

Long-term Groundwater Monitoring and Reporting Plan

**Taylor Lumber and Treating
Superfund Site**

Prepared by
U.S. Environmental Protection Agency

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1. Introduction

1.1 Overview

The purpose of this Long-term Groundwater Monitoring and Reporting Plan (LGMRP) is to describe the objectives, sampling, analysis, and reporting procedures for the long-term groundwater monitoring activities as related to the needs identified in the Record of Decision (ROD) for the Taylor Lumber and Treating Superfund Site (TLT Site) in Sheridan, Oregon. The TLT Site is a fund-financed site, and the U.S. Environmental Protection Agency (EPA) completed remedial action construction activities in 2008 (EPA 2008). EPA determined that the site was operational and functional (O&F) on September 30, 2009 (EPA 2009). Upon O&F, the Oregon Department of Environmental Quality (Oregon DEQ) is the State agency responsible for ensuring that operation and maintenance, including groundwater monitoring, is carried out at the site (Superfund State Contract, EPA 2007).

This document is organized as follows:

- Section 1 – Introduction
- Section 2 – Field Sampling Plan
- Section 3 – Field Quality Assurance/Quality Control
- Section 4 – Sample Management and Handling
- Section 5 – Documentation
- Section 6 – Reporting
- Section 7 – References

1.2 Project Organization

The names and responsibilities of key project personnel that will be involved in long-term groundwater monitoring at the TLT Site are listed in Table 1.

1.2.1 Distribution List

Karen Keeley, EPA Regional Project Manager

Ginna Grepo-Grove, EPA Regional QA Manager

Norm Read, Oregon DEQ Project Manager

Oregon DEQ Quality Assurance Manager

1.2.2 Special Training Requirements and Certifications

Field personnel conducting sample collection will have complied with Oregon DEQ training requirements for Health and Safety and media specific sample collection. Knowledge, understanding and experience with the well sample collection and field survey techniques cited in this plan will be documented prior to mobilization to the field.

Laboratory(s) supporting this effort will have a current drinking water certification from the State of Oregon for the analysis of pentachlorophenol.

1.3 Data Quality Objectives

1.3.1 Background

The Taylor Lumber and Treating Superfund Site is a wood treating facility located in Yamhill County, Sheridan, Oregon (Figure 1). The EPA identification number for the site is ORD009042532. The entire site is one operable unit. The ROD was signed on September 30, 2005. The Preliminary Close Out Report was signed on September 24, 2008. The Final Construction Report was completed in March 2009 (CH2M HILL 2009). The Operation and Maintenance Plan for the TLT Site was completed in October 2009 (CH2M HILL 2009).

TLT operated at the site from 1946 until 2001, when TLT filed for bankruptcy. Pacific Wood Preserving of Oregon (PWPO) entered into a Prospective Purchaser Agreement with EPA and purchased the wood-treating portion of the facility, beginning operations in June 2002. PWPO is currently active at the site, using copper- and borate-based treating solutions.

As required by the ROD, contaminated soils have been removed from the site and transported to an off-site landfill. Contaminated soils were removed from specified portions of the site (Treated Pole Storage Areas and White Pole Storage Area), railroad ditches, roadside ditches, adjacent gullies, and former soil storage cells. Post-excavation confirmational sampling results show that the cleanup goals were met (CH2M HILL 2009).

At the TLT Site, contaminated soils and groundwater remain within the treatment plant area (approximately 6 acres), encompassed by a soil-bentonite barrier wall (Figure 2). The ROD identifies pentachlorophenol (PCP) as the contaminant of concern in groundwater. The depth of the barrier wall between the ground surface and the top of the siltstone ranges from 14 to 20 feet. The siltstone beneath the TLT Site functions as an aquitard. The barrier wall is keyed into the siltstone to minimize seepage along the bottom of the wall. The permeability of the wall was designed to be less than 1×10^{-7} centimeters per second (cm/sec).

Low-permeability asphalt pavement is placed over the entire area encompassed by the barrier wall (approximately 6.7 acres). The asphalt meets the design-specified 1×10^{-8} cm/sec permeability criteria. The asphalt cap serves to impede the infiltration of stormwater into the groundwater in the area encompassed by the barrier wall and protect people from direct contact with contaminated soils located within the barrier wall. Four groundwater extraction wells, which pump less than 0.2 to 0.5 gallons per minute (gpm) (CH2M HILL, September 15, 2009), are installed within the barrier wall to induce an inward hydraulic gradient and to prevent the water level from rising above the protective asphalt

cap. Control of the groundwater elevation within the barrier wall is important to ensure the structural stability of the asphalt cap, and must be regularly monitored (CH2M HILL 2009). The extracted groundwater is conveyed to PWPO's onsite stormwater treatment system, which discharges to the South Yamhill River pursuant to a National Pollutant Discharge Elimination System (NPDES) permit.

Installation of the barrier wall effectively cut off the dense non-aqueous phase liquid (DNAPL) and PCP-contaminated groundwater plume. DNAPL does not occur outside the barrier wall (ROD; p. 36). However, some dissolved PCP still exists outside the barrier wall, with the highest concentrations occurring immediately downgradient from the wall and decreasing rapidly with distance from the wall¹. This contamination existed prior to installation of the wall, and does not indicate failure of the barrier wall (ROD; p. 36). Although the installation of the barrier wall created a groundwater stagnation zone in the area immediately downgradient of the wall, long-term groundwater monitoring will be performed to ensure that migration of PCP-contaminated groundwater is controlled to minimize risk to ecological receptors in surface waters (South Yamhill River, Rock Creek), and to monitor effectiveness of the wall.

A summary of all existing groundwater wells, including the two residential wells, is provided in Table 2, and well locations are shown on Figure 2. This compilation of information on groundwater wells is based on the *Monitor Well Information Summary* (CH2M HILL, June 30, 2009; CH2M HILL 2009FCR). Historical groundwater data is summarized in the Remedial Investigation/Feasibility Study, the ROD, and in post-ROD data reports. The most recent groundwater sampling event occurred in 2006 (CH2M HILL 2006).

Consistent with the ROD, this Plan focuses on long-term monitoring of shallow groundwater outside the barrier wall.

1.3.2 Problem Statement

The ROD establishes the following remedial action objectives (RAOs) for groundwater:

- Prevent migration of the DNAPL and contaminated groundwater to outside of the barrier wall.
- Minimize future migration of contaminated groundwater to adjacent surface water (Rock Creek, South Yamhill River) to protect ecological receptors.
- Restrict human exposure to groundwater with contaminant concentrations that exceed federal drinking water standards both inside and outside the barrier wall.

The RAO that addresses groundwater outside the barrier wall was developed to minimize future migration of contaminated groundwater to adjacent surface water (South Yamhill River, Rock Creek) to protect ecological receptors. Also, the RAO that addresses groundwater outside the barrier wall was developed because of elevated risks to hypothetical future residents that may drink the shallow groundwater. Although this

¹ Based on pre-ROD data, PCP concentrations in groundwater outside the wall did not change substantively between May 2002 and April 2005. It appears that the PCP concentrations in the vicinity of MW-15S and MW-16S (just south of the barrier wall) are located in the stagnation zone created by the barrier wall. Groundwater velocity in this area is essentially zero; that is, the PCP in the groundwater is not moving. Data from wells downgradient of MW-15S and MW-16S indicate that PCP-contaminated groundwater is not reaching the river.

shallow groundwater is not used currently for drinking, there was a potential risk of unacceptable excess lifetime cancer to hypothetical future residents from exposure to groundwater outside the barrier wall in a drinking water well. The primary contributor to potential cancer risk in this well is PCP, and PCP concentrations exceed the federal Maximum Contaminant Level (MCL) of 1 µg/L PCP, with the highest concentrations south and east of the barrier wall. CERCLA specifies that federal MCLs are also relevant and appropriate cleanup goals for groundwater. The groundwater cleanup level applies to all shallow groundwater outside the barrier wall. The groundwater cleanup level does not apply to groundwater inside the barrier wall because this area is a waste management area per the NCP preamble.

To achieve the RAO that addresses groundwater outside the barrier wall, the ROD specified development and implementation of a Long-term Groundwater Monitoring and Reporting Plan to include, at a minimum, the following [excerpted from Section 12.1 of the ROD]:

- Monitoring objectives, overview of monitoring approach, monitoring program design, data analysis and interpretation, reporting requirements, schedule, Field Sampling Plan, Quality Assurance Project Plan, Health and Safety Plan, field forms, and other relevant information.
- The primary objective of the monitoring program is to provide data that can be evaluated to document that PCP-contaminated groundwater is not migrating to the South Yamhill River, and is not migrating across Rock Creek Road to the residences and wells.
- The monitoring program for shallow groundwater will include, but will not be limited to, water level measurements, field measurements of water quality parameters, collection and PCP analysis of samples from wells at the site, and comparisons of results to previous data. Wells that likely will be included in the monitoring program will be the wells located south of the barrier wall and east of the Treatment Plant Area. Additionally, a new monitoring well will be installed near the former Geoprobe location GP-03. Additional monitoring wells will be installed as needed.
- Deep groundwater from nearby residential well RW-01 will be analyzed for PCP on a periodic basis because the residents currently get their water from this well. This hand-dug well is apparently 30 feet deep, which would put the well into the siltstone aquifer. Groundwater from nearby well RW-02 will also be analyzed for PCP because groundwater has historically been extracted for on-property watering. Although groundwater PCP concentrations have not been a problem in these wells historically, EPA believes it is prudent to continue sampling these wells at least once per year for the next five years and beyond if deemed appropriate.

1.3.3 Project Objectives

The purpose of groundwater monitoring at TLT is to answer the following questions:

- Is the barrier wall effectively containing NAPL and contaminated groundwater beneath the treatment plant area?

Groundwater concentrations of PCP outside the barrier wall will be collected and analyzed, and will results will be compared to historical concentrations. A decreasing trend will suggest that the wall is effective.

If contamination is not contained by the barrier wall, i.e., concentrations are increasing outside the wall at levels of concern, several additional wells will be required to adequately monitor groundwater quality between the treatment plant and the river.

Also, as described in the OMP (CH2M HILL 2009), groundwater level monitoring will be performed to ensure that the barrier wall is functioning as intended, and that the groundwater extraction wells are maintaining an inward hydraulic gradient. Groundwater level monitoring at monitor wells inside and outside of the barrier wall will be used to determine that an inward hydraulic gradient is being maintained within the barrier wall through groundwater extraction. The OMP recommends annual monitoring.

- Is PCP-contaminated groundwater outside the barrier wall (near MW-15S and MW-16S) migrating to the South Yamhill River and/or Rock Creek, or across Rock Creek Road to residential well RW-02?

Groundwater concentrations of PCP outside the barrier wall will be compared to historical PCP groundwater concentrations, and trends analyses will be performed to evaluate whether PCP is migrating off-site.

- Are PCP concentrations in groundwater remaining undetected in residential well RW-01, which is located west of the site, and RW-02, which is located east of the site?

Groundwater concentrations of PCP will be measured in RW-01 and RW-02.

1.3.4 Data Needs

To accomplish the project objectives and answer these questions, the following data will be collected during each groundwater monitoring event:

- Groundwater samples will be collected for PCP analysis from 19 monitoring wells located outside the barrier wall.
- Groundwater samples will be collected for PCP analysis from residential wells RW-01 and RW-02.
- Water quality parameters will be measured prior to sampling in order to determine groundwater stability during purging and establish the representativeness of samples.
- Water levels will be measured in each sampled monitoring well and at extraction wells (PW-01 through PW-04) inside the barrier wall.
- Presence of organic vapors in well headspace prior to well monitoring and sample collection (health and safety issue).

1.3.5 Measurement Quality Objectives

Two categories of data will be collected as part of this environmental data collection effort, and each category has different measurement quality objectives and associated data quality indicators which are measured through specific QA/QC requirements. The first category involves the collection of field survey data which is made up of measurements of well headspace, water levels and water quality parameters. The second category is comprised of laboratory data for pentachlorophenol in groundwater samples at concentrations below drinking water MCLs. For each category, required QA/QC elements and documentation are discussed below.

Field Survey Data

Field survey data requires use of field calibrated and/or pre-calibrated instrumentation with data and information recorded into bound field logbooks. Data from these efforts will be used to determine the safety of well headspace gas, determine the water levels and record the water quality conditions at the time of sampling. These data include: organic vapor response, water levels, temperature, pH, specific conductance, dissolved oxygen, turbidity and oxidation-reduction potential (ORP). Measurement quality objectives for field survey data will rely on data quality indicators for instrument calibration, calibration checks and field duplicates. Parameter specific data quality indicators for measuring the precision and accuracy (bias) of field survey data can be found in Table 3.

Laboratory Data

Laboratory generated data of groundwater samples for pentachlorophenol requires use of program specific analytical methods with stringent quality control requirements and sufficient documentation such that the analytical results can be independently verified. Data from this effort will be compared to drinking water MCLs and used to determine the status of pentachlorophenol concentrations of groundwater within specific locations over a period of time. Measurement quality objectives for laboratory data are defined by the requirements of the drinking water method (i.e., 515.3). The data quality indicators for this method require determination of laboratory specific detection limits, instrument calibration, calibration verification, laboratory fortified sample matrix, duplicates, surrogates, internal standards and blanks. Pentachlorophenol data quality indicators for determining sensitivity, precision and accuracy (bias) for can be found in Table 4.

1.3.6 Data Quality

In order to determine that data derived from environmental monitoring activities are appropriate for their intended use, specific data quality indicators have been developed to evaluate data performance and acceptability. These indicators serve to describe and define the utility of data through various measures, sampling requirements and assessments. Specifically, these are precision, bias, accuracy, representativeness, comparability, completeness and sensitivity. Definitions and use of these parameters are provided in the following sections.

Precision

Precision is the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions; calculated as either the range, standard

deviation or expressed as a percentage of the mean of measurements. For this project, precision will be determined through the analysis of duplicate samples at a rate of 1/sampling round and calculated as the relative percent difference (RPD). This calculation is given as:

$$\text{RPD} = \frac{\text{ABS (R1 - R2)}}{((\text{R1} + \text{R2})/2)} \times 100$$

R1 = Result for original sample

R2 = Result for duplicate sample

Bias

Bias is the systematic error or persistent distortion of a measurement process that causes error in one direction. Bias will be determined in conjunction with the determination of analytical accuracy.

Accuracy

Accuracy is the measure of the overall agreement of a measurement to a known value; includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations. Determination of accuracy is conducted through the analysis of standard reference materials and fortified sample matrices (matrix and surrogate spikes) and is usually expressed as percent recovery. The percent recovery calculation is given by:

$$\% \text{ Recovery} = \frac{\text{SQ} - \text{NQ}}{\text{S}} \times 100$$

SQ = quantity of spike or surrogate found in sample

NQ = quantity found in native (unspiked) sample

S = quantity of spike or surrogate added to native sample

Representativeness

Representativeness is a qualitative term that expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. For the purposes of this project, sample procedures and well construction/placement are designed to provide samples that are representative of local groundwater conditions at the time of sample collection.

Comparability

Comparability is the measurement of the confidence in comparing the results of one experiment with the results of different experiments using the same matrix, sample location, sampling techniques and analytical methodologies. A better comparability is achieved by

consistently using the same methodologies and technical acceptance criteria for monitoring the same scenarios. Data from each sampling round in this project will be compared to others over a period of time in addition to drinking water MCLs.

Completeness

Completeness is the percentage of valid results obtained compared to the total number of samples taken for a parameter. Since sampling from inspections are usually grab and limited in number of samples, the number of valid results obtained from the analyses are expected to be equal or better than 90%. %Completeness may be calculated using the following formula:

$$\% \text{ Completeness} = \frac{\# \text{ of valid results}}{\# \text{ of samples taken}}$$

Sensitivity

Sensitivity is the measure of the concentration at which an analytical method can positively identify and report the results. The sensitivity of a method is often referred to as the detection limit. For the analysis of pentachlorophenol, the laboratory will be required to have demonstrated attainment of a method detection limit that meets the value referenced in Table 4. The specific method requirement for this determination is referred to as the “initial demonstration of capability”. Verification of sensitivity is conducted at the time of analysis through the use of method blanks and low concentration calibration standards.

2. Field Sampling Plan

2.1 Overview of Field Investigation

The primary tasks of each groundwater monitoring well sampling program at TLT include:

- Groundwater samples for PCP analysis will be obtained from 19 monitor wells outside the barrier wall.
- Field parameter measurements (temperature, pH, dissolved oxygen, oxidation-reduction potential, specific conductivity, and turbidity) will be obtained from monitor wells outside the barrier wall.
- Water level measurements will be measured in the monitor wells and four extraction wells.
- Groundwater samples will be collected for PCP analysis from two nearby residential wells, RW-01 and RW-02.

Table 5 lists the groundwater wells and the residential wells that will be sampled, and the analyses required for groundwater samples from each well. Water levels will be measured at all the wells listed in this table, except the residential wells. Well locations are shown in Figure 2. Note that these field instructions may need to be modified in the future to incorporate any changes in the sampling plan.

2.1.1 Project Schedule

Sampling events will be conducted annually starting in the spring of 2010 continuing each year through 2015, after which the monitoring schedule will be determined for the next five years at a schedule no less than one time per five-year period.

The sampling schedule will be adjusted if increasing contaminant concentrations are observed.

2.2 Field Procedures

2.2.1 Check-In

The owners of the site, Pacific Wood Preserving of Oregon, require that the field team check-in at the main office before proceeding onto the site. The main office is located at 22125 Rock Creek Road, Sheridan, Oregon, with the primary entrance off Highway 18B. PWPO should be contacted at least a week in advance to be made aware of the expected sampling event. Refer to Section 5.4 for contact information.

Two monitor wells (MW-11S, MW-22S) are located east of Rock Creek Road, and three monitor wells (MW-10S, MW-24S, and MW-9S) are located south of PWPO. The two residential wells (RW-01, RW-02) are located off-site (Figure 2). Owners of these properties

should be contacted at least one week prior to sampling. Contact information is in Table 1 and Section 5.4.

2.2.2 General Conditions

Before sampling, any site conditions that may affect the quality of the sample should be documented. Weather conditions must be recorded, including temperature, wind direction, and precipitation (type and intensity). Other conditions include the presence of airborne particulate such as dust from a gravel road, or the presence of an unusual odor.

The outer protective monument, well casing, and well cap will be inspected for any signs of damage. If there is evidence of damage, or if a lock is missing, this information will be recorded in the field notebook and reported to the PM.

Before each well is sampled, the headspace will be screened for the presence of organic gases using a photoionization detector (PID) or flame ionization detector (FID). If detected, document in the field notebook and allow gases to dissipate before proceeding.

2.2.3 Well Development

Wells will be developed according to standard protocol.

2.2.4 Groundwater Elevation

During sampling events, groundwater elevation measurements will be made within 72 hours before each sampling event.

If a difference in air pressure between the air in the casing and ambient barometric pressure is suspected, at least 5 minutes will be allowed for the water level in the well casing to equilibrate prior to making the measurement. A confirmatory water level will be measured and must agree with the initial measurement by within ± 0.01 foot.

The depth to water to the nearest 0.01 foot from the top of casing will be measured with an electric water-level indicator. The depth to water, measurement date, and measurement time will be recorded on the *Groundwater Sampling Field Data Sheet* for each well.

The water-level indicator will be decontaminated between wells by rinsing the probe with distilled water and shaking the probe dry or wiping it with a clean paper towel.

2.2.5 Well Purging

A minimum of three well casing volumes will be removed prior to sampling to provide for groundwater samples that are representative of geochemical conditions in the surrounding aquifer. The wells shall be purged (pumped) using dedicated Teflon tubing and a peristaltic pump. The purge water will be contained and disposed into the evaporator system as described in Attachment A.

Water will be collected in a graduated bucket to gauge the purge rate and total purge volume. Teflon tubing dedicated to each monitor well will be used due to its relatively inert properties. The wells will be purged at a rate generally below 0.5 gpm, consistent with low-flow sampling protocols. Field parameter measurements (temperature, pH, dissolved oxygen, oxidation-reduction potential, specific conductivity, and turbidity) will be made

once per well casing volume, as described below, and recorded on the *Groundwater Sampling Field Data Sheet*.

The volume of water to be purged from each well prior to sampling will be calculated in the field and noted on the filed data sheet. The depth to water (DTW) measured just prior to sampling is subtracted from the total depth to the bottom of the well (TD) and multiplied by 0.16 (for a 2-inch inside diameter well) to compute each well casing volume to be purged.

Note that if a low yielding well is encountered, the well will be bailed and allowed to recover within 80 percent of the original static water level before sampling. If a well is known to be low yielding, field parameters will be collected during the start and end of the one well casing volume removal effort. Otherwise, field parameters will be measured following the removal of the casing volume with the peristaltic, and then prior to sampling as the well is bailed.

2.2.6 Sample Collection Procedures

Sampling procedures include the following steps:

1. Unlock the well cap and screen the headspace using a FID or a PID for organic gases. If present, allow gases to dissipate before proceeding. Record the FID or PID measurements.
2. Measure water level using an electronic water level probe. Record the water level.
3. Calculate the purgeable well casing volume (purge volume) using the following formula:

$$\text{Purge Volume [gal]} = 7.48 \pi (D/2)^2 H_1$$

Where D = Diameter of well casing [feet]
 H₁ = Height of water column in well [feet]

4. Purge the well using a peristaltic pump with dedicated tubing. Set the suction tubing intake so that it is near the top of the water column during pumping. Extract a minimum of three purge volumes from the well. Note volumes purged on the field data sheet.
5. Measure the water level downhole and field water quality parameters in a flow-through cell after each purge volume, and record the measurements in the groundwater quality sampling diary (see Appendix C).
6. **All groundwater samples will be analyzed for pentachlorophenol.** Table 5 lists the wells and analytes. Collect groundwater samples after field parameter readings have stabilized within 10 percent of the previous measurement, and turbidity readings are less than 5 to 15 NTU.
7. Store samples in cooler at 4 °C.

Table 6 lists analysis method, sample containers, sample preservation, and holding times for each sample parameter. Analytical methods and reporting limits are listed in Section 3 of this document.

2.2.7 Residential Wells

Two residential wells will be sampled, in a manner very similar to the onsite monitor wells.

RW-01 is located at the home of Robert and Virginia Bowman just west of the site (see Table 2 and Figure 2). The Bowman's use the well water for domestic purposes. The well water can be accessed from the faucet at the pump house (facing Highway 18).

RW-02 is located at the home of Steven and Melinda Burk, 1523 West Main Street. This home is approximately 3 houses east of Rock Creek Road on Highway 18. The well is on the northwest corner of the house, and is not used at this time.

2.2.8 Schedule

The schedule for sampling wells and shipping samples will be developed by Oregon DEQ for each sampling event. At a minimum, sampling will occur every five years, with results of monitoring available one year prior to the five-year review for the site. This schedule will allow potential additional sampling to be conducted, as deemed necessary.

2.3 Sample Containers, Preservatives and Holding Times

The field team leader is responsible for ensuring proper sampling, labeling of samples, preservation, and shipment of samples to the laboratory to meet required holding times. The required sample containers, preservative requirements, and maximum holding times are shown in Table 6. Sample IDs and labels are described in Section 4.

Precleaned and certified sample containers will be used for monitoring events, and the field team leader will retain all certificates of analysis for the precleaned containers.

Sampling Order

1) Fill 1 × 1000-mL amber glass bottle for Pentachlorophenol (unpreserved)

For MS/SD site collect:

- Triple the sample volume for pentachlorophenol (1).

For Field Duplicate (FD) site collect:

- Double the sample volume for each parameter, i.e., treat as a separate sample.

3. Field Quality Assurance/Quality Control

3.1 Quality Control Samples

Field duplicates, and matrix spike/matrix spike duplicates (MS/MSDs) will be submitted to the laboratory as part of the field QA/QC program. Trip blanks will not be necessary because none of the samples will be analyzed for VOCs. Field blanks and equipment rinse blanks will not be necessary because all of the groundwater sampling tubing is dedicated to each well. Number of QC samples for each parameter are summarized in Table 7. **Where possible, the sample, the sample duplicate, and the MS/MSD sample will be taken from the same sample location.**

Temperature blanks will be provided by the contract laboratory in sample coolers shipped to the site with sample containers.

3.2 Field Instrument Calibration and Use

Groundwater and headspace field parameters to be measured in each well are:

- temperature and pH
- specific conductance,
- dissolved oxygen,
- turbidity,
- oxidation/reduction potential (ORP), and
- organic vapors in well headspace (health and safety).

Field instruments will be calibrated daily prior to sampling activities. All field instruments will be calibrated in accordance with the manufacturer's specifications. Table 3 summarizes the calibration standards. Calibration information will be recorded in the Groundwater Sampling Field Data Sheet. Recorded information will include the make and model and serial or identification number of each field instrument, as well as the readings observed during instrument calibration.

The field meters will be decontaminated before each sample is measured by rinsing the probe with deionized water. The meters will be checked for battery charge and physical damage each day. The specific conductance and pH meter calibration solutions will be stored in a cool, dry environment. Calibration solutions will be discarded on their expiration dates.

Field instruments used to collect field survey (or bulk measurements such as pH or conductivity) are direct reading, thus making field calculations and subsequent data reduction unnecessary. The FTL is responsible for the collection and verification of all field data while in the field. Recorded data will be accepted or rejected by the FTL 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 if the readings are verified by retesting.

3.3 Decontamination of Sampling Equipment

The only equipment that should be used between wells are meters used for analyzing field parameters and the water level probe. These will be cleaned and rinsed with tap water and deionized water between sample locations and at the end of each sampling event. Rinse water will be disposed with the IDW (see below).

3.4 Disposal of Investigation Derived Waste

Investigation derived waste will be managed in accordance with the IDW management plan (Attachment A).

4. Sample Management and Handling

The **field team leader** will be responsible for properly labeling each sample. Each label will designate a unique Sample Number, and a Location ID Number that identifies from which well, depth and date the sample was collected.

The **field team leader** will also be responsible for sequencing the collection and analysis of the QA/QC samples so those appropriate samples are included in each analytical batch. When applicable, QA/QC samples will be referenced to the associated field sample using the unique Sample ID.

The **field team leader** will be responsible for management and security of the samples while in the field and will be responsible for proper shipment of the samples the laboratory.

Sample Identification and Sample Location ID numbers will be determined by Oregon DEQ for each sampling event.

4.1 Sample Labels

Prior to collection of a particular sample, all the containers needed for the different analyses should be properly labeled. The sample label should be attached directly to the sample container.

The information that should be written on the sample label in non-water soluble ink (e.g. Sharpie, not ball-point) includes:

- Project name
- Sample ID-unique identification for each sample location
- Date sampled
- Time sampled - in military time
- Initials of sampler(s)
- Analysis for which the particular container is intended
- Preservative in the sample container, if any

The label should be wrapped in clear packing tape, once around the bottle, to ensure that the sample labels do not come off once they get wet in the cooler.

4.2 Sample Packaging

During the field effort, the project chemist will contact the laboratory daily to inform it about shipments. Hard plastic ice chests or coolers with similar durability will be used for shipping samples. The coolers must be able to withstand a 4-foot drop onto solid concrete in the position most likely to cause damage. Double contain sample bottles in ziplock bags, grouped by sample set. Styrofoam or bubble wrap will be used as packing material to protect the samples from leakage during shipment.

Coolers will be packed with ice, and double bagged in ziplock baggies. A volume of ice approximately equal to sample volume should be present in each cooler. Blue ice will not be used. Ice volume will be recorded in field notebook. After packing is complete, the cooler will be taped securely, with custody seals affixed across the top and bottom joints. Custody protocols are described in Section 5.3.

Cooler Shipment Notes

1. Include absorbent material in the cooler to absorb any ice melt.
2. Include a temperature blank (DI water in plastic bottle) in each cooler.
3. Record the airbill on each Chain-of-Custody.
4. Use custody seals on the cooler.
5. Make sure return address is on the cooler so it can be returned to sender.

4.3 Sample Shipping

This information will be determined by Oregon DEQ.

4.4 Laboratory Contacts and Addresses

This information will be determined by Oregon DEQ.

5. Documentation

During the groundwater monitoring at the TLT Site, all field activities will be documented using one or more of the following methods:

- Field notebooks
- Photographs
- Well development logs (if necessary)
- Groundwater sampling sheet
- Chain of Custody forms
- Sample labels

5.1 Field notebook

Field personnel will use a field notebook to record any pertinent information and to describe sampling procedures. After completion of the sampling activities, the field notebooks will be in the custody of the PM. Each notebook will be identified by the project-specific document number, and each page will be numbered. Personnel will update the project notebooks daily during field activities. In addition to the investigation data, the following site activity records will be recorded in the project notebooks:

- Time of arrival and departure from the site
- Project personnel and subcontractor personnel onsite
- Equipment calibration records
- Health and safety monitoring records
- Equipment present and equipment used
- Names of visitors, their associations, and purpose of visit

5.2 Field Investigation Data Forms

Groundwater sampling information to be recorded on the *Groundwater Sampling Field Data Sheet* includes:

- Instrument calibration data
- Water levels
- Purge volumes and analysis data
- Field measurements
- Sampling information
- Decon volumes and disposal information
- Shipping information.

5.3 Chain of Custody

Components of sample custody procedures include the use of field logbooks, sample labels, custody seals, and Chain of Custody (COC) forms. Each person involved with sample

handling will be trained in COC procedures before the start of the field program. The COC form will accompany the samples during shipment from the field to the laboratory.

The following procedures will be used when transferring the samples for shipment:

- Sample labels will be completed for each sample with waterproof ink, making sure that the labels are legible and affixed firmly on the sample container.
- All sample-related information will be recorded in the project logbook.
- The field sampler will retain custody of the samples until they are transferred or properly dispatched.
- To simplify the COC record and minimize potential problems, as few people as possible should handle the samples. For this reason, one individual from the field sampling team will be designated as the responsible individual for all sample transfer activities. This field investigator will be responsible for the care and custody of the samples until they are properly transferred to another person or facility.
- A COC form will accompany all samples. This record documents transfer of custody of samples from the field sampler to the laboratory. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record.
- Samples will be properly packaged for shipment and sent to the appropriate laboratory for analysis with a separate signed COC form, enclosed in a plastic bag, and taped inside the cover of each sample box or cooler. The original record will accompany the shipment, and a copy will be retained by the FTL. When samples are relinquished to shipping companies for transport the tracking number from the shipping bill or receipt will be recorded on the COC form or in the site logbook.
- The COC must be signed when relinquished by field personnel and signed by the laboratory receiving the samples. The contact person on the COC should be Scott Echols.

Custody seals will be used on the shipping containers when samples are shipped to the laboratory to inhibit sample tampering during transportation.

5.4 Contact Names and Numbers

Information on the sampling team and laboratory(s) will be determined at a later date.

Contact Name	Entity	Phone Number	E-mail
Norm Read	Oregon DEQ	541-687-7348	read.norm@deq.state.or.us
Sheldon Stewart	Pacific Wood Preserving of Oregon	503-843-2122 503-437-0389	sheldon.stewart@pacificwood.com
Tom Baker Environmental, Health, & Safety Manager	Pacific Wood Preserving of Oregon	503-437-0559 (Cell)	tom.baker@pacificwood.com
George Gabriel	Northwest Gazebo	503-843-0024	
Robert and Patricia Harris	Property with MW-9S	503-472-8017	
Residential Homes	Property with RW-01 and RW-02	See Table 1	

6. Schedule and Reporting

Groundwater monitoring will occur at least once every five years with results of monitoring available one year prior to the five-year review for the site. This schedule will allow potential additional sampling to be conducted, as deemed necessary. Future modifications to the groundwater monitoring program may be proposed to reflect the conditions observed at the site.

Oregon DEQ will prepare reports for each sampling event, and copies will be provided to EPA. The reports will include:

- Brief summary of the field event, including number of wells sampled, the dates during which sampling events were conducted, and a discussion of any problems encountered or modifications made to the program during a particular sampling event.
- A summary table of validated water quality monitoring results collected during the year compared with previous groundwater data.
- A summary table of the water level elevation measurements.
- If relevant to data evaluations, or evaluation of the effectiveness of the barrier wall, water level elevation contour maps for each of the aquifer horizons.
- Selected analytical data time-series concentration plots (where necessary to reflect data of interest).

Oregon DEQ will prepare tasks and a schedule for this work as part of the Statement of Work for contractor support, and the Tasks and Schedule will be provided to EPA as a draft for courtesy review, and as a final for the project file.

7. References

CH2M HILL. 2005. Monitor Well MW-25S Installation and Sampling, Taylor Lumber and Treating Superfund Site, Sheridan, Oregon. December 2005. Prepared by CH2M HILL, Corvallis, Oregon, for U.S. EPA, Seattle, WA.

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EPA. 2007. Superfund State Contract between the United States Environmental Protection Agency and the State of Oregon pertaining to remedial action and operation and maintenance at the Taylor Lumber and Treating Superfund Site. February 21, 2007.

EPA. 2009. Operational and Functional Determination. Taylor Lumber and Treating Superfund Site, Superfund State Contract. Letter from S. Eckman, EPA Office of Environmental Cleanup, to Max Rosenberg, Oregon Department of Environmental Quality. September 18, 2009.

Oregon DEQ. 2009. Water Monitoring and Assessment Mode of Operations Manual (MOMs), Laboratory and Environmental Assessment Division, Oregon Department of Environmental Quality, March 10, 2009.

Figures

Tables

TABLE 1
 Project Personnel
Taylor Lumber and Treating Superfund Site

Title	Responsibility	Name	Phone
Oregon DEQ Project Manager	Coordinates all of the project efforts. Responsible for the coordination and execution of all work items associated with project planning and implementation. Identifies team members and project assignments. Manages and tracks schedule, budget, and reporting requirements.	Norm Read/Oregon DEQ	541-687-7348
Chemist/Data Validation	Responsible for coordinating analytical services with laboratories. Coordinates sample shipments to laboratories. Reviews and validates data and generates data validation summary report.	TBD by Oregon DEQ	
Data Manager	Responsible for the preparing chain of custody's, sample bottle labels. Utilizes project database to produce data summary reports under direction of the project manager.	TBD by Oregon DEQ	
Field Team Leader and Site Safety Coordinator (SSC)	Oversees field activities and implements the field portion of the work. As SSC will implement the Health and Safety Plan in the field.	TBD by Oregon DEQ	
Lab Project Manager	Will serve as the laboratory contact and communicate through the project chemist to coordinate sample bottle delivery, field sample delivery schedule and data delivery schedules.	TBD by Oregon DEQ	
EPA Contact to Receive Reports	Will ensure groundwater monitoring reports are reviewed, as appropriate, and filed.	Karen Keeley/EPA	206-553-2141
EPA QA Contact	Provides approval for QA Plan	Ginna Grepo-Grove	206-553-1632

Table 2 - Summary of Existing Groundwater Wells as of June 2009.

[Table 2 will be inserted as a pdf, pages 2, 3, and 4.]

TABLE 3
 Field Quality Control Specifications¹
Taylor Lumber and Treating

Parameter / Instrument	Sensitivity	Precision²	Bias (Accuracy)
pH	0.1 pH units	± 0.5 pH units	± 0.1 pH units ³
Dissolved Oxygen	0.3 mg/l	± 0.5 mg/l	± 0.3 mg/l ⁴
Oxidation Reduction	10 mv	± 50 mv	± 10 mv
Specific Conductance	1 µS/cm	± 20%	± 7%
Turbidity	0.1 NTU	± 20% or ± 1 NTU (for readings of ≤ 5 NTU)	± 10%
Temperature	0.5 °C	± 1 °C	± 0.5 °C ⁴
Water Level	0.01 ft	± 0.05	± 0.01
Organic Vapor Analyzers (PID or FID) ⁵	ppm	N/A	N/A

¹ Instrument calibration and/or verification checks will occur in accordance with Oregon DEQ 2009. Temperature is measured to measure the stability of groundwater prior to sample collection.

² As measured by field duplicate analyses (frequency of 1/sampling round). Percent represented by relative percent difference (RPD).

³ Daily calibration check against known standards.

⁴ Calibration conducted at the lab prior to field work.

⁵ Calibrate according to health & safety plan requirements. PIDs typically calibrated with isobutylene and FIDs with methane, though propane may be substituted for methane.

TABLE 4
Laboratory Quality Control Specifications¹
Taylor Lumber and Treating

Parameter	Sensitivity	Precision²	Bias (Accuracy)³
Pentachlorophenol	0.56 µg/l	± 20%	70-130%

¹ Instrument calibration, required verification checks, blanks, internal standards and surrogates will occur in accordance with EPA method 515.3.

² As measured by matrix spike duplicate analysis (frequency of 1/sampling round). Percent represented by relative percent difference (RPD).

³ As measured by matrix spike and surrogate recoveries.

TABLE 5 Monitor Wells to be Sampled and Required Analytes <i>Taylor Lumber and Treating</i>		
Well ID	PCP	Water Level
Outside Barrier Wall		
MW-1S	X	X
MW-6S	X	X
MW-6D	X	X
MW-9S	X	X
MW-12S	X	X
MW-13S	X	X
MW-15S	X	X
MW-16S	X	X
MW-19S	X	X
MW-20S	X	X
MW-25S	X	X
MW-103S	X	X
PZ-101	X	X
PZ-102	X	X
PZ-105	X	X
South of Highway 18B		
MW-9S	X	X
MW-10S	X	X
MW-24S	X	X
East of Rock Creek Road		
MW-11S	X	X
Residences		
RW-01	X	
RW-02	X	
Extraction Wells inside Barrier Wall		
PW-1, PW-02, PW-03, PW-04		X
Total number of wells to be sampled for PCP: 21 (excluding duplicates, etc.)		

TABLE 6 Required Sample Containers, Preservation, and Holding Times <i>Taylor Lumber and Treating</i>						
Analyses	Analytical Method	Sample Matrix	Container^a	Qty	Preservative^b	Holding Time^d
Pentachlorophenol	EPA 515.3	Water	1-Liter Amber Glass	1	Cool 4°C	7/14 days ^c

a - Container requires a septa lined cap. The entire sample volume will be extracted using this method. The second sample is collected as a backup in case of breakage during transport or loss of sample during extraction.

b - Immediately stored at 4°C after sample collection.

c - Days to extraction/ days for analysis of extract.

d - Starts from the time of sample collection.

TABLE 7 Sample Summary <i>Taylor Lumber and Treating</i>							
Parameter	Method	Field Samples	Field Duplicates	MS/MSD	Field Blanks	Equipment Rinse Blanks	Total Number of Samples
TDS	USGS I-1750	21	1	0/0	1	1 (see note)	24
PCP	EPA 515.3	21	1	1/1	1	1 (see note)	26

Duplicate frequency = 10%

MS/MSD frequency = 5 %

Field Blank (water) = 1 per event per source of rinse blank water

Equipment rinse blank = 1 beginning and 1 at end of sampling. Note that equipment rinse blanks are not necessary if wells are sampled using dedicated tubing.

Attachment A: Investigation-Derived Waste Management Plan

This plan describes the investigation-derived waste (IDW) streams likely to be generated by the long-term groundwater monitoring events at the Taylor Lumber and Treating (TLT) Superfund Site and explains how they will be managed and disposed. This IDW Management Plan is provided as an attachment to the Long-term Groundwater Monitoring and Reporting Plan.

IDW Streams

The scope of work for this project is to monitor groundwater concentrations of pentachlorophenol (PCP) in wells outside the barrier wall at the TLT Site. Water levels will be recorded in order to determine groundwater flow patterns and validate the effectiveness of barrier wall containment system. No cutting or drilling waste will be associated with these tasks since sampling will occur at existing wells.

The waste streams associated with this scope of work may include:

- Personal protective equipment (PPE) (e.g., Tyvek coveralls and gloves)
- Disposable sampling items (tubing, tape, and packing materials)
- Purge water from well sampling.

Disposable personal protective equipment and disposable sampling equipment will be collected in a plastic garbage bag and disposed of in an onsite municipal solid waste dumpster. Any contaminated PPE will be placed in a designated drum that will be labeled, tracked and disposed of according to RCRA requirements.

Purge water generated from the sampling activities will be collected and containerized. (PWPO may have 55-gallon drums available for use). As needed, with PWPO's permission, the purge water will be emptied into PWPO's evaporative system originally used to recover wood treating product from aqueous wastes generated at the site, or into PWPO's stormwater treatment system.