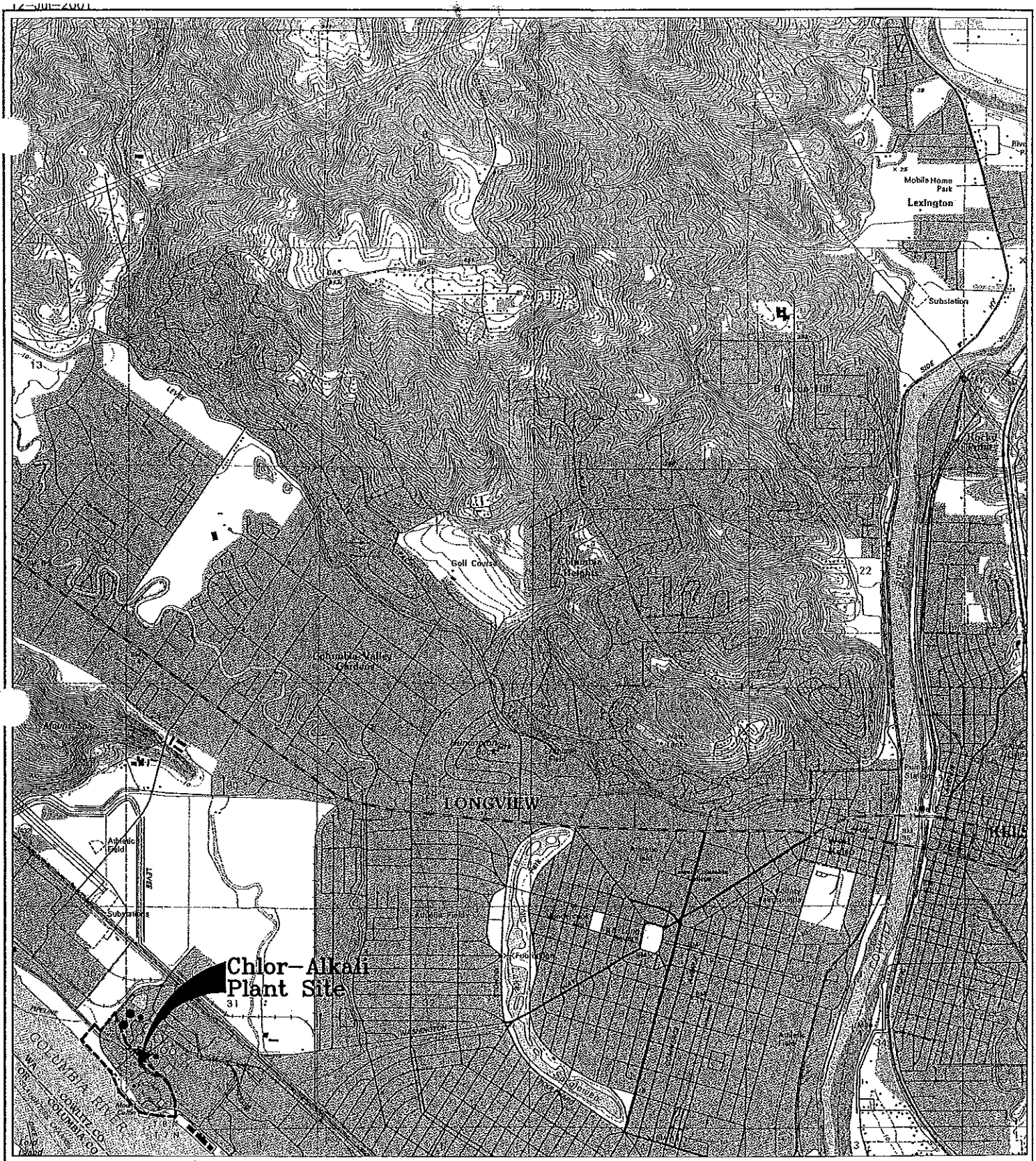


FIGURE 1

Location Map

WEYERHAEUSER CHLOR-ALKALI PLANT
LONGVIEW, WASHINGTON

P:\WEYERHAS\148834\Cad 8B34c016F.dwg

07-12-2001

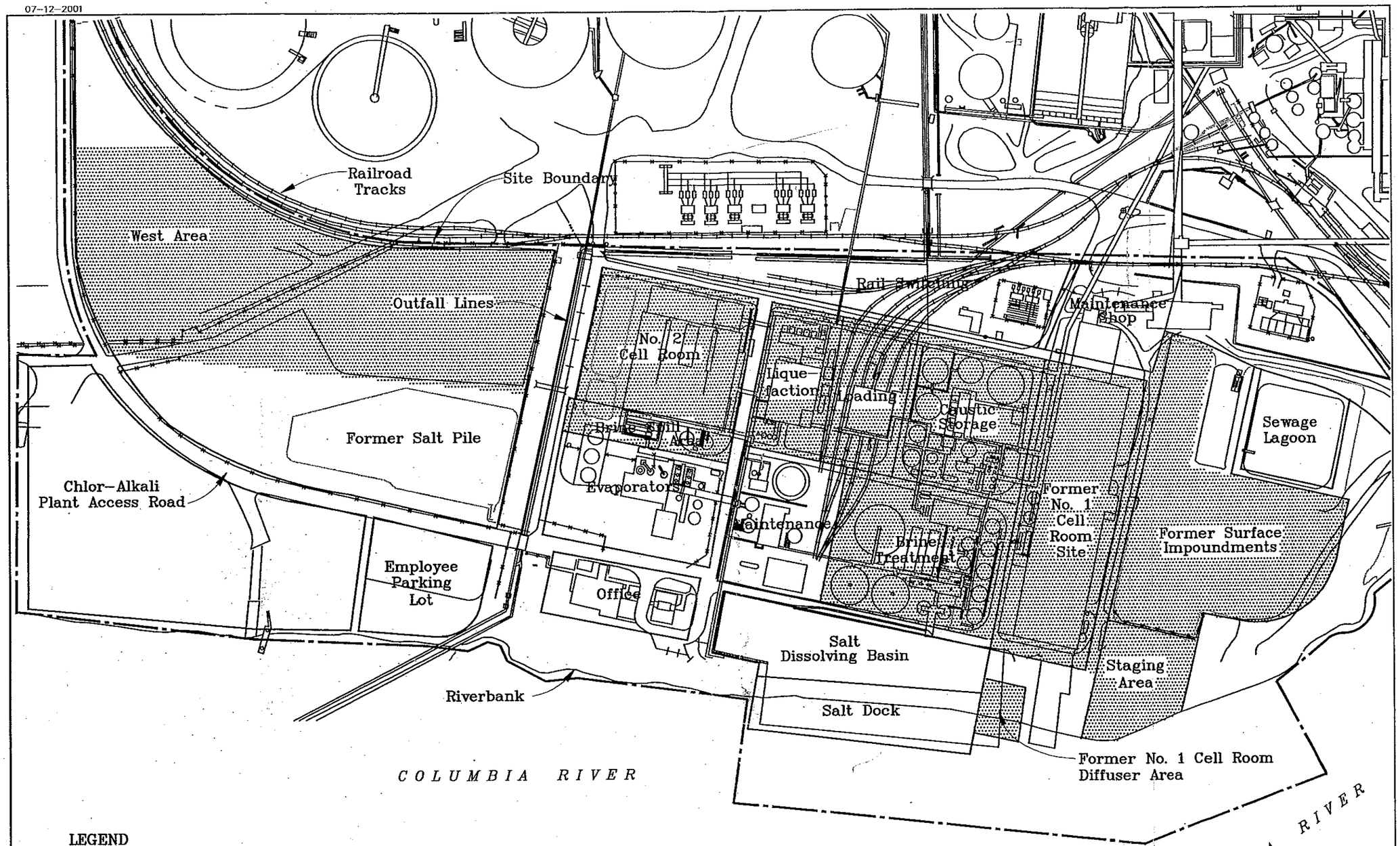
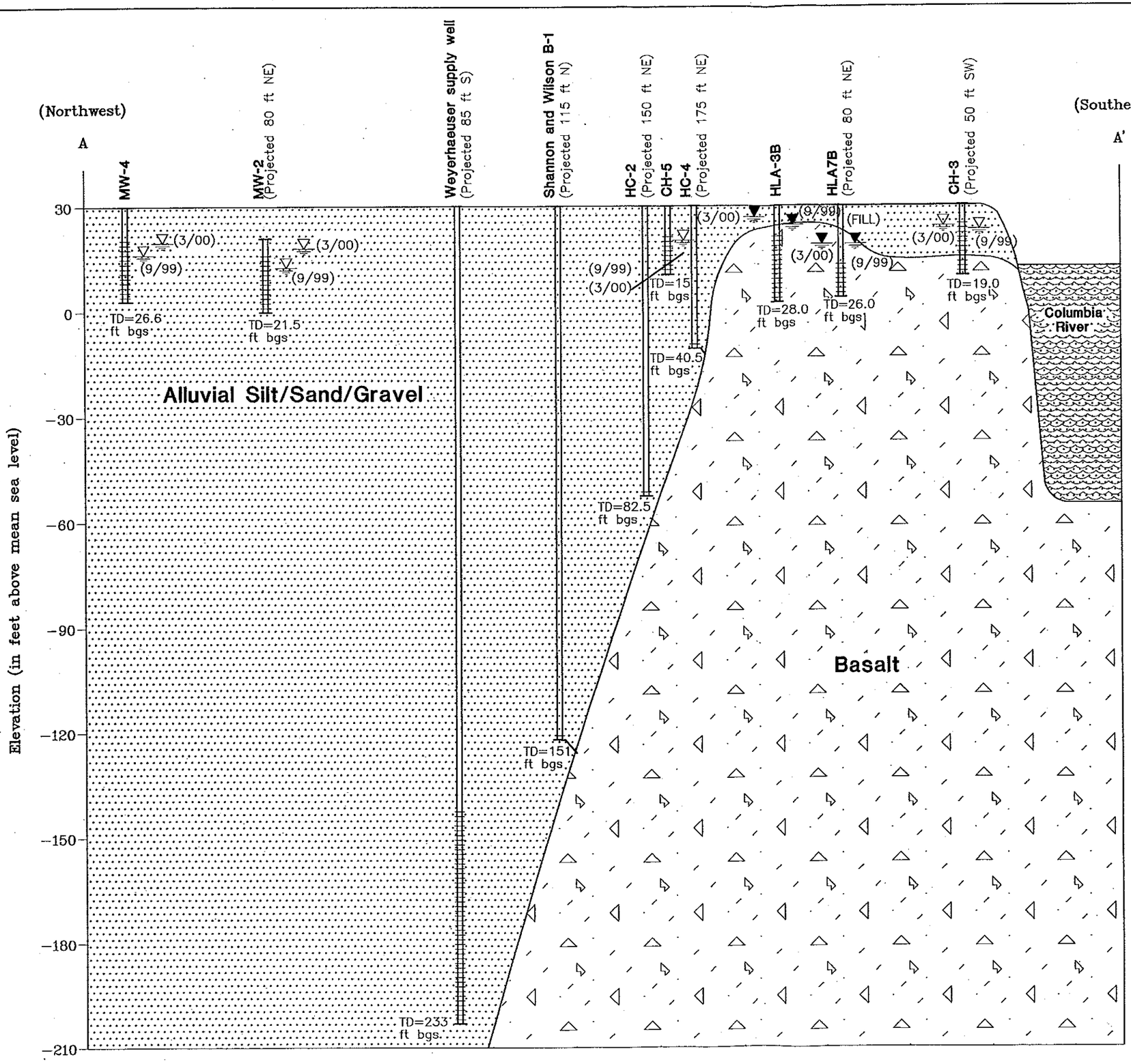


FIGURE 2

Site Map Showing Areas of Potential Concern

WEYERHAEUSER CHLOR-ALKALI PLANT
LONGVIEW, WASHINGTON

P:\WEYERHAS\148834\Cad 8834g020E.dwg



LEGEND

CH-3 — Well ID

TD=19.0 ft bgs — Monitoring well or borehole with screened interval and total depth (TD) in feet below ground surface (bgs)

Groundwater elevation (NGVD) for basalt monitoring well

(9/99) —Dry season water level (Sept.99)
(3/00) —Wet season water level (March 00)

Alluvial zone

(9/99) —Dry season water level (Sept.99)
(3/00) —Wet season water level (March 00)

NGVD — National Geodetic Vertical Datum

Ground Surface Elevation is Generalized

Vertical Exaggeration—10x
Approximate Horizontal Scale

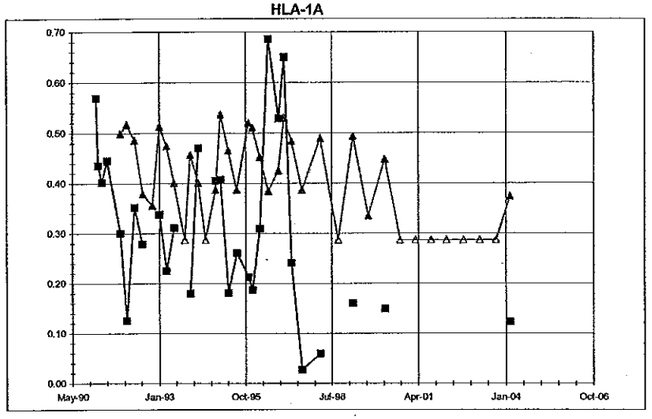
0 150 300
SCALE IN FEET

FIGURE 3

Schematic Cross Section

WEYERHAEUSER CHLOR-ALKALI PLANT
LONGVIEW, WASHINGTON

HLA-1A



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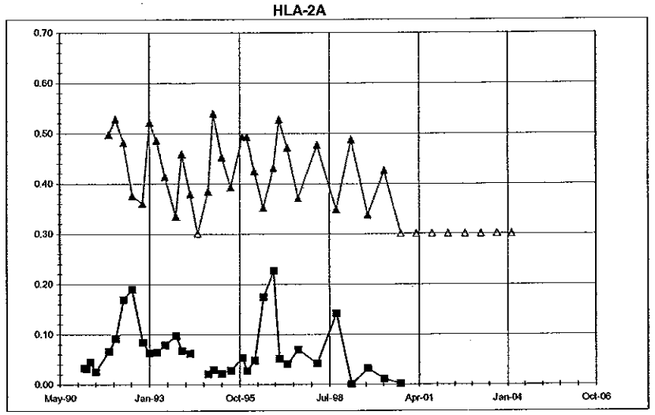

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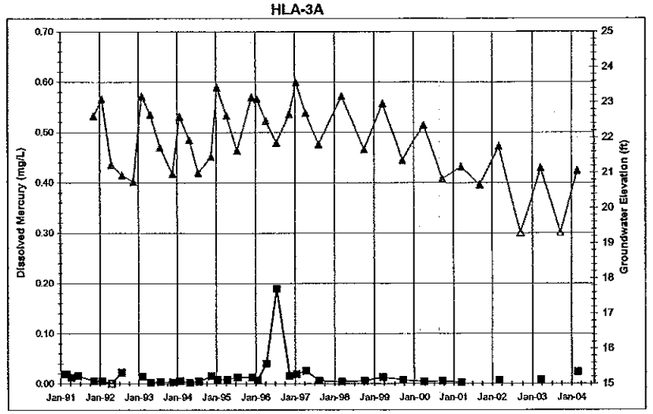

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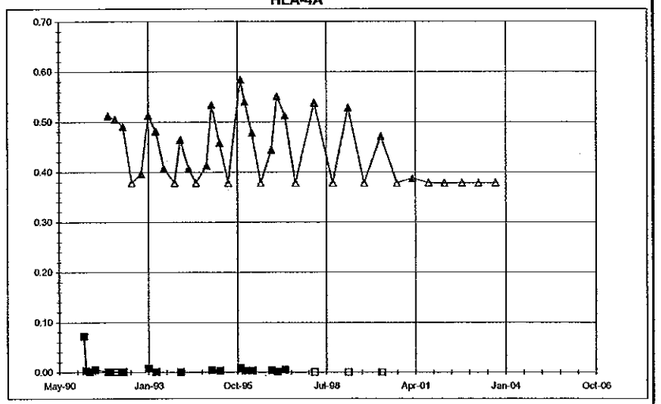
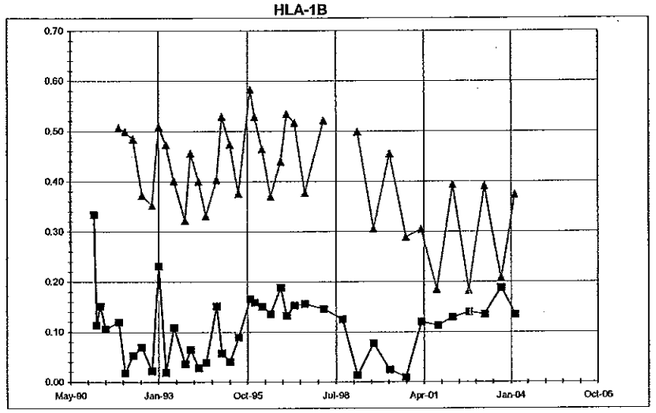
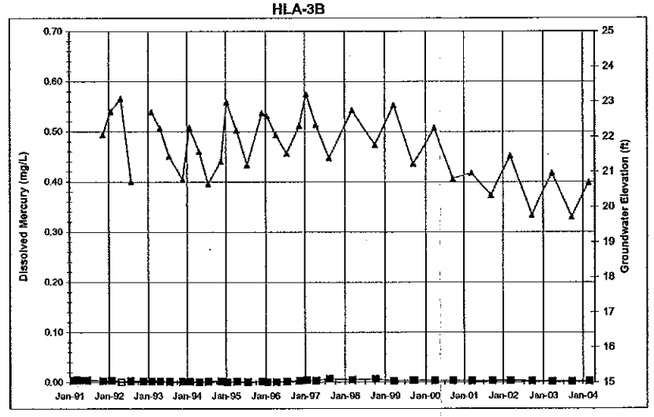


HLA-1B

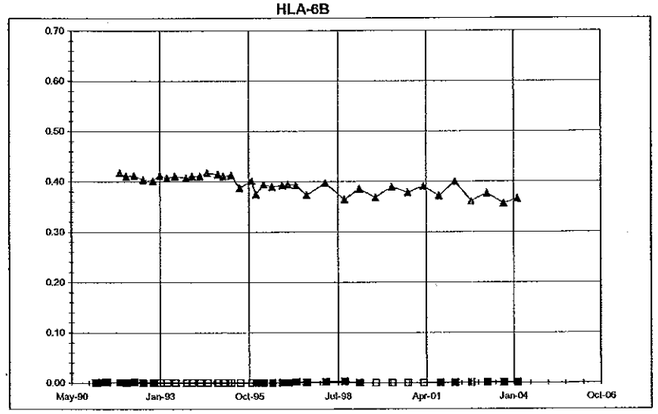


HLA-3B

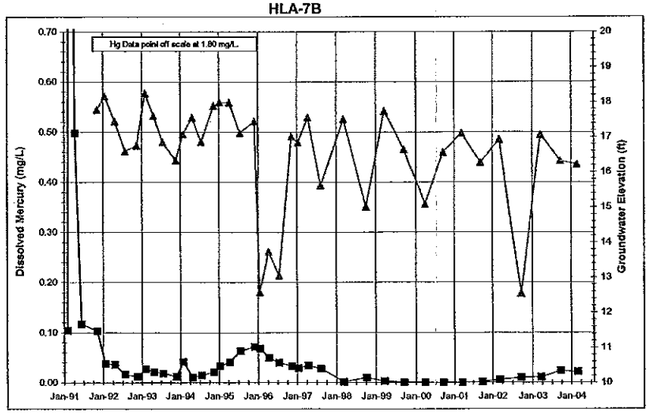


Shallow Wells Overlying Basalt

HLA-6B



HLA-7B



Basalt Wells

Analytical Results

-■- Dissolved Mercury Concentration (mg/L)

-⊟- Not Detected, Value Shown at Reporting Limit

Groundwater Elevations

-▲- Groundwater Elevation (feet)

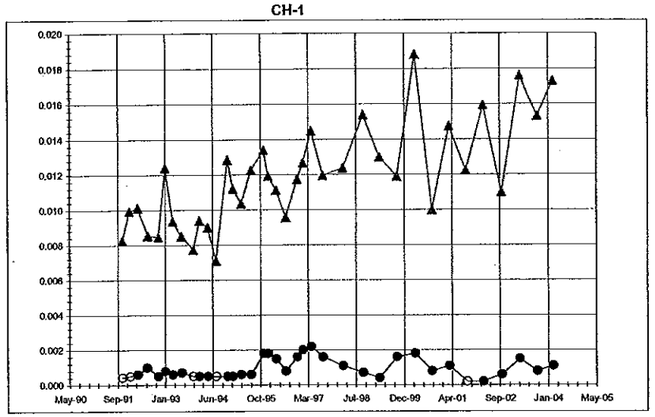
-△- Well Was Dry; Value Shown is Elevation

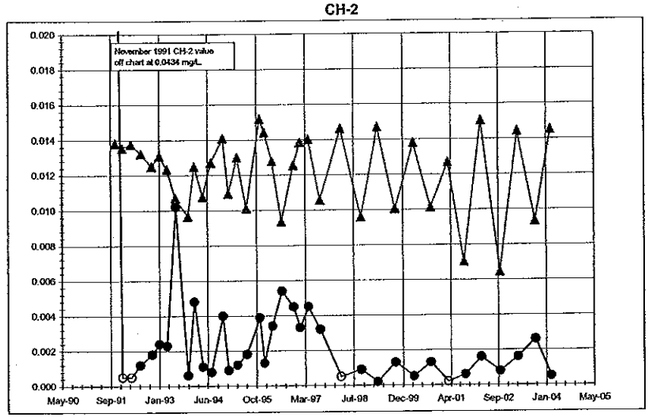
Notes:

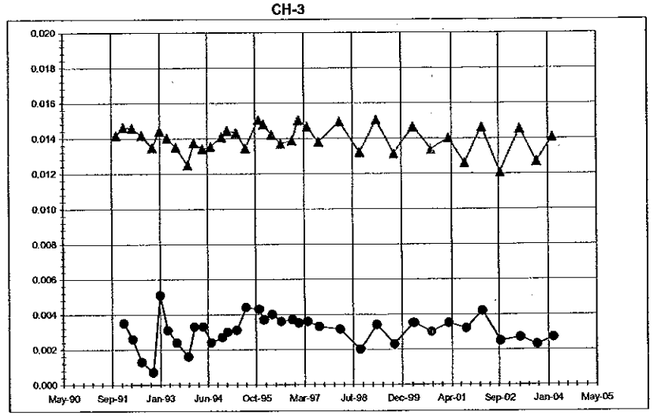
1. Break in line indicates no sample collected for lab analysis because the well was dry.
2. The reporting limit may be elevated because sample required dilution for analysis.

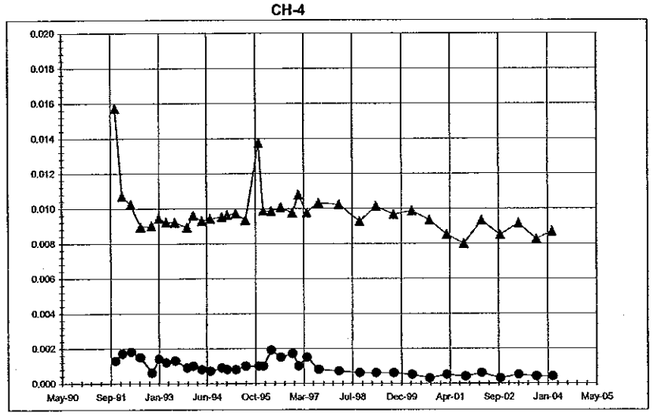
Figure 5
Dissolved Mercury Concentrations and Groundwater Levels - HLA Wells

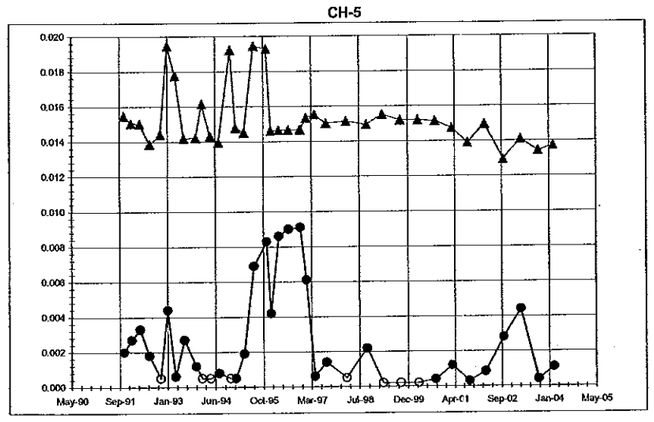
Weyerhaeuser Chlor-Alkali Plant
Longview, Washington

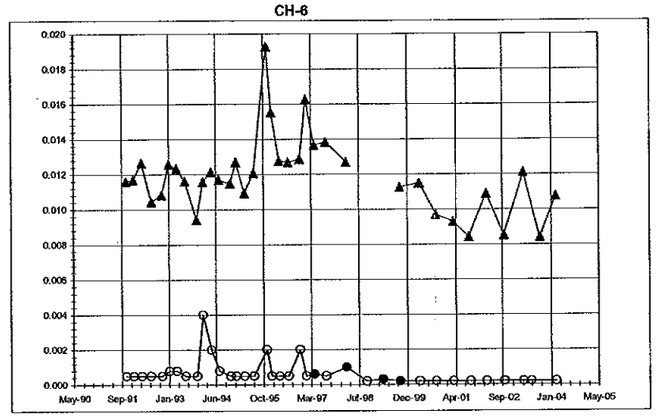


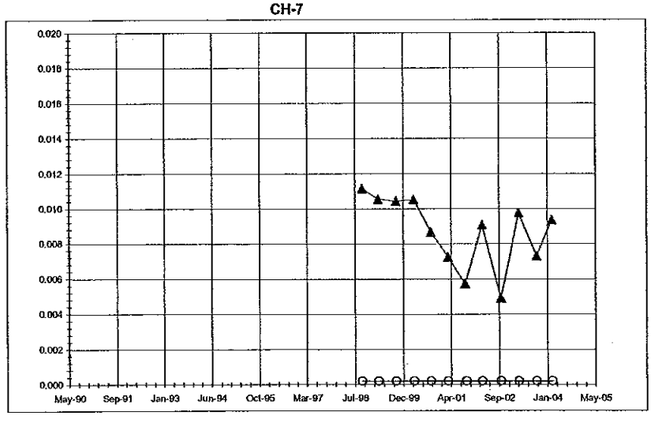


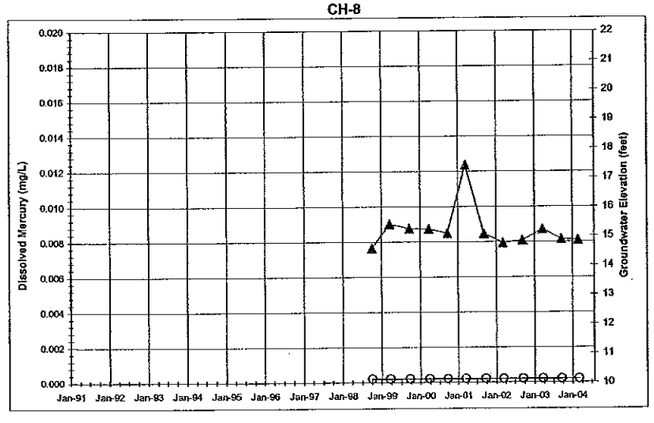












Analytical Results

- Dissolved Mercury Concentration (mg/L)
- Not Detected, Value Shown at Reporting Limit

Groundwater Elevations

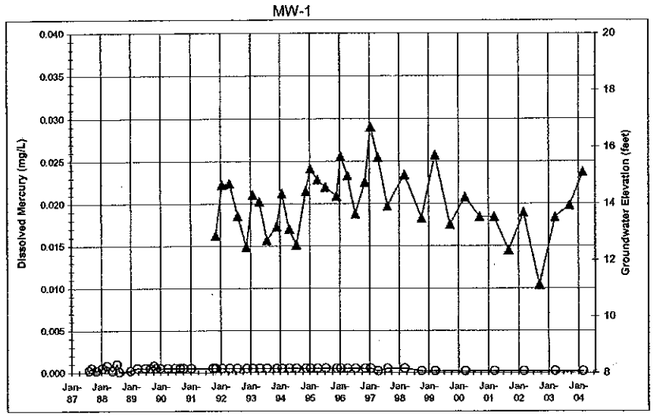
- Groundwater Elevation (feet)
- Well Was Dry; Value Shown is Elevation

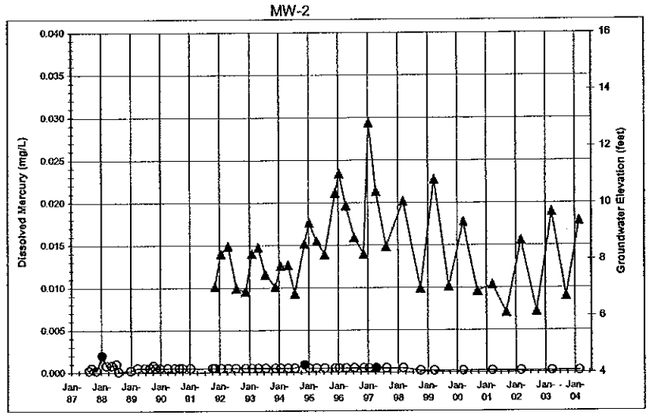
Notes:

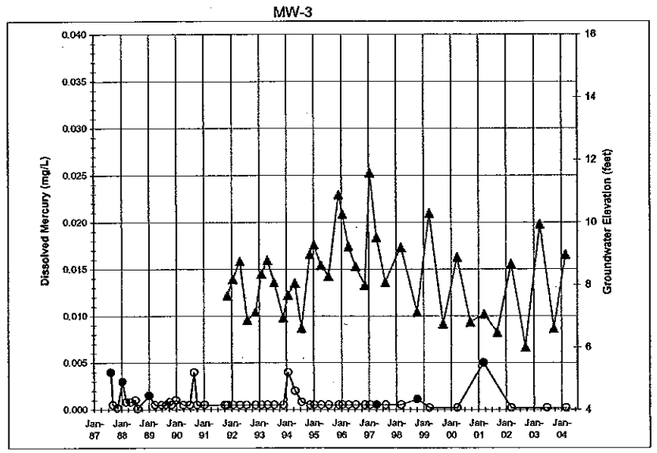
1. Break in line indicates no sample collected for lab analysis because the well was dry.
2. The reporting limit may be elevated because sample required dilution for analysis.

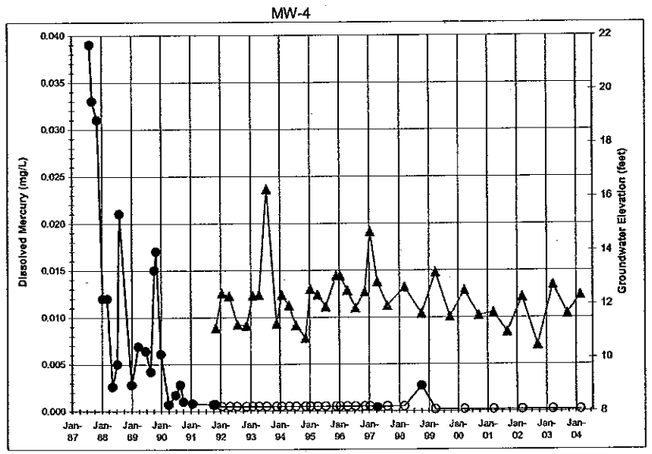
Figure 6
Dissolved Mercury Concentrations and Groundwater Levels - CH Wells

Weyerhaeuser Chlor-Alkali Plant
Longview, Washington









Analytical Results

- Dissolved Mercury Concentration (mg/L)
- Not Detected, Value Shown at Reporting Limit

Groundwater Elevations

- Groundwater Elevation (feet)
- Well Was Dry; Value Shown is Elevation

Notes:

1. Break in line indicates no sample collected for lab analysis because the well was dry.
2. The reporting limit may be elevated because sample required dilution for analysis.

Figure 7
Dissolved Mercury Concentrations and Groundwater Levels - MW Wells

Weyerhaeuser Chlor-Alkali Plant
Longview, Washington

Attachment A

Field Sampling Plan for Long-Term Monitoring Program Chlor-Alkali Plant Longview, Washington

Prepared for

Weyerhaeuser

September 2004

Prepared by

CH2MHILL

Printed on Recycled and Recyclable Paper

Contents

Tables

SECTION 1

1 Introduction

This Sampling and Analysis Plan (SAP) describes field activities associated with the long-term monitoring program identified in the cleanup action plan for the Weyerhaeuser Chlor-Alkali plant in Longview, Washington. Table 5 of the Compliance Monitoring Plan (2004) summarizes the wells to be sampled and sampling frequency for wells in the Chlor-Alkali Plant (site) long-term monitoring program. Under WAC, the long-term monitoring program for the site is a "confirmational monitoring" program - it is intended to confirm the long-term effectiveness of the cleanup action for the site [WAC 173-340-410(1)(c)]. More specifically, this groundwater monitoring is intended to confirm the long-term effectiveness of the cleanup action by monitoring to verify mercury concentrations beneath the site are stable or decreasing. Fieldwork described in the SAP includes groundwater monitoring and well maintenance.

This SAP is organized as follows:

- Section 1: Introduction
- Section 2: Groundwater Monitoring Procedures
- Section 3: Quality Assurance/Quality Control Program
- Section 4: Handling of Investigation-Derived Waste

SECTION 2

2 Groundwater Monitoring Procedures

The following sections describe the procedures to be followed during groundwater monitoring events at Weyerhaeuser Company's Chlor-Alkali Plant. Figure 4 of the Compliance Monitoring Plan (CMP) presents the locations of monitoring well for the site. Groundwater monitoring activities will include water level measurements, field analysis of general groundwater parameters, groundwater sample collection, and laboratory analysis for dissolved mercury. Table 1 presents a summary of the groundwater samples and analyses.

Groundwater levels will be measured annually at all wells before beginning collection of groundwater samples. Collection of groundwater samples will be performed at the frequency outlined in Table 5 of the CMP.

The sequential procedure for data and sample collection from each well will consist of measuring the water level, purging the well, and collecting the sample. Groundwater sampling information will be recorded on field data sheets. Information recorded will include project, field team, date, field conditions, field parameter measurements, instrument calibration, decontamination, purge information, sampling information, shipping information, and field comments if sampling procedures vary significantly from this SAP.

2.1 Water Level Measurements

Prior to collecting groundwater samples, the depth to groundwater will be measured at all of the monitoring wells (including those not sampled during the current event) and at the gauging location along the Columbia River (Figure 4 of the CMP). An effort will be made to make all measurements within a relatively short period, in order to minimize tidal impacts on water levels. Water levels should be measured in the river before and after measurement of groundwater levels at the monitoring wells since the river stage may fluctuate over the course of the day. The depths to groundwater and weather conditions will be recorded in the field notebook for the site.

2.2 Well Purging

Wells will be purged and sampled using a low flow sample collection procedure. This procedure is outlined in the following steps:

- The groundwater level will be measured at each well before purging and while measuring field parameters. Water levels will be measured from the surveyed measuring point at the top of the PVC casing using an electric water-level indicator.
- Monitoring wells will be purged using a peristaltic pump with dedicated polyethylene tubing. The dedicated tubing will be lowered to middle of the screened interval except

when water levels are below this depth, in which case the tubing will be located approximately one to two feet below the top of water.

- Target purge rates will be within the range of approximately 0.1 to 0.5 liters per minute (0.026 to 0.132 gallons per minute), to minimize water level drawdown in the well and minimize sample turbidity. A target maximum drawdown in the well during purging and sampling is one foot; however the amount of drawdown actually observed will vary between wells due to varying well yields. Accordingly, the criteria listed are targets and may not be achievable at all wells.
- Stable parameters will be monitored (and recorded) every three to five minutes during purging. After parameters have been stable for three successive measurements, groundwater samples may be collected.
- Field parameters to be measured are pH, temperature, specific conductance, dissolved oxygen, and turbidity.
- An overflow cell will be used for parameter measurements to reduce the effect of atmospheric oxygen on field parameter measurements.
- Clean nitrile gloves will be worn by field personnel when handling samples and sampling equipment. At wells that have a history of elevated pH, chemical-resistant nitrile gloves which protect the forearms should also be worn over the surgical-style nitrile gloves.

2.3 Groundwater Sampling Procedures

Groundwater will be sampled using the following procedures:

- Samples will be collected from the purge tubing after stable parameters have been achieved.
- Groundwater samples will be filtered using a new disposable in-line groundwater filter cartridge (0.45 micro). A minimum of 1 liter (0.26 gallons) of groundwater should be passed through the filter prior to sample collection.
- Samples will be sent under custody control to Weyerhaeuser Analytical Testing Laboratory in Federal Way, Washington at the conclusion of the sampling event. Samples will be analyzed for dissolved mercury.

Table 1 summarizes groundwater sampling details.

TABLE 1
Groundwater Sampling Parameter Summary

Constituent	Analytical Method	Container	Preservation	Reporting Limit	Holding Time
Dissolved Mercury	EPA SW-7470	500 ml polyethylene	HNO_3	0.2 µg/L	28 days

2.3.1 Sample Nomenclature

Sample bottles will be labeled using permanent pens with the following information:

- Project Name: Chlor-Alkali Plant
- Well Name
- Sample Identification number
- Client (CH2M HILL)
- Date and time of sample collection
- Sample preservative
- Type of analyses to be conducted

The sample identification number for groundwater samples uses the following convention:

WCP-CH3-09304-XX

WCP = Weyerhaeuser Chlor-Alkali Plant

CH3 = Three to five digit well identification number, should be XXX for duplicate samples

09304 = Five-digit date where 093 represents the sequential number of the day of the year (001 through 366) and 04 represents the last two digits of the year (e.g. "04" for 2004)

following:

XX = normal sample

DU = field duplicate sample

2.4 Field Documentation

The field logbook will be maintained by the field team leader and other team members to provide a daily record of significant events, observations, and measurements during sampling. Sampling information will be recorded in the logbooks using a permanent ink pen. Notebook pages containing field notes will be initialed by the person recording notes..

Notes recorded in field logbooks, sample labels, and chain of custody (COC) forms will be written with waterproof, indelible ink. If an error is made in the field notes, the individual taking notes will make corrections by drawing a line through the error, initialing and dating the correction, and entering the correct information. Any subsequent error discovered in the field notes will be corrected by lining out the original entry such that the original entry remains legible. Corrections will be initialed and dated.

Project binders will be used to maintain copies of relevant information, and should include field data sheets and chain-of-custody (COC) forms.

2.5 Well Maintenance

If monitoring well performance or well integrity issues are observed during monitoring events, maintenance should be performed at that time or scheduled for the near future. Common problem indicators include but are not limited to: damaged well casing, monument, or concrete pad; reduced yield; incrustation of screens; biologic fouling; significant change in water parameters (e.g. turbidity); and/or silt, clay, or sand intrusion. Maintenance activities may include casing repair, well re-development or, in severe cases, well abandonment and replacement.

2.6 Decontamination Procedures

This section outlines procedures that will be followed to meet decontamination objectives. The purpose of decontamination is to prevent the introduction of constituents into samples from sampling equipment or other samples, to prevent contamination from leaving the sampling site by way of sampling equipment, to prevent cross-contamination, and to prevent exposure of field personnel to contaminated materials.

2.6.1 Personnel

Personnel decontamination procedures depend on the level of protection specified for a given activity. It is anticipated that all of the work associated with the groundwater monitoring program will be conducted in Level D or modified Level D personal protection. Decontamination procedures are detailed in the heath and safety plan for the site (CH2M HILL 2003).

2.6.2 Sampling Equipment

Dedicated tubing will be used for each monitoring well in order to reduce the potential for cross contamination. The tubing for each well should be stored individually in Ziploc bags that are labeled with the well name, and all tubing will be stored in project-dedicated rubber totes that are housed at the CH2M HILL office.

Water level indicators will be decontaminated between each well with a distilled water rinse. If visible contamination or soil is present, the following decontamination procedures will be used:

- Alconox detergent wash
- Tap water rinse
- Isopropyl alcohol
- Air dry
- Distilled water rinse

2.6.3 Sampling Containers

The outside of sample containers will be cleaned by wiping the container with a paper towel dampened with distilled water prior to delivering the sample to the laboratory.

3 Quality Assurance/Quality Control Program

This section discusses the quality control (QC) samples for the project, and QA/QC processes for ensuring appropriate use of field equipment, handling of samples, and analysis of investigation data. The environmental sample QA/QC program for the site LTM is designed to meet end usage of the data collected during this work.

3.1 Field Program

3.1.1 Field QC Samples

QC samples during monitoring well sampling will include collecting one duplicate sample per groundwater sampling event. Equipment rinsate blanks will not be collected since dedicated tubing is used for collecting samples.

The duplicate field samples will be sent "blind" to the laboratory (i.e., the identity of the duplicate field samples is not noted on the laboratory COC form). These samples are collected to evaluate the repeatability of the field sampling process. Whenever possible, duplicate samples should be collected at monitoring wells that have detected mercury in the recent past. The identity of the duplicate field samples will be recorded in the field sampling logbook, and this information will be forwarded to the data quality evaluation team to aid in the review and evaluation of the data. Duplicate measurements will be considered suspect if they differ by more than 20 percent.

3.1.2 Field Instruments

Equipment used for field measurements will be maintained in accordance with the manufacturers' instructions.

Field instruments will be calibrated daily in accordance with the manufacturer's specifications before use in sampling activities. The method and frequency of calibration for the instruments used for each field activity are described in the manufacturer's instructions.

3.1.3 Sample Handling, Storage, and Delivery

After collecting the samples, the field sampling personnel will complete the COC form. A COC form will accompany each sample shipment to the laboratory. The following information will be specified for each sample on the COC form:

- Sample location (monitoring well)
- Date and time of sample collection
- Sample type (grab)
- Number of sample containers
- Analysis requested

The original COC form will accompany the shipment, and the field manager will retain the copy. When transferring samples, the individuals relinquishing and receiving the samples

will sign, date, and note the time on the form. Shipping containers will be sealed and custody seals will be attached before shipment to the laboratory.

Sample jars will be sealed in Ziploc bags, placed on ice in a cooler, and packed with foam, bubble wrap, or other packing material to reduce the potential for container breakage. The completed COC form will be placed in a sealed bag and placed inside the ice chest. The chest then will be sealed with tape and custody seals and shipped or delivered to the laboratory at the conclusion of the monitoring event. To retain sample custody, samples will remain in sight of field personnel or in a locked location until they are shipped to the laboratory.

The Weyerhaeuser Analytical Testing Laboratory in Federal Way, Washington will be responsible for analysis of samples collected during field activities. Dennis Catalano will serve as the project contact. The mailing address for the laboratory is:

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98001
Phone: 253-924-6242

The field team leader or the project chemist will notify the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the expected date of arrival.

3.2 Data Review and Validation

Data review and validation are processes whereby data generated in support of this project are reviewed against the QA/QC requirements. The data are evaluated for precision, accuracy, and completeness against the analytical protocol requirements. Nonconformance or deficiencies that could affect the usability of data are identified and noted. The conventional approach to data validation involves the EPA's Laboratory Data Validation Functional Guidelines (EPA, 1991).

3.2.1 Field Survey Data

Field instruments used to collect field survey measurements (such as pH or conductivity) are direct reading, thus field calculations and subsequent data reduction are unnecessary. Field data will be recorded in the site logbooks by appropriately trained field personnel.

Data will be reviewed by the field team leader, who is responsible for the collection and verification of all field data while in the field. Recorded data will be reviewed by the field team leader before leaving the sampling site. Extreme readings (readings that appear significantly different from other readings at the same site) will be accepted only after the instrument has been checked for malfunction and/or the readings are verified by retesting.

3.2.2 Laboratory Analyses

Data quality evaluations will be performed by the project chemist or designee. The data quality evaluation process is used to assess the effect of the overall analytical process on the usability of the data. Two major categories of data evaluation are laboratory performance and matrix interference. Evaluation of laboratory performance is a check for compliance with the method requirements: either the laboratory did or did not analyze the samples within the limits of the analytical method.

The data package will be reviewed by the project chemists using the process outlined in the guidance document *Functional Guidelines for Evaluating Data Quality* (EPA, 1991). The data review and validation process is independent of the laboratory's checks. It focuses on the usability of the data to support the project data interpretation and decision-making process. Areas of review include data package completeness, holding time compliance, initial and continuing calibration, spiked sample results, method blank results, and duplicate sample results. A data review worksheet will be completed for each data package. Acceptance criteria for each area of review are specified in the analytical method. For example, acceptance criteria for initial and continuing calibration may be specified in each analytical method; nonconformance will be noted on the data review worksheets and the effect of the nonconformance on the overall usability of the data will be evaluated as part of the overall data quality evaluation.

Samples that do not meet the acceptance limit criteria will be indicated with a qualifying flag, which is a one- or two-letter abbreviation that indicates a problem with the data. Flags used in the text may include the following:

- **U** **Undetected:** analyte was analyzed for, but not detected above, the method detection limit.
- **J** **Estimated:** analyte was present, but the reported value may not be accurate or precise.
- **UJ** **Detection limit estimated:** analyte was not detected above the detection limit, but the actual detection limit may be estimated.
- **R** **Rejected:** data were rejected because the corresponding QC data were not within the method-specified limits.

It is important to note that laboratory-qualifying flags are included on the data summary forms (Form I) that are submitted to the project by the laboratory. However, during the data review and validation process, the laboratory qualifying flags are evaluated and replaced with the project-specific validation flags.

Once each of the data packages has been reviewed, and the data review worksheets completed, the entire data set will be evaluated for overall trends in data quality and usability. Information summarized as part of the data quality evaluation may include constituent frequencies of detection, dilution factors that may affect data usability and patterns of target compound distribution. The data set also will be evaluated to identify potential data limitations or uncertainties in the laboratory. Additional areas of review are listed below.

Field duplicate samples will be collected and analyzed as part of the field effort. The concentrations of mercury that are detected in both the native and duplicate samples will be compared and the relative percent difference will be calculated between the sample results.

SECTION 4

4 Handling of Investigation-Derived Waste

Investigation-derived waste (IDW) includes purge water, decontamination fluids, and disposables (e.g., gloves, plastic bags, Tyvek, paper towels) generated during groundwater monitoring activities. Personnel protective equipment (PPE) (such as gloves, Tyvek, etc.) and other equipment, will be segregated and properly disposed after use. Purge water and decontamination fluids generated during sampling will be staged during well sampling and then discharged to a process water sump for effluent treatment at the Weyerhaeuser treatment plant.

Attachment B

REVISED

CH2M HILL HEALTH AND SAFETY PLAN

This Health and Safety Plan (HSP) will be kept on the site during field activities and will be reviewed as necessary. The plan will be amended or revised as project activities or conditions change or when supplemental information becomes available. The plan adopts, by reference, the Standards of Practice (SOPs) in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual*, as appropriate. In addition, this plan adopts procedures in the project Work Plan. The Safety Coordinator - Haz Waste (SC-HW) is to be familiar with these SOPs and the contents of this plan. CH2M HILL's personnel and subcontractors must sign Attachment 1.

Project Information and Description

PROJECT NO: 185785.01.03

CLIENT: Weyerhaeuser Company

PROJECT/SITE NAME: Chlor-Alkali Plant

SITE ADDRESS: 3401 Industrial Way, Longview, WA 98632

CH2M HILL PROJECT MANAGER: Mark Leece

CH2M HILL OFFICE: Portland

DATE FIELD SAFETY INSTRUCTIONS PREPARED: 9/19/2003

DATE FIELD SAFETY INSTRUCTIONS REVISED: September 2004

DATE(S) OF SITE WORK: September 9, 2004 through December 31, 2005

SITE DESCRIPTION AND HISTORY: The Chlor-Alkali plant began operations in the 1950s to produce chlorine and caustic was the mercury electrolytic process. Leaks from pumps, valves, and process lines for the No. 1 Cell Room resulted in mercury releases to onsite soils. The mercury cells were located in the No. 1 and 2 cell rooms. In the mid-1970s, the mercury electrolytic chlorine and caustic production cells were replaced with diaphragm cell technology, effectively ended the production-related loss of mercury to the environment.

In 1985 Ecology designated the plant as a medium priority under the Washington hazardous waste site list. Based on groundwater monitoring in the area, groundwater from some wells contained mercury in excess of the EPA maximum contaminant level (MCL). Between 1989 and 1991 the No. 1 cell room was demolished. On March 15, 1999, Weyerhaeuser shut down chlorine production at the Chlor-Alkali plant.

Between the mid-1970s and early 1990s remediation actions to remove soil and concrete contaminated mercury was conducted. This included the closure of the former No. 1 cell room area through placement of clean backfill, construction of a rainwater collection system, and polymer modified asphalt (PMA) paving in accordance with Ecology.

Since 1991 groundwater has been sampled, semi-annually since 1998. Analytical results for groundwater using EPA Method 7470 have revealed mercury concentrations ranging from 0.5 ppb (below the Method Detection Limit) up to 149 ppb during the 2000 groundwater sampling events.

DESCRIPTION OF SPECIFIC TASKS TO BE PERFORMED BY CH2M HILL: CH2M Hill employees are on the site to conduct groundwater sampling and collect the water levels at monitoring wells installed at various points around the site. It is anticipated that several of the monitoring wells will be abandoned by over-drilling or grouting up the wells.

Project HS&E Change Management Form

*This evaluation form should be reviewed on a **continuous** basis to determine if the current site health and safety plan adequately addresses ongoing project work, and should be completed whenever new tasks are contemplated or changed conditions are encountered..*

Project Task:

Project Number: 185785 Project/Task Manager: **Mark Leece/ Eric Aronson**

Name: Employee #:

	Evaluation Checklist	Yes	No
1.	Have the CH2MHILL staff listed in the original HSP/FSI changed?		
2.	Has a new subcontractor been added to the project?	X	
3.	Is any chemical or product to be used that is not listed in Attachment 2 of the plan?		
4.	Have additional tasks been added to the project which were not originally addressed in the plan?		
5.	Have new contaminants or higher than anticipated levels of original contaminants been encountered?		
6.	Have other safety, equipment, activity or environmental hazards been encountered that are not addressed in the plan?		

If the answer is "YES" to Question 3, an HSP/FSI revision is NOT needed. Please take the following actions:

- Add the chemical to Attachment 2, and ensure employees handling the chemical are trained, and training documentation is added to Attachment 3.

If the answer is "YES" to Questions 1, 2 or 4-6, an HSP/FSI revision MAY BE NEEDED. Please contact HS&E directly.

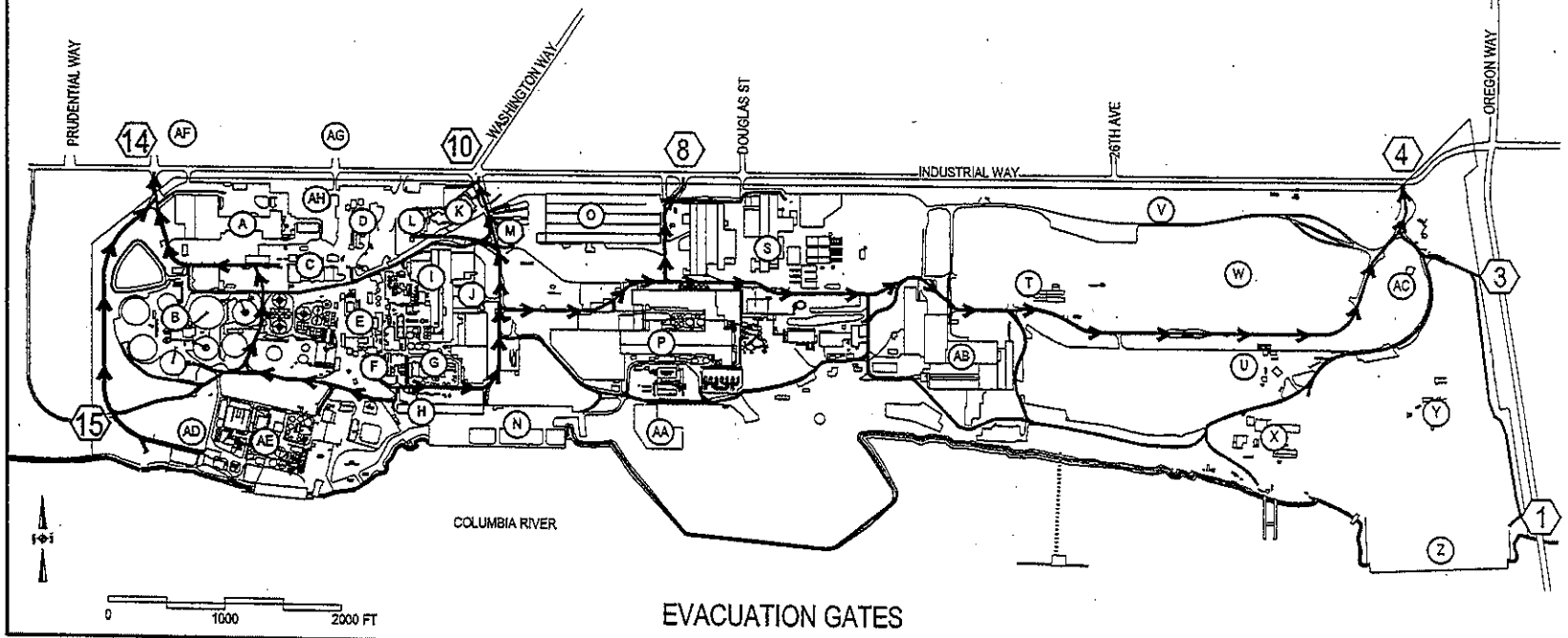
WEYERHAEUSER COMPANY
3401 INDUSTRIAL WAY
LONGVIEW, WA 98632

OPERATING GATES

- 1 EAST GATE 11 PORT WAY
- 3 RAW MATERIALS GATE - PORT WAY
- 4 INDUSTRIAL WAY GATE 1701 INDUSTRIAL WAY
- 8 NORPAC GATE 3001 INDUSTRIAL WAY
- 10 MAIN GATE 3401 INDUSTRIAL WAY
- 14 PULP GATE 3539 INDUSTRIAL WAY
- 15 LV ALUMINUM ROAD TO INDUSTRIAL WAY

➤ EXIT ROUTES

- A RW FINE PAPER
- B EFFLUENT AREA
- C PULP MAINTENANCE/STOREROOM
- D LIME KILN
- E POWERHOUSE/BOILERS
- F CLO2/CHEMICAL HANDLING
- G FIBERLINE/WETLAP
- H RIVERVIEW BUILDING
- I L3 PM/WAREHOUSES
- J PACLAM
- K MAINOFFICE/LAB A1 CUSTOMER IN HUMAN RESOURSES
- L MEDICAL CENTER FITNESS CENTER
- M FIRE STATION/HAZMAT
- N CARGO DOCK
- O LUMBER SHIPPING
- P NORPAC
- S WOOD PRODUCTS
- T MRF
- U CHIPS
- V RAIL YARD
- W SORTING YARD
- X LOG TRUCK/RAIL CAR SHOP
- Y EXPORT DEBARKER
- Z TIMBER EXPORT DOCK
- AA PUD POWER GENERATORS
- AB ONP WAREHOUSE (PLYWOOD)
- AC TIMBERLANDS OPERATIONS BLDG
- AD CONTRACTOR HUB
- AE OLD CHEMICAL PLANT/CAUSTIC TANK FARM
- AF INTEROX
- AG JM HUBER
- AH SPECIALTY MINERALS INC



EVACUATION GATES

Site Map

This page is reserved for a Site Map.

Note locations of Support, Decontamination, and Exclusion Zones; site telephone; first aid station; evacuation routes; and assembly areas.

1 Tasks to be Performed Under this Plan

1.1 Description of Tasks

(Reference Field Project Start-up Form)

Refer to project documents (i.e., Work Plan) for detailed task information. A health and safety risk analysis (Section 1.2) has been performed for each task and is incorporated in this plan through task-specific hazard controls and requirements for monitoring and protection. Tasks other than those listed below require an approved amendment or revision to this plan before tasks begin. Refer to Section 8.2 for procedures related to "clean" tasks that do not involve hazardous waste operations and emergency response (Hazwoper).

1.1.1 Hazwoper-Regulated Tasks

- Geo-probe
- Soil sampling
- Groundwater monitoring
- Well abandonment
- Observation of demolition/excavation/grading of concrete pad

1.1.2 Non-Hazwoper-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Prior approval from the Health and Safety Manager (HSM) is required before these tasks are conducted on regulated hazardous waste sites.**

TASKS	CONTROLS
• None Identified	

1.2 Task Hazard Analysis

(Refer to Section 2 for hazard controls)

POTENTIAL HAZARDS	TASKS		
	Geo-probe	Soil Sampling	Groundwater monitoring, aquifer testing, well abandonment
Flying debris/objects	X		X
Noise > 85dBA	X		X
Electrical	X	X	
Suspended loads	X		X
Buried utilities, drums, tanks	X		
Slip, trip, fall	X	X	X
Back injury	X	X	
Visible lightning	X	X	X
Vehicle traffic			X
Elevated work areas/falls	X		
Fires	X		
Heavy equipment	X		X

2 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the SC-HW for clarification.

In addition to the controls specified in this section, Project-Activity Self-Assessment Checklists are contained in Attachment 5. These checklists are to be used to assess the adequacy of CH2M HILL and subcontractor site-specific safety requirements. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. Self-assessment checklists should be completed early in the project, when tasks or conditions change, or when otherwise specified by the HSM. The self-assessment checklists, including documented corrective actions, should be made part of the permanent project records, and be promptly submitted to the HSM.

Project-specific frequency for completing self-assessments: **Initially for drilling and geo-probe activities**

Project Specific Training
In addition to the basic training requirements for Construction sites the following specialty training is required:
Safety Coordinator Training – CH2M HILL SC-HW must have completed SC-Haz Waste training.
Fire Extinguisher - The assigned SC onsite must take the on-line fire extinguisher training course.
Blood-borne Pathogen Training - The assigned SC onsite must take the on-line blood-borne pathogen training course.
Dangerous Goods Shipping - The assigned SC-HW onsite must take the on-line DG Shipping training course.
First Aid & CPR - The assigned SC-HW must have current FA/CPR training.

2.1 Project-Specific Hazards

2.1.1 Elevated pH Groundwater

- pH up to 9.5 has been detected in groundwater on site
- This level of alkalinity does not pose an immediate corrosive hazard, but continuous skin contact may produce dermatitis. This is a particular hazard if elevated pH water gets into gloves or boots and is held against the skin by rubber or elastic.
- Follow all PPE requirements in section 4 and tape wrists to prevent getting elevated pH water on skin.

2.1.2 Drilling/Geo-probe (Reference CH2M HILL SOP HS-35, *Drilling*)

- Only authorized personnel are permitted to operate drill rigs.
- Stay clear of areas surrounding drill rigs during every startup.
- Stay clear of the rotating augers and other rotating components of drill rigs.
- Stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel.
- Do not wear loose-fitting clothing or other items such as rings or watches that could get caught in moving parts. Long hair should have it restrained.
- If equipment becomes electrically energized, personnel shall be instructed not to touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have line de-energized prior to approaching the equipment.
- Smoking around drilling operations is prohibited.

2.2 General Hazards

2.2.1 General Practices and Housekeeping

(Reference CH2M HILL SOP HS-20, *General Practices*)

- Site work should be performed during daylight hours whenever possible. Work conducted during hours of darkness require enough illumination intensity to read a newspaper without difficulty.
- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel should be established and kept free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals.
- All spills shall be quickly cleaned up. Oil and grease shall be cleaned from walking and working surfaces.

2.2.2 Hazard Communication

(Reference CH2M HILL SOP HS-05, *Hazard Communication)*

The SC-HW is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using Attachment 2.
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available.
- Request or confirm locations of Material Safety Data Sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees required chemical-specific HAZCOM training using Attachment 3.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

2.2.3 Shipping and Transportation of Chemical Products

(Reference CH2M HILL's *Procedures for Shipping and Transporting Dangerous Goods)*

Chemicals brought to the site might be defined as hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive CH2M HILL training in shipping dangerous goods. All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

2.2.4 Lifting

(Reference CH2M HILL SOP HS-29, *Lifting*)

- Proper lifting techniques must be used when lifting any object.
  - Plan storage and staging to minimize lifting or carrying distances.
  - Split heavy loads into smaller loads.
  - Use mechanical lifting aids whenever possible.
  - Have someone assist with the lift -- especially for heavy or awkward loads.
  - Make sure the path of travel is clear prior to the lift.

2.2.5 Fire Prevention

(Reference CH2M HILL SOP HS-22, *Fire Prevention*)

- A Fire extinguishers shall be provided if the field vehicle. Extinguishers must:
  - be maintained in a fully charged and operable condition,
  - be visually inspected each month, and
  - undergo a maintenance check each year.

2.2.6 Electrical

(Reference CH2M HILL SOP HS-23, *Electrical*)

- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service.
- All temporary wiring, including extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.
- Extension cords must be:
  - equipped with third-wire grounding.
  - covered, elevated, or protected from damage when passing through work areas.
  - protected from pinching if routed through doorways.
  - not fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated UL approved.
- Operate and maintain electric power tools and equipment according to manufacturers' instructions.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

2.2.7 Heat Stress

(Reference CH2M HILL SOP HS-09, *Heat and Cold Stress*)

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°F to 60°F should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons per day. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate yourself by slowly increasing workloads (e.g., do not begin with extremely demanding activities).
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shelter/shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Observe one another for signs of heat stress. Persons who experience signs of heat syncope, heat rash, or heat cramps should consult the SC-HW to avoid progression of heat-related illness.

SYMPTOMS AND TREATMENT OF HEAT STRESS

	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool–but not cold–water. Call ambulance, and get medical attention immediately!

2.2.8 Cold Stress

(Reference CH2M HILL SOP HS-09, *Heat and Cold Stress*)

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- Wind-Chill Index is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- NSC Guidelines for Work and Warm-Up Schedules can be used with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; workers should be monitored for symptoms of cold-related illnesses. If symptoms are not observed, the work duration can be increased.
- Persons who experience initial signs of immersion foot, frostbite, hypothermia should consult the SC-HW to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS

	Immersion (Trench) Foot	Frostbite	Hypothermia
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm–but **not** hot–water. Have victim drink warm fluids, but **not** coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but **not** coffee or alcohol. Get medical attention.

2.2.9 Procedures for Locating Buried Utilities

Local Utility Mark-Out Service

Name: One Call
Phone: 800/663-2255

- Where available, obtain utility diagrams for the facility.
- Review locations of sanitary and storm sewers, electrical conduits, water supply lines, natural gas lines, and fuel tanks and lines.
- Review proposed locations of intrusive work with facility personnel knowledgeable of locations of utilities. Check locations against information from utility mark-out service.
- Where necessary (e.g., uncertainty about utility locations), excavation or drilling of the upper depth interval should be performed manually
- Monitor for signs of utilities during advancement of intrusive work (e.g., sudden change n advancement of auger or split spoon).
- When the client or other onsite party is responsible for determining the presence and locations of buried utilities, the SC should confirm that arrangement.

2.3 Biological Hazards and Controls

2.3.1 Bees and Other Stinging Insects

Bee and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform the SC-HW and/or buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

2.3.2 Bloodborne Pathogens

(Reference CH2M HILL SOP HS-36, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or CPR, or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and personal protective equipment (PPE) are required as specified in CH2M HILL SOP HS-36, *Bloodborne Pathogens*. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

2.3.3 Hanta Virus

The hanta virus is sometimes transmitted by deer mice, and causes respiratory distress, sometimes with fatal consequences. Transmission of the hanta virus occurs with exposure to deer mouse droppings. The virus can be inhaled in the dust from areas where mice have nested or left their droppings. Avoid these areas whenever possible. Good hygiene practices such as washing hands and face prior to eating and drinking will help to minimize the potential for exposure to the hanta virus. If work must be done in areas with potential exposure spray the area with disinfectant and let sit for one hour before disturbing the area. Use Level C protection with high efficiency particulate air filters (HEPA) cartridges and work practices which minimize generation of dust and aerosols. Thoroughly wash hands and face after removing personal protective equipment (PPE).

2.5 Contaminants of Concern

(Refer to Project Files for more detailed contaminant information)

Contaminant	Location and Maximum[a] Concentration (ppm)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Mercury	GW: 135 ug/L	0.05 mg/m^3	10	Skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumontitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, GI disturbance	NA
No. 6 Fuel Oil *MSDS in Attachment 6	Expected	NL	NL	Eye, skin and mucous membrane irritation; dermatitis, headache	UK

Footnotes:

[a] Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), S (Surface Soil), SL (Sludge), SW (Surface Water).

[b] Appropriate value of PEL, REL, or TLV listed.

[c] IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.

[d] PIP = photoionization potential; NA = Not applicable; UK = Unknown.

2.6 Potential Routes of Exposure

Dermal: Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 4.	**Inhalation:** Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 4 and 5, respectively.	**Other:** Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).

3 Project Organization and Personnel

3.1 CH2M HILL Employee Medical Surveillance and Training

(Reference CH2M HILL SOPs HS-01, *Medical Surveillance*, and HS-02, *Health and Safety Training)*

The employees listed below are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SC-HW" have completed a 12-hour Safety Coordinator - Haz Waste course, and have documented requisite field experience. An SC-HW with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL's SOP HS-04, *Reproduction Protection*, including obtaining a physician's statement of the employee's ability to perform hazardous activities before being assigned fieldwork.

Employee Name	Office	Responsibility	SC-HW/FA-CPR
Pat Heins	PDX	Field Team Leader/SC-HW	Level C SC-HW; FA-CPR
Eric Aronson	PDX	Field Team Leader/SC-HW	Level C SC-HW; FA-CPR
Dave Lacey	PDX	Field Team Leader/SC-HW	Level C SC-HW; FA-CPR
Brad Ostapkowicz	PDX	Field Team Leader/SC-HW	Level C SC-HW; FA-CPR

3.2 Field Team Chain of Command and Communication Procedures

3.2.1 Client

Contact Name: Dick Luetkenhaus
Phone: (360) 578-4645
Facility Contact Name: Brian Wood
Phone: (360) 636-7080

3.2.2 CH2M HILL

Project Manager: Mark Leece/PDX
Health and Safety Manager: Jim Bushnell/SEA
Field Team Leader/SC-HW: Eric Aronson/PDX

The SC-HW is responsible for contacting the Field Team Leader and Project Manager. In general, the Project Manager will contact the client. The Health and Safety Manager should be contacted as appropriate.

3.2.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HS-55, *Subcontractor, Contractor, and Owner*)

Subcontractor: Geo-Tech Explorations

Contact: Pete Larse

Phone: (503) 692-6400

Tasks: Over-drilling for well abandonment and geo-probe

The subcontractors listed above are covered by this HSP and must be provided a copy of this plan. However, this plan does not address hazards associated with the tasks and equipment that the subcontractor has expertise in (e.g., drilling, excavation work, electrical). Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit these procedures to CH2M HILL for review before the start of field work. Subcontractors must comply with the established health and safety plan(s). The CH2M HILL SC-HW should verify that subcontractor employee training, medical clearance, and fit test records are current and must monitor and enforce compliance with the established plan(s). CH2M HILL's oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

CH2M HILL should continuously endeavor to observe subcontractors' safety performance. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. In addition to this level of observation, the SC-HW is responsible for confirming CH2M HILL subcontractor performance against both the subcontractor's safety plan and applicable self-assessment checklists. Self-assessment checklists contained in Attachment 5 are to be used by the SC-HW to review subcontractor performance.

Health and safety related communications with CH2M HILL subcontractors should be conducted as follows:

- Brief subcontractors on the provisions of this plan, and require them to sign the Employee Signoff Form included in Attachment 1.
- Request subcontractor(s) to brief the project team on the hazards and precautions related to their work.
- When apparent non-compliance/unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action – the subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat non-compliance/unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, and stop affected work until adequate corrective measures are implemented. Notify the Project Manager and HSM as appropriate.
- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

3.2.4 Contractors

(Reference CH2M HILL SOP HS-55, *Subcontractor, Contractor, and Owner*)

Contractor: **TBD**
Contractor Contact Name:
Telephone:

Contractor Tasks: Demolition/excavation/grading of concrete pad

This plan does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for the health and safety or means and methods of the contractor's work, and we must never assume such responsibility through our actions (e.g., advising on H&S issues). In addition to this plan, CH2M HILL staff should review contractor safety plans so that we remain aware of appropriate precautions that apply to us. Except in unusual situations when conducted by the HSM, CH2M HILL must never comment on or approve contractor safety procedures. Self-assessment checklists contained in Attachment 5 are to be used by the SC-HW to review the contractor's performance ONLY as it pertains to evaluating our exposure and safety.

Health and safety related communications with contractors should be conducted as follows:

- Request the contractor to brief CH2M HILL employees and subcontractors on the precautions related to the contractor's work.
- When an apparent contractor non-compliance/unsafe condition or practice poses a risk to CH2M HILL employees or subcontractors:
  - Notify the contractor safety representative
  - Request that the contractor determine and implement corrective actions
  - If needed, stop affected CH2M HILL work until contractor corrects the condition or practice. Notify the client, Project Manager, and HSM as appropriate.
- If apparent contractor non-compliance/unsafe conditions or practices are observed, inform the contractor safety representative. Our obligation is limited strictly to informing the contractor of our observation – the contractor is solely responsible for determining and implementing necessary controls and corrective actions.
- If an apparent imminent danger is observed, immediately warn the contractor employee(s) in danger and notify the contractor safety representative. Our obligation is limited strictly to immediately warning the affected individual(s) and informing the contractor of our observation – the contractor is solely responsible for determining and implementing necessary controls and corrective actions.
- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

4 Personal Protective Equipment (PPE)

(Reference CH2M HILL SOP HS-07, *Personal Protective Equipment*, HS-08, *Respiratory Protection*)

PPE Specifications [a]

Task	Level	Body	Head	Respirator [b]
General site entry	D	Work clothes; steel-toe, leather work boots; work glove.	Hardhat [c] Safety glasses Ear protection [d]	None required Emergency Escape Per Weyco site requirements
Activities associated with Tank Farm Area • Geo-probe • Soil sampling	Modified D	**Coveralls:** Cotton coveralls, or uncoated Tyvek® if cotton cannot be kept clean. **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Safety glasses Ear protection [d]	None required.
Activities associated with old Chlor-Alkali plant • Groundwater sampling • Well Abandonment • Observation of Demolition/Excavation/ Grading of concrete pad • Soil sampling	Modified D	**Coveralls:** Cotton coveralls, or uncoated Tyvek® if cotton cannot be kept clean. **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves. **Taped at wrists during groundwater sampling due to elevated pH.**	Hardhat [c] Splash shield [c] Safety glasses Ear protection [d]	None required.
Tasks requiring upgrade; See Section 5.0	C	**Coveralls:** Polycoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with MERSORB cartridges or equivalent[e].

Reasons for Upgrading or Downgrading Level of Protection

Upgrade[f]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 5) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

[b] No facial hair that would interfere with respirator fit is permitted.

[c] Hardhat and splash-shield areas are to be determined by the SC-HW.

[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.

[e] Cartridge change-out schedule is at least every 8 hours (or one work day), except if relative humidity is > 85%, or if organic vapor measurements are > midpoint of Level C range (refer to Section 5)--then at least every 4 hours. If encountered conditions are different than those anticipated in this HSP, contact the HSM.

[f] Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an SC-HW qualified at that level is present.

5 Air Monitoring/Sampling

(Reference CH2M HILL SOP HS-06, *Air Monitoring)*

5.1 Air Monitoring Specifications

Instrument	Tasks	Action Levels[a]	Frequency [b]	Calibration
PID: MiniRAE with 10.0 eV lamp or greater	**Activities associated with Tank Farm Area** • Geo-probe • Soil sampling	<1 ppm → Level D ≥1 ppm → Stop work; Stop work; contact HSM	Initially and continuously during task; record every 30-60 minutes	Daily
Jerome 431 XD, Mercury Vapor Meter	**Activities associated with old Chlor-Alkali plant** • Groundwater sampling • Well Abandonment • Observation of Demolition/Excavation/ Grading of concrete pad • Soil sampling	< 0.05 mg/m³ → Level D 0.05 – 2.5 mg/m³ → Level C > 2.5 mg/m³ → Stop work; notify HSM	Initially and continuously during invasive activities. Record readings every 30-60 minutes.	Daily

[a] Action levels apply to **sustained** breathing-zone measurements above background **for more than 5 minutes.**

[b] The exact frequency of monitoring depends on field conditions and is to be determined by the SC-HW; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place/location where measurement is taken (e.g., "Breathing Zone/MW-3", "at surface/SB-2", etc.).

- Air monitoring results may be obtained from other onsite parties if the following conditions are met:
  a.) Instruments are calibrated in accordance with manufacturer's specifications. Calibration logs and verifications must be kept by the SC-HW.
  b.) Readings must be taken in CH2M Hill employees' breathing zones (or from an employee who has a higher level of exposure) for the task listed. Results must be recorded as often as is stated above.
  c.) The action levels listed above must be followed.

5.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF=53	53 ppm ±5 ppm	1.5 lpm REG T-Tubing
Mercury Vapor Meter: Jerome 431XD	Per Manufacturer's Specification (calibration will be valid from vendor, but a daily clearing of the filament should be required. Follow protocol stated in equipment manual)			

5.3 Air Sampling

Sampling, in addition to real-time monitoring, may be required by other OSHA regulations where there may be exposure to certain contaminants. Air sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain volatile organic compounds. Contact the HSM immediately if these contaminants are encountered.

Method Description

None at this time

6 Decontamination

(Reference CH2M HILL SOP HS-13, *Decontamination*)

The SC-HW must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SC-HW. The SC-HW must ensure that procedures are established for disposing of materials generated on the site.

6.1 Decontamination Specifications

Personnel

- Boot wash/rinse
- Glove wash/rinse
- Outer-glove removal
- Body-suit removal
- Inner-glove removal
- Hand wash/rinse
- Face wash/rinse
- Shower ASAP
- Dispose of PPE in municipal trash, or contain for disposal
- Dispose of personnel rinse water to facility or sanitary sewer, or contain for offsite disposal

Sample Equipment

- Wash/rinse equipment
- Solvent-rinse equipment
- Contain solvent waste for offsite disposal

Heavy Equipment

- Not covered by this HSP

6.2 Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SC-HW should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.

Figure 6-1 illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SC-HW to accommodate task-specific requirements.

7 Spill-Containment Procedures

Sorbent material will be maintained in the support zone. Incidental spills will be contained with sorbent and disposed of properly.

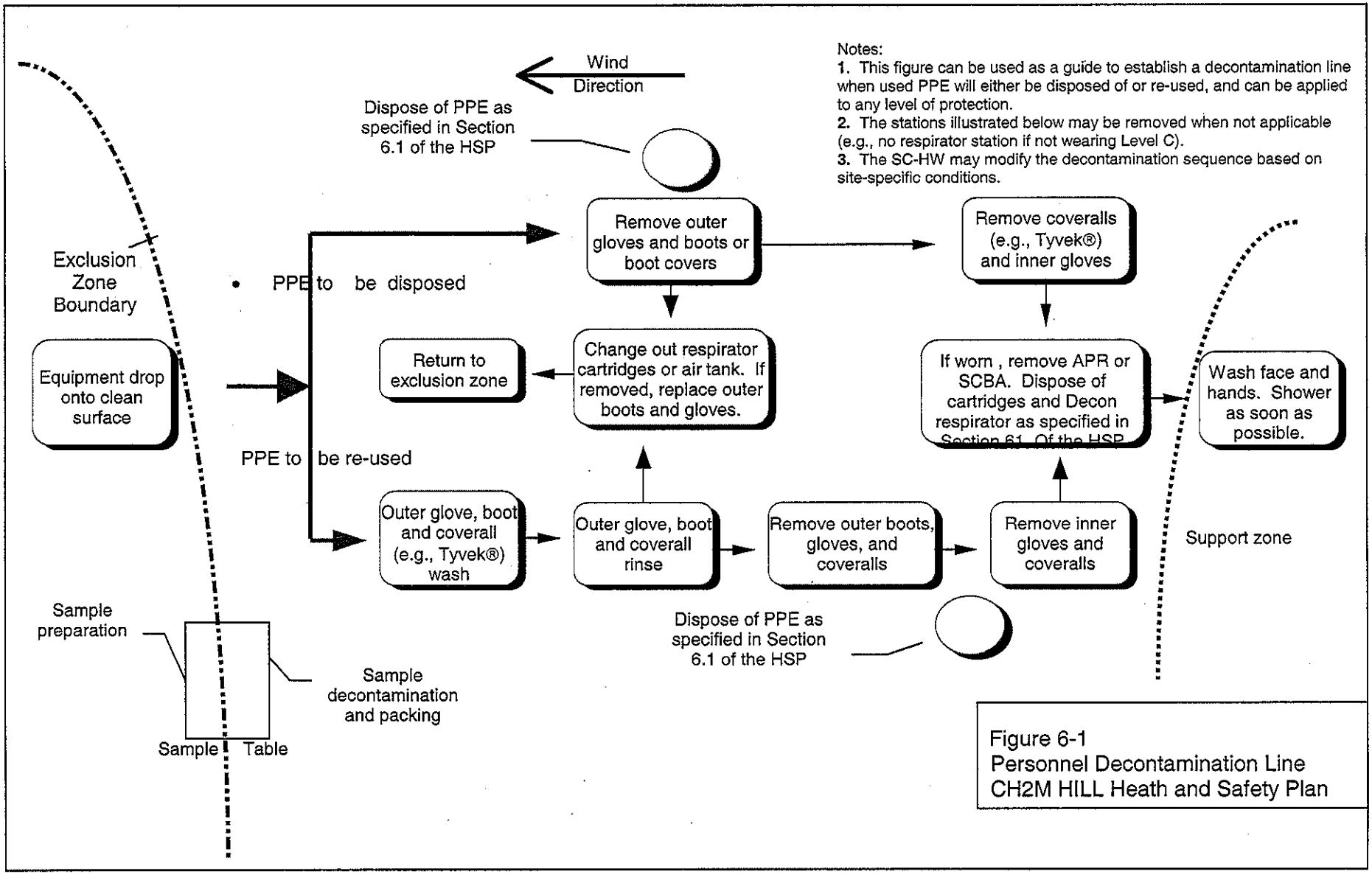


Figure 6-1
Personnel Decontamination Line
CH2M HILL Heath and Safety Plan

8 Site-Control Plan

8.1 Site-Control Procedures

(Reference CH2M HILL SOP HS-11, *Site Control)*

- The SC-HW will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing on site safety: general discussion of Health and Safety Plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies.
- The SC-HW records attendance at safety briefings in a logbook and documents the topics discussed.
- Establish support, decontamination, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the "buddy system."
- Initial air monitoring is conducted by the SC-HW in appropriate level of protection.
- The SCC is to conduct periodic inspections of work practices to determine the effectiveness of this plan – refer to Sections 2 and 3. Deficiencies are to be noted, reported to the HSM, and corrected.

8.2 Hazwoper Compliance Plan

(Reference CH2M HILL SOP HS-19, *Site-Specific Written Safety Plans)*

Certain parts of the site work are covered by state or federal Hazwoper standards and therefore require training and medical monitoring. Anticipated Hazwoper tasks (Section 1.1.1) might occur consecutively or concurrently with respect to non-Hazwoper tasks. This section outlines procedures to be followed when approved activities specified in Section 1.1.2 do not require 24- or 40-hour training. Non-Hazwoper-trained personnel also must be trained in accordance with all other state and federal OSHA requirements.

- In many cases, air sampling, in addition to real-time monitoring, must confirm that there is no exposure to gases or vapors before non-Hazwoper-trained personnel are allowed on the site, or while non-Hazwoper-trained staff are working in proximity to Hazwoper activities. Other data (e.g., soil) also must document that there is no potential for exposure. The HSM must approve the interpretation of these data. Refer to subsections 2.5 and 5.3 for contaminant data and air sampling requirements, respectively.
- When non-Hazwoper-trained personnel are at risk of exposure, the SC-HW must post the exclusion zone and inform non-Hazwoper-trained personnel of the:
  - nature of the existing contamination and its locations
  - limitations of their access
  - emergency action plan for the site
- Periodic air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-Hazwoper-trained personnel (e.g., in an adjacent area) are not exposed to airborne contaminants.
- When exposure is possible, non-Hazwoper-trained personnel must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to health and safety hazards.
- Remediation treatment system start-ups: Once a treatment system begins to pump and treat contaminated media, the site is, for the purposes of applying the Hazwoper standard, considered a treatment, storage, and disposal facility (TSDF). Therefore, once the system begins operation, only Hazwoper-trained personnel (minimum of 24 hour of training) will be permitted to enter the site. All non-Hazwoper-trained personnel must not enter the TSDF area of the site.

9 Emergency Response Plan

(Reference CH2M HILL, SOP HS-12, *Emergency Response*)

9.1 Pre-Emergency Planning

The SC-HW performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate.

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin, including driving route to hospital.
- Brief new workers on the emergency response plan.
- The SC-HW will evaluate emergency response actions and initiate appropriate follow-up actions.

9.2 Emergency Equipment and Supplies

The SC-HW should mark the locations of emergency equipment on the site map and post the map.

Emergency Equipment and Supplies	Location
Fire extinguisher (A, B, and C classes)	Support Zone/Heavy Equipment
First aid kit	Support Zone/Field Vehicle
Eye Wash	Support & Decon Zone/Field Vehicle
Potable water	Support & Decon Zone/Field Vehicle
Bloodborne-pathogen kit	Support Zone/Field Vehicle

9.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down CH2M HILL operations and evacuate the immediate work area.
- Notify appropriate response personnel.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled.

9.4 Emergency Medical Treatment

The procedures listed below may also be applied to non-emergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CH2M HILL medical consultant. During non-emergencies, follow these procedures as appropriate.

- Notify appropriate emergency response authorities listed in Section 9.8 (e.g., 911).
- The SCC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, state that the situation is a CH2M HILL matter, and give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 9.7.

9.5 Evacuation

- Evacuation routes and assembly areas (and alternative routes and assembly areas) are specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the SC-HW before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The SC-HW and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The SC-HW will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The SC-HW will write up the incident as soon as possible after it occurs and submit a report to the Corporate Director of Health and Safety.

9.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

9.7 Incident Notification and Reporting

- Upon any project incident (fire, spill, injury, near miss, death, etc.), immediately notify the PM and HSM. Call emergency beeper number if HSM is unavailable.
- For CH2M HILL work-related injuries or illnesses, contact and help Human Resources administrator complete an Incident Report Form (IRF). IRF must be completed within 24 hours of incident.
- For CH2M HILL subcontractor incidents, complete the Subcontractor Accident/Illness Report Form and submit to the HSM.
- Notify and submit reports to client as required in contract.

10 Approval

This site-specific Health and Safety Plan has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

10.1 Original Plan

Written By: Jim Bushnell **Date:** September 17, 2003

Approved By: Jim Bushnell **Date:** September 19, 2003

10.2 Revisions

Revisions Made By: Eric Aronson/PDX **Date:** January 2004

Revisions to Plan: Update tasks, hazard/controls, PPE, and air monitoring sections

Revisions Approved By: **Date: January 16, 2004**

John Culley/SEA

10.3 Revisions

Revisions Made By: Eric Aronson/PDX **Date:** September 2004

Revisions to Plan: Update tasks, hazard/controls, PPE, and air monitoring sections

Revisions Approved By: **Date: September 9, 2004**

John Culley/SEA

11 Attachments

Attachment 1: **Employee Signoff Form – Field Safety Instructions**
Attachment 2: **Project-Specific Chemical Product Hazard Communication Form**
Attachment 3: **Chemical-Specific Training Form**
Attachment 4: **Emergency Contacts**
Attachment 5: **Self-assessment Checklists**

SIGNOFF FORM

Health and Safety Plan

- The CH2M HILL project employees and subcontractors listed below have been provided with a copy of this HSP, have read and understood it, and agree to abide by its provisions.

Project Name: **Project Number:**

NAME (Please print)	EMPLOYEE SIGNATURE	COMPANY	DATE

CH2MHILL

Project-Specific Chemical Product Hazard Communication Form

This form must be completed prior to performing activities that expose personnel to hazardous chemicals products. Upon completion of this form, the SC-HW shall verify that training is provided on the hazards associated with these chemicals and the control measures to be used to prevent exposure to CH2M HILL and subcontractor personnel. Labeling and MSDS systems will also be explained.

Project Name: **Project Number:**

MSDSs will be maintained at the following location(s):

Hazardous Chemical Products Inventory

Chemical	Quantity	Location	MSDS Available	Container labels	
				Identity	Hazard

Refer to SOP HS-05 *Hazard Communication* for more detailed information.

CH2MHILL

CHEMICAL-SPECIFIC TRAINING FORM

Location:	Project # :
HCC:	Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

☐ Physical and health hazards

☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)

☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

Emergency Contacts

24-hour CH2M HILL Emergency Beeper – 888/444-1226

Medical Emergency – 911
Facility Medical Response #: on-site 7777 cell phone: (360) 425-2150 ext. 7777

CH2M HILL Medical Consultant
Health Resources
Dr. Jerry H. Berke, M.D., M.P.H.
600 West Cummings Park, Suite 3400
Woburn, MA 01801-6350
1-781-938-4653 1-800-350-4511
(After hours calls will be returned within 20 minutes)

Fire/Spill Emergency -- 911
Facility Fire Response #: on-site 4444
cell phone: (360) 425-2150 ext. 4444

Local Occupational Physician

Security & Police – 911
Facility Security #: on-site 7777
cell phone: (360) 425-2150 ext. 7777

Corporate Director Health, Safety & Environment
Name: Dave Waite/SEA
Phone: 425/453-5000
24-hour emergency beeper: 888-444-1226

Utilities Emergency
Comm Center: On site -5296

Regional Health & Safety Program Manager (RHSPM)
Name: Jim Bushnell/SEA
Phone: 425/453-5005 ext. 5678
Cell: 206/295-1785

Safety Coordinator (SC)
Name: Eric Aronson/PDX
Phone: 503/235-5000

Regional Human Resources Department
Name: Janis Williams/PDX
Phone: 503/235-5000

Project Manager (PM)
Name: Mark Leece/PDX
Phone: 503/235-5000

Corporate Human Resources Department
Name: Pete Hannan/COR
Phone: 303/771-0900

Federal Express Dangerous Goods Shipping
Phone: 800/238-5355

Worker's Compensation:
Contact Regional HR dept. to have form completed or contact Julie Zimmerman after hours: 303/664-3304

CH2M HILL Emergency Number for Shipping Dangerous Goods
Phone: 800/255-3924

Automobile Accidents:
Rental: Carol Dietz/COR 303/713-2757
CH2M HILL owned vehicle:
Zurich Insurance Co. 800/987-3373

Contact the PM. Generally, the PM will contact relevant government agencies.

Facility Alarms:

Evacuation Assembly Area(s):

Facility/Site Evacuation Route(s):

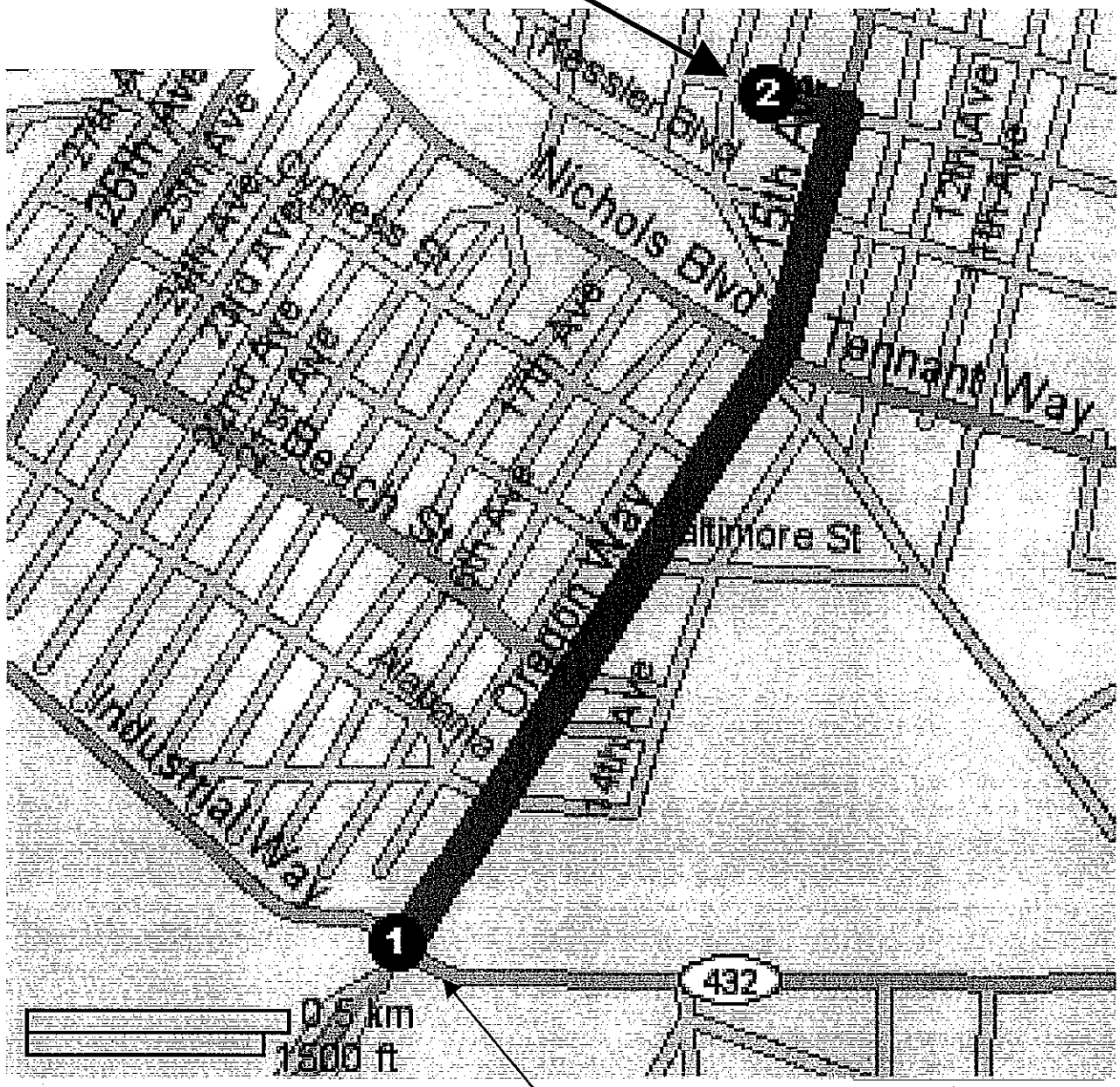
Hospital Name/Address: St John Medical Ctr
1615 Delaware St
Longview, WA

Hospital Phone #: (360) 414-2000

Directions to Hospital

Go 0.8 miles on Oregon Way
Continue on 15th Ave.
Turn Left on Delaware St. and go 0.1 mile to hospital.

St John Medical Ctr
1615 Delaware St,
(360) 414-2000



Weyerhaeuser Main Gate
3401 Industrial Way

CH2MHILL

H&S Self-Assessment Checklist - DRILLING

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to hazards associated with drilling operations (complete Sections 1 and 3), and/or 2) CH2M HILL oversight of a drilling subcontractor is required (complete entire checklist).

SC-HW may consult with drilling subcontractors when completing this checklist, but shall not direct the means and methods of drilling operations nor direct the details of corrective actions. Drilling subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Completed checklists shall be sent to the health and safety manager for review.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to drilling hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with drilling H&S requirements
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the drilling subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-35.

SECTION 1	Yes	No	N/A	N/O
PERSONNEL SAFE WORK PRACTICES (3.1)				
1. Only authorized personnel operating drill rig	☐	☐	☐	☐
2. Personnel cleared during rig startup	☐	☐	☐	☐
3. Personnel clear of rotating parts	☐	☐	☐	☐
4. Personnel not positioned under hoisted loads	☐	☐	☐	☐
5. Loose clothing and jewelry removed	☐	☐	☐	☐
6. Personnel instructed not to approach equipment that has become electrically energized	☐	☐	☐	☐
7. Smoking is prohibited around drilling operation	☐	☐	☐	☐
8. Personnel wearing appropriate PPE, per HSP/FSI	☐	☐	☐	☐

SECTION 2	Yes	No	N/A	N/O
GENERAL (3.2.1)				
9. Daily safety briefing/meeting conducted with crew	☐	☐	☐	☐
10. Daily inspection of drill rig and equipment conducted before use	☐	☐	☐	☐
DRILL RIG PLACEMENT (3.2.2)				
11. Location of underground utilities identified	☐	☐	☐	☐
12. Safe clearance distance maintained from overhead powerlines	☐	☐	☐	☐
13. Drilling pad established, when necessary	☐	☐	☐	☐
14. Drill rig leveled and stabilized	☐	☐	☐	☐
DRILL RIG TRAVEL (3.2.3)				
15. Rig shut down and mast lowered and secured prior to rig movement	☐	☐	☐	☐
16. Tools and equipment secured prior to rig movement	☐	☐	☐	☐
17. Only personnel seated in cab are riding on rig during movement	☐	☐	☐	☐
18. Safe clearance distance maintained while traveling under overhead powerlines	☐	☐	☐	☐
19. Backup alarm or spotter used when backing rig	☐	☐	☐	☐
DRILL RIG OPERATION (3.2.4)				
20. Kill switch clearly identified and operational	☐	☐	☐	☐
21. All machine guards are in place	☐	☐	☐	☐
22. Rig ropes not wrapped around body parts	☐	☐	☐	☐
23. Pressurized lines and hoses secured from whipping hazards	☐	☐	☐	☐
24. Drill operation stopped during inclement weather	☐	☐	☐	☐
25. Air monitoring conducted per HSP/FSI for hazardous atmospheres	☐	☐	☐	☐
26. Rig placed in neutral when operator not at controls	☐	☐	☐	☐
DRILL RIG MAINTENANCE (3.2.5)				
27. Defective components repaired immediately	☐	☐	☐	☐
28. Lockout/tagout procedures used prior to maintenance	☐	☐	☐	☐
29. Cathead in clean, sound condition	☐	☐	☐	☐
30. Drill rig ropes in clean, sound condition	☐	☐	☐	☐
31. Fall protection used for fall exposures of 6 feet or greater	☐	☐	☐	☐
32. Rig in neutral and augers stopped rotating before cleaning	☐	☐	☐	☐
33. Good housekeeping maintained on and around rig	☐	☐	☐	☐
DRILLING AT HAZARDOUS WASTE SITES (3.2.6)				
34. Waste disposed of according to HSP	☐	☐	☐	☐
35. Appropriate decontamination procedures being followed, per HSP	☐	☐	☐	☐

SECTION 3

Complete this section for all items checked "No" in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

CH2MHILL

H&S Self-Assessment Checklist - EARTHMOVING EQUIPMENT

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to hazards associated with earthmoving equipment operations (complete Sections 1 and 3), and/or 2) CH2M HILL oversight of a earthmoving equipment subcontractor is required (complete entire checklist).

SC-HW may consult with earthmoving equipment subcontractors when completing this checklist, but shall not direct the means and methods of equipment operations nor direct the details of corrective actions. Earthmoving equipment subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Completed checklists shall be sent to the health and safety manager for review.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to earthmoving equipment hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with earthmoving equipment H&S requirements
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the earthmoving equipment subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-27.

SECTION 1	Yes	No	N/A	N/O
PERSONNEL SAFE WORK PRACTICES (3.1)				
1. Only authorized personnel operating earthmoving equipment	☐	☐	☐	☐
2. Personnel maintaining safe distance from operating equipment	☐	☐	☐	☐
3. Personnel and equipment operator in close communication when personnel must be in proximity of operating equipment	☐	☐	☐	☐
4. Personnel approach operating equipment safely	☐	☐	☐	☐
5. Personnel wearing high-visibility and/or reflective vests when close to operating equipment	☐	☐	☐	☐
6. Personnel riding only in seats of equipment cab and using seat belts	☐	☐	☐	☐
7. Personnel not positioned under hoisted loads	☐	☐	☐	☐
8. Personnel not hoisted by equipment	☐	☐	☐	☐
9. Personnel instructed not to approach equipment that has become electrically energized	☐	☐	☐	☐
10. Personnel wearing appropriate PPE, per HSP/FSI	☐	☐	☐	☐

SECTION 2	Yes	No	N/A	N/O
GENERAL (3.2.1)				
11. Daily safety briefing/meeting conducted with crew	☐	☐	☐	☐
12. Daily inspection of equipment and equipment accessories conducted before use	☐	☐	☐	☐
13. At least one fire extinguisher available at the equipment operating area	☐	☐	☐	☐
EARTHMOVING EQUIPMENT COMPONENTS (3.2.2)				
14. Backup alarm or spotter used when backing equipment	☐	☐	☐	☐
15. Operational horn provided on bi-directional equipment	☐	☐	☐	☐
16. Seat belts are provided and used	☐	☐	☐	☐
17. Rollover protective structures (ROPS) provided	☐	☐	☐	☐
18. Braking system capable of stopping full payload	☐	☐	☐	☐
19. Headlights and taillights operable when additional light required	☐	☐	☐	☐
20. Brake lights in operable condition	☐	☐	☐	☐
21. Cab glass provides no visible distortion to the operator	☐	☐	☐	☐
22. Hauling equipment (dump trucks) provided with cab shield or canopy	☐	☐	☐	☐
23. Dump truck beds provided with positive means of support during maintenance or inspection	☐	☐	☐	☐
24. Dump truck operating levers provided with latch to prevent accidental dumping	☐	☐	☐	☐
EARTHMOVING EQUIPMENT PLACEMENT (3.2.3)				
25. Location of underground utilities identified	☐	☐	☐	☐
26. Safe clearance distance maintained while working under overhead powerlines	☐	☐	☐	☐
27. Safe distance is maintained while traveling under powerlines	☐	☐	☐	☐
28. Unattended equipment visibly marked at night	☐	☐	☐	☐
29. Parking brake set when equipment parked and equipment chocked when parked on incline	☐	☐	☐	☐
EARTHMOVING EQUIPMENT OPERATION (3.2.4)				
30. Equipment operated on safe roadways and grades	☐	☐	☐	☐
31. Equipment operated at safe speed	☐	☐	☐	☐
32. Equipment not operated during inclement weather, lightning storms	☐	☐	☐	☐
33. Using equipment to lift loads, other than earth, done according to equipment manufacturer specifications	☐	☐	☐	☐
34. Lifting and hauling capacities are not exceeded	☐	☐	☐	☐
35. Equipment components lowered when not in use	☐	☐	☐	☐
36. All machine guards are in place	☐	☐	☐	☐
37. Air monitoring conducted per HSP/FSI for hazardous atmospheres	☐	☐	☐	☐
EARTHMOVING EQUIPMENT MAINTENANCE (3.2.5)				
38. Defective components repaired immediately	☐	☐	☐	☐
39. Suspended equipment or equipment parts are supported prior to work under or between	☐	☐	☐	☐
40. Lockout/tagout procedures used prior to maintenance	☐	☐	☐	☐
41. Tires on split rims removed using safety tire rack or cage	☐	☐	☐	☐
42. Good housekeeping maintained on and around equipment	☐	☐	☐	☐
EXCAVATING AT HAZARDOUS WASTE SITES (3.2.6)				
43. Waste disposed of according to HSP	☐	☐	☐	☐
44. Appropriate decontamination procedures being followed, per HSP	☐	☐	☐	☐

SECTION 3

Complete this section for all items checked "No" in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Attachment 6

No. 6 Fuel Oil MSDS

Attachment C

Soil and Groundwater Management Plan

Prepared for

Weyerhaeuser Company
Chlor-Alkali Plant
Longview, Washington

October 2003

CH2MHILL

Soil and Groundwater Management Plan

1.0 Purpose

The purpose of this Soil and Groundwater Management Plan (plan) is to define procedures that ensure appropriate handling of contaminated soil and/or groundwater that may be disturbed as a result of routine maintenance activities and emergency repairs at the Weyerhaeuser Chlor-Alkali Plant (site). In particular, this plan is intended to ensure that maintenance activities associated with the disturbance of either soil and/or groundwater will not result in the release or a threatened release of mercury to the environment.

2.0 Background

Activities on the site involving the disturbance of, or exposure to, either soil or groundwater are subject to the terms and conditions of the Agreed Order, No DE 1037, and the associated Restrictive Covenant prepared pursuant to RCW70.105D.030(1)(f) and (g) and WAC 173-340-440. The Restrictive Covenant was developed because remedial action at the site will result in residual concentrations of mercury onsite that exceed the Washington Department of Ecology's (Ecology) cleanup levels for industrial soil and groundwater established under the Model Toxics Control Act (MTCA) (Chapter 173-340 WAC).

3.0 Applicability

Weyerhaeuser, the site owner (and the owner's assignees and successors), will implement the plan as part of ongoing operations at the site. The plan applies to routine maintenance activities and emergency repairs requiring the disturbance of subsurface soils and/or groundwater. Routine maintenance activities are defined as regular activities necessary to ensure ongoing operation of plant infrastructure and equipment. Emergency repairs are defined as activities necessary to protect the site from property damage due to plant upsets, or failed underground utilities. All other intrusive activities are subject to the requirements of the Agreed Order and Restrictive Covenant.

3.1 Routine Maintenance Activities

- Maintenance and repairs to subsurface utilities and structures
- Application of and repairs to erosion and runoff controls
- Installation of and repairs to fencing, signage, telecommunications, and lighting
- Maintenance and repairs to existing surface roads, drainage ditches, and rail tracks

3.2 Emergency Repairs

- Emergency repairs to subsurface utilities and structures
- Emergency repairs to fencing, signage, telecommunications, and lighting
- Emergency repairs to existing surface roads, drainage ditches, and rail tracks

4.0 Ecology Notification and Reporting

Routine maintenance activities performed in accordance with this plan will not require Ecology notification.

Emergency repairs will be commenced without notification, but will require a summary of the actions to be completed and submitted to Ecology. The owner will notify Ecology by phone within 1 business day of implementing action and will submit a completed Appendix A within 2 business days of completing the actions, documenting steps that were taken to be protective of the environment.

In the event that a release or exposure is identified during either routine maintenance or emergency repair work, Ecology will be notified immediately and procedures detailed in this plan will be implemented. Following identification of a release or exposure, Ecology has authority to issue orders or directives requiring remedial actions be completed to address the release.

Contact persons for matters related to the environmental media management under this plan are:

Owner: Environmental Manager (current incumbent or designee)
Weyerhaeuser Company
P.O. Box 188
Longview, WA 98632
Phone: (360) 425-2150

Ecology: Project Manager (current incumbent or designee)
Department of Ecology
P.O. Box 47775
Olympia, WA 98504-7775
Phone: (360) 407-6388

5.0 Soil and Groundwater Handling Procedures

5.1 Soil Handling Procedures

Elevated concentrations of mercury are present at the site in soil as a dispersed, residual contaminant. If an activity requires penetration of an impervious surface, the exposed or excavated soil will require special handling at the work site to prevent environmental release or spread of contamination. Similarly, soil excavated and stored from any activity must also be reused and/or disposed of in a manner that will not result in a release of mercury.

Actions that penetrate impervious surfaces or disturb soil will require the following special handling procedures:

1. ***Soil Screening***—Using visual means, examine exposed or excavated soil for evidence of mercury contamination. Conduct analytical testing of soil for mercury as appropriate.

2. ***Staging and Temporary Storage***—To prevent a release, manage soil that is stored pending analytical results. Use spill-proof containers such as U.S. Department of Transportation-(DOT) approved drums or roll-off bins. If soil is stockpiled, place all soil on and cover with an impermeable layer such as Visqueen, or store the soil onsite in an area where releases of hazardous contaminants will not occur. Implement best management practices to ensure that dust is not generated and uncontrolled run-on and runoff of soil entrained in stormwater does not occur.

3. ***Characterization***—Characterize any excavated soil, as necessary, to properly manage it, either onsite or to dispose of it offsite, in accordance with applicable federal and state solid and hazardous waste requirements. Remediation wastes, such as those at the site, are subject to the Washington State Dangerous Waste requirements for Waste Code D009 if the waste exhibits mercury concentrations greater than 0.2 milligrams per liter (mg/L) as demonstrated by the toxic characteristic leaching procedure, U.S. Environmental Protection Agency [EPA] test Method 1311.

4. ***Transportation and Disposal***—If possible, before excavation, contact the designated disposal facility and complete the necessary paperwork for waste disposal approval. Ensure that soil is disposed of in a timely manner and in accordance with applicable regulations. Maintain disposal records including waste manifests and disposal confirmation in accordance with applicable regulations.

5. ***Backfill***—At the location of excavation or soil removal, visually inspect area to ensure it is free of roots, debris, or other matter that could act as a preferential exposure pathway for mercury remaining on the site. Backfill the opening with clean fill or staged soil that is consistent with existing site conditions. Restore any disturbed cap or impermeable surface to a preexcavation condition.

6. ***Records***—Maintain documentation describing the activities related to the soil disturbance, including Appendix A and, as appropriate, laboratory analytical results, waste profiles, waste manifests, offsite disposal confirmation, and backfill information, including information regarding the proper repair or installation of the impervious surface layer.

5.2 Groundwater Handling Procedures

Elevated concentrations of mercury are present at the site in groundwater. If an activity requires groundwater collection (for example, excavation dewatering), collected groundwater will require special handling to prevent the environmental release or spread of contamination. Groundwater collected from any activity must be managed in a manner that will not result in release of hazardous contaminants.

Groundwater special handling procedures include the following:

1. ***Groundwater Testing***—As appropriate, conduct analytical testing of groundwater for mercury.

2. ***Staging and Temporary Storage***—To prevent a release, manage groundwater that is stored pending analytical results. Use spill-proof containers, such as DOT-approved drums or temporary holding tanks. Implement spill prevention and containment

countermeasures to ensure that the dewatering and fluid transfer practices do not result in uncontrolled releases to the environment. Similarly, construct storage containers to meet spill control integrity design requirements and to ensure sufficient freeboard and spill containment. The containers must not leak or be managed in a manner that would result in a release of their contents.

3. ***Characterization***—Characterize any collected groundwater as necessary, to properly manage its treatment or offsite disposal in accordance with applicable federal and state requirements. Remediation wastes, such as those at the site, are subject to Washington State Dangerous Waste requirements for Waste Code D009 if the waste exhibits mercury concentrations greater than 0.2 mg/L as demonstrated by the toxic characteristic leaching procedure, EPA test Method 1311.

4. ***Transportation and Disposal***—If possible, before collecting groundwater, contact the designated disposal facility and complete the necessary paperwork for waste disposal approval. Ensure that groundwater is disposed of in a timely manner and in accordance with applicable regulations. Maintain disposal records, including waste manifests and disposal confirmation, in accordance with applicable regulations.

5. ***Records***—Maintain documentation describing the activities associated with the collection of or impacts to groundwater, including Appendix A, and, as appropriate, laboratory analytical results, waste profiles, waste manifests, and treatment and/or offsite disposal confirmation. Any cap or impermeable surface disturbance resulting from groundwater activities must be restored to a predisturbance condition and documented.

6.0 Health, Safety, and Emergency Response Plan

A Health, Safety, and Emergency Response Plan (HSERP) has been developed consistent with the requirements of WAC 173-340-810, WAC 296-62 Part P, and WAC 296-824 and is included as Appendix B. The HSERP is intended specifically for routine maintenance activities and emergency repairs requiring the disturbance of subsurface soils and/or groundwater, as described in Section 3.0. Emergencies outside this scope are covered by other existing site response plans.

APPENDIX A

Report of Emergency Soil and/or Groundwater Management Activity

ATTACHMENT A

Report of Emergency Soil and/or Groundwater Management Activity
Weyerhaeuser Chlor-Alkali Plant
Longview, Washington

Note: This form will be submitted to the Washington Department of Ecology within 2 business days of completing emergency maintenance activities.

Maintenance Activity (Reason for Disturbance/Excavation) _____

Location of Maintenance Activity (attach site map that clearly indicates the area of activity relative to easily identifiable site features) _____

Describe Soil Activity

Approximate Surface Area of Cap/Impervious Soils Disturbance, ft^2 _____

Maximum Approximate Depth of Excavation, ft. _____

Approximate Volume of Excavated Soils, yd^3 _____

Location of Samples Collected _____

Describe Groundwater Activity

Approximate Site Area _____

Location of Samples Collected _____

Release Evaluation. Briefly describe steps that were taken to be protective of the environment.

_____

_____

_____

Form completed by: _____

Title: _____

Date: _____

APPENDIX B

Health, Safety, and Emergency Response Plan

Health, Safety, and Emergency Response Plan

This Health, Safety, and Emergency Response Plan (HSERP) will be kept on the site during soil and groundwater management activities and will be reviewed as necessary. The plan will be amended or revised, with the approval of the Washington Department of Ecology (Ecology), as activities or conditions change or when supplemental information becomes available. The plan adopts, by reference, employers' procedures, such as personal protective equipment (PPE) procedures, respiratory protection programs, medical surveillance programs, and training programs. In addition, this plan adopts procedures in the Soil and Groundwater Management Plan. The project coordinator is to be assigned by the employer performing the work and must be familiar with the contents of this plan. Site personnel engaged in soil and groundwater management activities must sign an acknowledgement that they have read and understand this plan.

Contents

1.0 Project Information and Description

SITE NAME: Weyerhaeuser Chlor-Alkali Plant

SITE ADDRESS: 3401 Industrial Way
Longview, WA 98632

DATE HEALTH AND SAFETY PLAN PREPARED: September 2003

SITE ACCESS: Via Plant Security Gate

SITE DESCRIPTION AND HISTORY:

The Weyerhaeuser Chlor-Alkali Plant produced chlorine and sodium hydroxide for use by the pulp and paper industry. Chlorine production using the mercury electrolytic cell process began in 1958, following construction of the No. 1 Cell Room. The plant was expanded in 1966 with the addition of a second cell room (the No. 2 Cell Room) and a liquefaction building. Chlorine production in the No. 1 Cell Room ceased in 1975. A year later, the mercury cells in the No. 2 Cell Room were converted to diaphragm cells (a non-mercury-based process). The No. 1 Cell Room was demolished in 1991 and the No. 2 Cell Room continued to operate until 1999. All operations ceased at the plant in March 1999. As a result of the operations prior to 1976, mercury was released to the site from equipment and process leaks and spills. Mercury was released from both the No. 1 and No. 2 Cell Rooms. Mercury present at the site is inorganic and has relatively low mobility.

The highest mercury concentrations remaining in soil average 46 milligrams per kilogram (mg/kg) and were reported in the vicinity of the former No. 1 Cell Room. Lower mercury concentrations (averaging 18 mg/kg) were reported within and near the central process area. The mercury concentrations averaged 3 mg/kg in soil in the west area and stormwater drainage ditch.

The distribution of mercury in the two water-bearing groundwater zones (alluvial groundwater and basalt groundwater) is predominantly a result of the zones' proximity to the most significant historical sources: the former No. 1 Cell Room and the former surface impoundment area. Groundwater monitoring indicates that the areas of the plant site where mercury concentrations were detected above the analytical detection limits are in the vicinity of these historical sources. In these areas, groundwater sample results show mercury concentrations in the alluvial and basalt groundwater zones ranging from below detection (0.002 microgram/liter [µg/L]) to 0.0095 µg/L.

2.0 Activities to be Performed

2.1 Description of Activities

Weyerhaeuser, the site owner (and the owner's assignees and successors), will implement the Soil and Groundwater Management Plan as part of ongoing operations at the site. The management plan applies to routine maintenance activities and emergency repairs requiring the disturbance of subsurface soils. These include the following:

Routine Maintenance Activities

- Maintenance and repairs to subsurface utilities and structures
- Application of and repairs to erosion and runoff controls
- Installation of and repairs to fencing, signage, telecommunications, and lighting
- Maintenance and repairs to existing surface roads, drainage ditches, and rail tracks

Emergency Repairs

- Emergency repairs to subsurface utilities and structures
- Emergency repairs to fencing, signage, telecommunications, and lighting
- Emergency repairs to existing surface roads, drainage ditches, and rail tracks

This Health, Safety, and Emergency Response Plan has been developed to assist site operators in the safe implementation of routine maintenance activities and emergency repairs that may encounter residual mercury in soils and/or groundwater. A health and safety activity hazard analysis (Section 2.2) has been performed for each routine maintenance and emergency repair activity. Activity-specific hazard controls and requirements for monitoring and protection shall be reviewed and implemented by the project coordinator prior to initiating activities.

2.2 Activity Hazard Analysis

(Refer to Section 3.0 for hazard controls.)

Potential Hazards	Activities				
	Excavation/Sub-Surface Work	Erosion Control Maintenance	Installation of and Repairs to Fence, Signs, Telecom, and Lighting	Work on Roads and Near Railroad Tracks	Sampling Spills for Mercury
Flying debris/objects	X		X	X	
Noise > 85dBA	X		X	X	
Electrical	X		X		
Suspended loads	X	X	X	X	
Buried utilities, drums, tanks	X		X		
Slip, trip, fall	X	X	X	X	X
Back injury	X	X	X	X	X
Confined space entry	X				
Trenches/ excavations	X		X		X
Visible lightning	X	X	X	X	X
Vehicle traffic		X	X	X	X
Elevated work areas/falls	X		X		X
Fires	X		X	X	
Heavy equipment	X	X		X	
Mercury Exposure	X	X	X	X	X

3.0 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards unique to mercury exposures on this site. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. Workers must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. Workers who do not understand these provisions should contact the project coordinator for clarification.

3.1 Physical and Biological Hazards

Specific physical and biological hazards for the task will be identified during task planning. Specific hazard control measures for physical and biological hazards will be determined and implemented by the employer undertaking the task.

3.2 Chemical Hazards and Controls

Elemental mercury is a liquid metal or vapor at normal temperatures. Mercury is insoluble in water. Liquid mercury is poorly adsorbed through the skin, but mercury vapor is readily absorbed through the lungs, intact skin, and gastrointestinal tract. The absorption of inorganic mercury depends on the solubility of the particular salt or of the products to which it is converted. Organic mercury compounds are not anticipated to be found on this site.

The nervous system is very sensitive to all forms of mercury. Mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain function may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems. While unlikely during excavation activities, short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increased blood pressure or heart rate, skin rashes, and eye irritation.

Mercury's harmful effects may be passed from the mother to the developing fetus and include brain damage, mental retardation, lack of coordination, blindness, seizures, and an inability to speak.

The Washington Department of Labor and Industries (WISHA) has set a Permissible Exposure Limits (PEL) of 0.05 milligram of mercury vapor per cubic meter of workplace air (0.05 mg/m^3) for 8-hour shifts and 40-hour work weeks.

For mercury vapor and inorganic mercury compounds, WISHA has established a maximum ceiling concentration of 0.1 mg/m^3. This is the concentration that cannot be exceeded at any time during an 8-hour shift.

CONTAMINANTS OF CONCERN

CONTAMINANTS OF CONCERN (REFER TO PROJECT FILES FOR MORE DETAILED CONTAMINANT INFORMATION)

Contaminant	Location and Highest[a] Concentration	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure[d]	PIP[e] (eV)
Mercury (inorganic)	54 mg/kg (SS) (average concentration near former brine spill area adjacent to Cell Room No. 2)	0.05 mg/m^3	10 mg/m^3	Eye and skin irritation; cough, chest pain, shortness of breath, bronchial pneumonitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, mouth inflammation, salivation, GI distress, anorexia, weight loss	UK

Footnotes:

a: Specify sample-designation and media: SB (Soil Boring), SG (Soil Gas), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), SS (Surface Soil), SL (Sludge), SW (Surface Water),
b: Appropriate value of PEL, REL, or TLV listed
c: IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen
d: NIOSH Pocket Guide to Chemical Hazards
e: PIP = photoionization potential; NA = Not applicable; UK = Unknown

POTENTIAL ROUTES OF EXPOSURE

DERMAL: Contact with contaminated media. This route of exposure is minimized through proper use of PPE.	**INHALATION:** Vapors and contaminated particulate. This route of exposure is minimized through proper respiratory protection and monitoring.	**OTHER:** Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before eating, drinking, or smoking).

4.0 Project Organization and Personnel

4.1 Worker Medical Surveillance and Training

4.1.1 Training

Craft Labor

Workers who are engaged in activities listed in Section 2.1 must meet one of the following training requirements:

- WISHA hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. If supplied air respiratory protection (level B) must be used based on air monitoring data, an additional 40 hours of Health and Safety training must be documented by the employer.
- Training that covers the following:
  - Use of personal protective equipment, including respiratory protection
  - Work practice controls for handling mercury-contaminated soil
  - Emergency response procedures for handling solid spills and responding to the discovery of liquid elemental mercury (first responder at the operations level)

Project Coordinator

The person designated as the project coordinator must have additional supervisory training meeting the requirements of WAC 296-62 Part P, and must have specific training in the use of air monitoring instruments.

4.1.2 Medical Surveillance

Workers who conduct activities listed in Section 2.1 must be medically qualified to perform the work. Medical examinations that meet the criteria of WAC 296-62, Part P are required. In addition to the basic requirements, medical approval to use respiratory protective equipment must be current.

4.2 Communication Procedures

Any person working on the project is responsible for notifying the project coordinator of any spills or releases during the course of the project. The project coordinator is responsible for notifying the site contact for spills and releases and reporting according to Section 8.2. The project coordinator is responsible for contacting the Health and Safety Manager as appropriate.

5.0 Personal Protective Equipment (PPE)

5.1 PPE Specifications

PPE Specifications [a]

Task	Level	Body	Head	Respirator [a]
• General site entry • Application and repairs to erosion and runoff controls • Installation of and repairs to fencing, signage, telecomm and lighting • Maintenance and repairs to existing surface roads, drainage ditches, and rail tracks. • Tasks with no sub-surface intrusion. • All tasks which have been cleared through Mercury air monitoring	D	Work clothes; steel-toe, leather work boots; work glove. High visibility vests may be required.	Hardhat [c] Safety glasses Ear protection [c]	None required
• Mercury Air Monitoring • Marking areas where Mercury is detected	Modified C	Cotton coveralls or uncoated Tyvek **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	• Hardhat [b] Safety glasses Ear protection [c]	• APR, full face, with mercury vapor cartridges.
• Tasks with subsurface intrusion prior to air monitoring. • Removing elemental mercury using mercury collection vacuum. • Tasks requiring upgrade (as described in Section 5.2 and 6.0)	C	**Coveralls:** Saranex coated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [b] Splash shield [b] Ear protection [c] Spectacle inserts	APR, full face, with mercury vapor cartridges.
• Tasks requiring upgrade (as described in Section 5.2 and 6.0)	B	**Coveralls:** Polycoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [b] Splash shield [b] Ear protection [c] Spectacle inserts	Positive-pressure demand self-contained breathing apparatus (SCBA); MSA Ultralite, or equivalent.

5.2 Reasons for Upgrading or Downgrading Level of Protection

Reasons for Upgrading or Downgrading Level of Protection

Upgrade[d]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 5) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] No facial hair that would interfere with respirator fit is permitted.

[b] Hardhat and splash-shield areas are to be determined by the project coordinator.

[c] Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.

[d] Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the project coordinator.

5.3 Cartridge Changeout Schedule

MSA mersorb cartridges have an end-of-life service indicator. Cartridges must be changed when the indicator changes color, indicating the cartridge no longer provides protection.

6.0 Air Monitoring/Sampling Specifications

Instrument	Tasks	Action Levels[a]		Frequency [b]	Calibration
Jerome Mercury Vapor Analyzer, Model 431-X, or equivalent	All Tasks	0 – 0.025 mg/m^3	Level D	Per Manual	Per Manual
		0.025 – 0.5 mg/m^3	Level C		
		> 0.5 mg/m^3	Level B		

[a] Action levels apply to sustained breathing-zone measurements above background.

[b] The exact frequency of monitoring depends on field conditions and is to be determined by the SSC; generally, every 5 to 15 minutes is acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place or location where measurement is taken (e.g., "Breathing Zone/MW-3," "at surface/SB-2").

7.0 Decontamination

Decontamination is the process of removing residual mercury that may have accumulated on personnel and equipment during routine maintenance activities or emergency repairs. Minimizing the spread of residual mercury contamination is the primary goal the decontamination process.

When contaminated soil is encountered during any operation or if contaminated soil is spilled, then proper decontamination must be established according to this section. Decontamination and establishing work zones in accordance with this section are not required if contaminated soil is not encountered.

The project coordinator must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the project coordinator. The project coordinator must ensure that procedures are established for disposing of materials generated on the site.

Consideration shall be given to the following personnel items during decontamination:

- Boots
- Gloves (outer/inner)
- Body-suit
- Hardhats
- Respirator removal
- Hand wash/rinse
- Face wash/rinse

Consideration shall be given to the following equipment items during decontamination:

- Hand tools/equipment
- Heavy equipment
- Disposal of rinse water

7.1 Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in the exclusion or decontamination zones. The project coordinator should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.

Figure 7-1 illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the project coordinator to accommodate task-specific requirements.

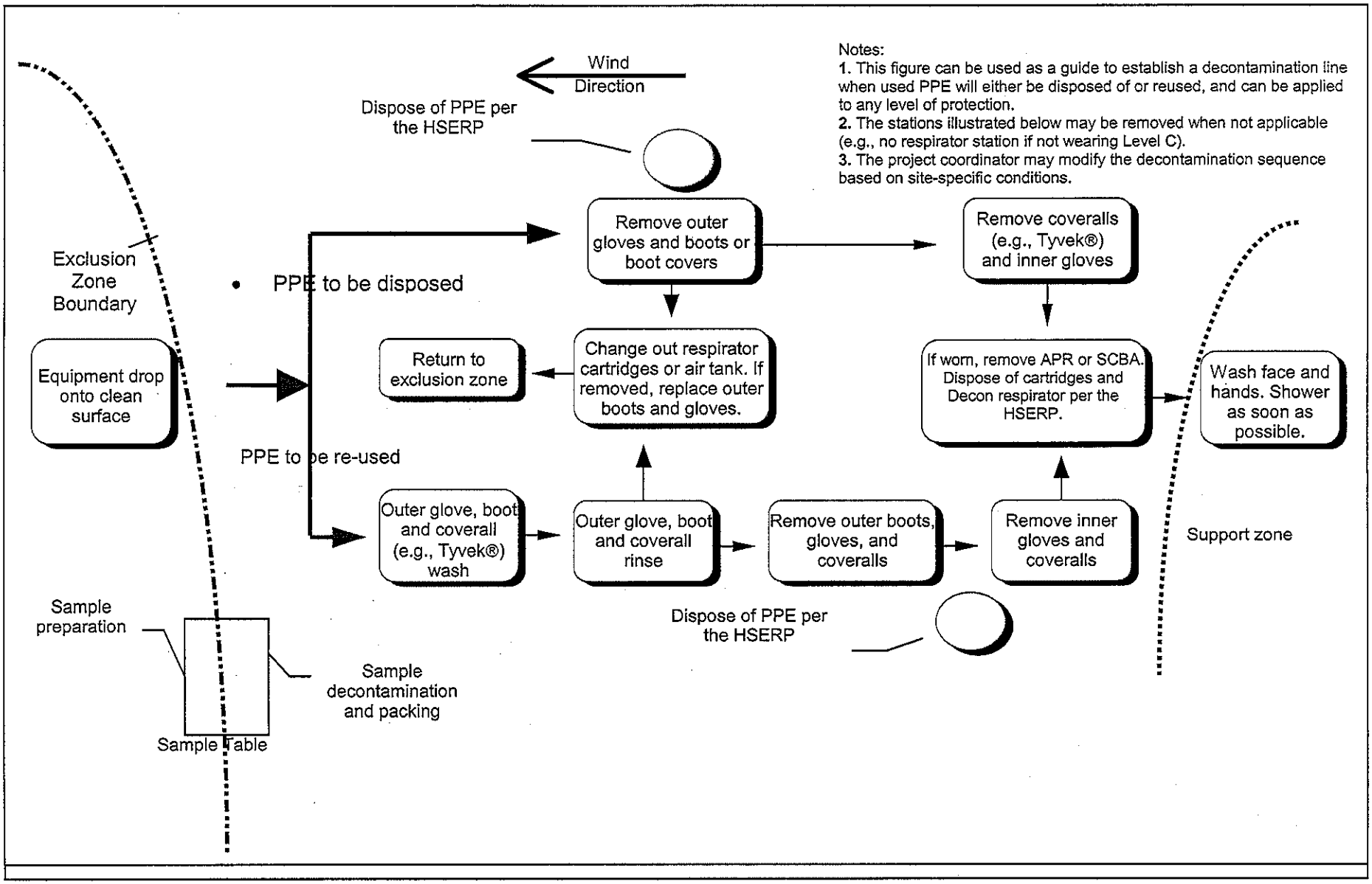


FIGURE 7-1
Work and Decontamination Zone Diagram

8.0 Release Response

8.1 General Release Response Actions

The following general response actions should be implemented in the event of a spill.

- Stay a safe distance away and alert others
- Notify the Communication Center by dialing 911 or X5296 on a mill site phone
- Assess scene for all hazards
- Identify the chemical released, if possible
- Note location and other identifying elements (flames, clouds, mist, liquid, placards/label information, weather, and hazards to responders)
- Safely confine the released material from contaminating soil, ditches or the river
- Keep others out as scene requires

8.2 Mercury-Specific Release Response Actions

In the event of a release or exposure of contaminated soil or groundwater, actions to be taken include the following:

Observe Safety Precautions

- Do not attempt to respond to the release or exposure unless properly trained (small spills—hazard communication training; large spills—40-hour Hazmat training).
- Conduct air monitoring to establish the level of PPE.
- Always wear proper personal protective equipment.

Report the Release or Exposure

- Follow established reporting procedures forreleases or exposures to the environment. Call the Communication Center at 911 or X5296 on a mill site phone to report all mercury releases or exposures.
- In the event that a release or exposure is identified during either routine maintenance or emergency repair work, Ecology will be notified immediately and procedures detailed in this plan will be implemented. Following identification of a release, Ecology has authority to issue orders or directives requiring remedial actions be completed to address the release.

Prevent Further Release

- Safely confine the material from contaminating soil, ditches, or the river.
- Take action to prevent further release or exposure, stop backhoe operation, turn off water, and other actions as needed.

- Rope off the area to prevent site access to unauthorized persons.

Implement Cleanup Procedure

- Call the HAZMAT response team to the release or exposure. The response team has mercury clean-up kits and will clean up mercury within their capability and the capacity of the kits they have.
  - For solid releases, shovel material into drums, trucks (lined with visqueen), or appropriate receptacle.
  - For liquid/elemental mercury releases, use appropriate mercury vacuum or mercury absorbent and collect material.
  - For water releases, pump potentially contaminated water into tank, drum, lined pond, or other area as directed by the appropriate Weyerhaeuser Environmental personnel.
- Call an external HAZMAT contractor if the spill exceeds the HAZMAT team's response capability, or if they are tied up on other emergencies.

9.0 Site-Control Plan

Activity Safety Briefing

The project coordinator will conduct a site safety briefing before starting routine maintenance or emergency repairs that involve penetration of impervious surfaces and excavation of subsurface soil. Topics for briefing on site safety may include: general discussion of Health and Safety Plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, and emergencies.

Site Control

The project coordinator will ensure that support, decontamination, and exclusion zones have been established prior to beginning work and will delineate with flags or cones as appropriate based on known contamination levels and anticipated hazards. The support zone should be upwind of the work area. Access control shall be established at entry and exit from each work zone.

Communication

The notification system for the Longview site consists of two primary elements:

- A ZETRON controller for activating radios and public address/intercom systems on the plant site.
- A Whelen electronically supervised high-powered audio warning system consisting of six 2,000-watt speakers strategically located across the Longview complex with the capability of alarm and voice transmission.

The Communication Center is manned 24 hours a day, 7 days a week. It is located next to the switchboard in the main office. If the Communication Center receives an alert message, it will broadcast to:

- Mill Population
- Near-Plant Neighbors
- 911 (if necessary)

Status reports will be broadcast every 10 minutes during an emergency.

Telephones

- In the event of a telephone outage, site radios will be used as the back-up communication system.
- Emergency response staff are equipped with multichannel radios to allow for communications during an emergency.

10.0 Emergency Response Plan

10.1 Emergency Planning

This emergency response plan covers spills of contaminated soil or water arising from the work activities described in Section 2.1. For all other emergencies, follow the site emergency response plan.

The project coordinator performs the applicable emergency planning tasks and coordinates emergency response with onsite parties, the facility, and local emergency-service providers as appropriate. Emergency planning is an ongoing activity that is conducted by the project coordinator on a regular basis. Tasks are as follows:

- Review the facility emergency and contingency plans.
- Review onsite communication equipment.
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Inform the site emergency responders of anticipated types of site emergencies.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for releases.
- Rehearse the emergency response plan regularly.
- Brief new workers on the emergency response plan.

The project coordinator will evaluate emergency response actions and initiate appropriate follow-up actions.

10.2 Emergency Equipment and Supplies

Prior to beginning work, the project coordinator will review the need for and confirm the location of the following appropriate emergency equipment and supplies.

- Fire extinguisher
- First aid kit
- Eye wash
- Potable water

- Bloodborne-pathogen kit
- Mercury vacuum
- Mercury spill kit (HG-X or equivalent)

10.3 Emergency Medical Treatment

Medical Emergency

Bloodborne Pathogens

The targeted diseases referred to as bloodborne pathogens include human immunodeficiency virus (HIV), hepatitis B virus (HBV), and other bloodborne diseases such as syphilis and malaria.

If you give first aid at the workplace, you must protect yourself from transmission of disease. The best way to protect yourself is to create a barrier between you and the accident victim's blood or other body fluids.

The first aid and trauma kits contain the following equipment for your protection:

- Latex gloves
- Disposable resuscitator microscreens
- Masks with eye shields

Minor Injuries

Example types: scrapes, small cuts, bruises, bumps, minor burns, and controllable bleeding.

Action Steps

1. Treat with first aid supplies and notify supervisor. First aid kits are available throughout the mill.
2. Seek additional first aid from HealthWorks Northwest or St. John Hospital if deemed appropriate.

Serious Injury/Illness

Example types: faintness/dizziness present with other symptom(s), shock symptoms (pale, sweaty, cold skin), profuse bleeding, probable broken limb(s), unconsciousness, chest pain, shortness of breath, and falls with possible spinal cord injury.

Action Steps:

1. Do what is necessary to prevent further injury:

- Shut down operations.
- Lock out the power source (for example, steam, electrical, hydraulic).
- Provide preliminary first aid care as required by the type of injury. ***Do not move the injured unless they are in a dangerous area.***

2. Call 911 for an ambulance. Do not transport the injured person in a personal or company vehicle.

- Give emergency response location number and type of injury.
- Give number of closest, most direct access.
- Give your name and location.
- Stay on the phone until all information is received and understood.
- Make sure someone guides the ambulance personnel to the injured person.

10.4 Evacuation

If you are advised to evacuate, leave the plant site in an orderly fashion. Evacuation routes and assembly areas are shown in Figure 10-1.

10.5 Evacuation Notification

The notification system for the Longview site consists of:

- A ZETRON controller for activating radios and public address/intercom systems on the plant site.
- A Whelen electronically supervised high-powered audio warning system consisting of six 2,000-watt speakers strategically located across the Longview complex with the capability of alarm and voice transmission.

10.6 Incident Notification and Reporting

- In the event of a project incident (for example, fire, spill, injury, near miss, death), immediately notify the project coordinator.
- The project coordinator is responsible for notifying appropriate site managers.

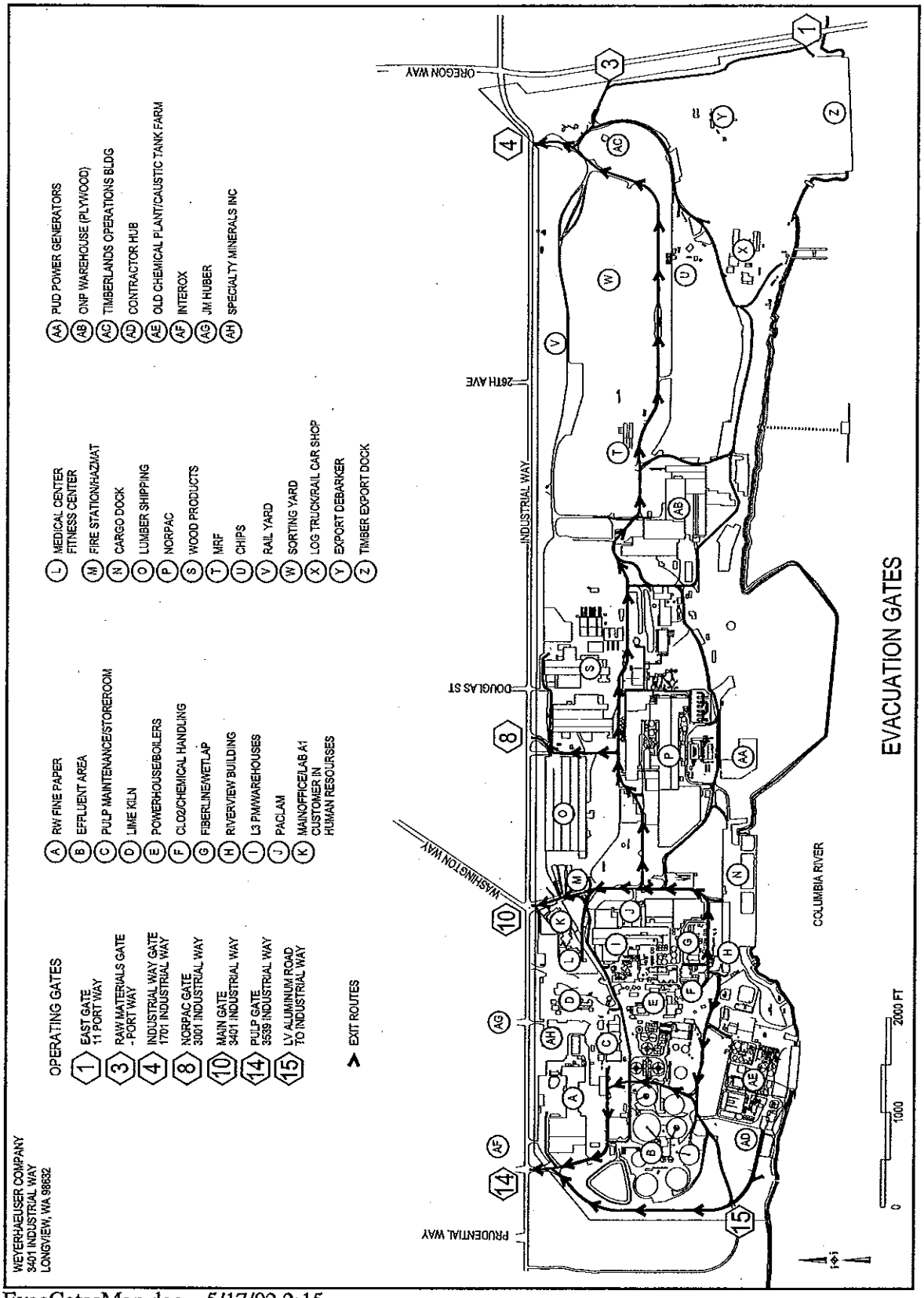
10.7 Emergency Contacts

EMERGENCY CONTACT LIST

	Ext.
Ambulance	911
Fire Department	911
HAZMAT	911
Communication Center	5296

Figure 10 – 1

Evacuation Routes and Assembly Areas



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