Final Report

Taylor Lumber and Treating Superfund Site Final Construction Report

Prepared for

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Acronyms and Abbreviations

AC	asphalt concrete
ADR	alternative dispute resolution
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cm/sec	centimeters per second
CQAP	Construction Quality Assurance Plan
CRABS	Cement Recycled Asphalt Base Stabilization
DBR	Design Basis Report
DNAPL	dense non-aqueous phase liquid
ECM	erosion control mat
EPA	United States Environmental Protection Agency
ERRS	Emergency and Rapid Response Service
ESAT	Environmental Services Assistance Team
ESCP	Erosion and Stormwater Control Plan
FCR	Final Construction Report
ftp	File transfer protocol
GES	Guardian Environmental Services
HDPE	high-density polyethylene
HSP	Health and Safety Plan
HWYD	Highway Ditch
lb/ft^3	pounds per cubic foot
mg/kg	milligrams per kilogram
mm	millimeter
NAPL	non-aqueous phase liquids
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List

ODOT	Oregon Department of Transportation
PCP	pentachlorophenol
PWPO	Pacific Wood Preserving of Oregon
QAPP	Quality Assurance Project Plan
RA	remedial action
RCG	Rock Creek Gully
RCP	Reinforced Concrete Pipe
RCRA	Resource Conservation and Recovery Act
RCRD	Rock Creek Road Ditch
RFI	Request for Information
RPM	Remedial Project Manager
RRD-E	East Railroad Ditch
RRD-W	West Railroad Ditch
SARA	Superfund Amendments and Reauthorization Act
SSAP	Soil Sampling and Analysis Plan
SWTS	stormwater treatment system
SYRG	South Yamhill River Gully
TLT	Taylor Lumber and Treating
TP Area	Treatment Plant Area
TPS Area	Treated Pole Storage Area
WPS Area	White Pole Storage Area
XRF	x-ray fluorescence
yd^3	cubic yard

SECTION 1

Introduction

The United States Environmental Protection Agency (EPA), under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), initiated remedial action (RA) construction activities for the Taylor Lumber and Treating (TLT) Superfund site to address potential risks to human health and the environment posed by site conditions. This Draft Final Construction Report (FCR), prepared by CH2M HILL under EPA Contract Number 68-S7-04-01 as set forth in Task Order Number 036-RX-BF-105G, communicates in a narrative format, CH2M HILL's understanding of the project and its requirements. This document will serve as an informational resource to summarize RA construction activities completed through December 2008.

1.1 Background

The TLT Superfund site is located in Yamhill County, Sheridan, Oregon (Figure 1-1). The site was listed on EPA's National Priorities List (NPL) on June 14, 2001. The EPA identification number for the site is ORD009042532.

TLT operated a sawmill and wood treating facility at the site from 1946 to 2001. Wood-treating operations commenced in 1966 in the western portion of the facility, and predominantly consisted of the treatment of Douglas fir logs for utility poles and pilings. The primary wood-treating chemicals used by TLT included creosote, pentachlorophenol (PCP), and Chemonite (a solution of arsenic, copper, zinc and ammonia). All operations ceased when TLT filed for bankruptcy in 2001. Pacific Wood Preserving of Oregon (PWPO) entered into a Prospective Purchaser Agreement with EPA and purchased the wood-treating portion of the facility (approximately 37 acres). PWPO began wood-treating operations in June 2002. Other entities purchased the remaining portion of the former TLT holdings.

PWPO currently performs wood-treating operations using copper- and borate-based treating solutions. In general, PWPO conducts wood-treating operations and stores poles on the same portions of the property where these activities were conducted by TLT. Wood treatment is conducted in the eastern portion of the facility, and untreated wood is handled and stored on the western portion of the facility. Since 2002, new structures have been constructed and certain areas were covered with asphalt or gravel.

The remedial action at TLT is focused on the wood-treating portion of the facility currently owned by PWPO. The portion of the site being addressed by the remedial action encompasses approximately 37 acres located west of Rock Creek Road, and is divided into the Treatment Plant (TP) Area, White Pole Storage (WPS) Area, and Treated Pole Storage (TPS) Areas. The designations of these areas reflect general property usage by the former TLT (Figure 1-2).

As described in the Design Basis Report, the primary areas of contamination and their sources at the TLT site include:

- Subsurface groundwater contamination, including dense non-aqueous phase liquid (DNAPL), in the vicinity of the TP Area resulting from past drips, spills, and leaks of wood-treating chemicals from above ground chemical storage tanks, drip pads, and tank farms.
- Surface soil contamination in the vicinity of the TP Area and areas of former treated pole storage (TPS) areas resulting from spills, drippage, and storage of wood-treating chemicals.
- Surface soil contamination in roadside ditches that abut the facility (contamination resulted from surface water runoff, spills associated with wood-treating operations, and deposition of contaminated dust).
- Contaminated soils from interim and removal measures conducted at the site are consolidated in the Soil Storage Cells located in the northwest corner of the facility.

1.1.1 Remediation Area Descriptions

Remediation areas consist of areas that were addressed or created as part of past interim actions at the site and contaminated in-place soil that has not been addressed through prior activities. Previous cleanup efforts at the site included paving part of the TPS Area, removing areas of arsenic contamination from the roadside ditches, and installing a barrier wall (bentonite slurry) to contain non-aqueous phase liquids (NAPL) present beneath the TP Area. The ground surface enclosed by the barrier wall was paved, and a groundwater extraction system constructed within the barrier wall to maintain an inward hydraulic gradient. Contaminated soil from various pre-existing stockpiles, in addition to soil resulting from interim action activities, was consolidated and moved in 2000 to Soil Storage Cells located in the northwest corner of the site. Relatively small amounts of soil have been added to these cells since 2000.

These remediation areas are described in greater detail in the following subsections.

Barrier Wall

The barrier wall system, completed in 2000, consists of a number of components that work together to meet the RA objectives for the area as a whole.

The soil-bentonite barrier wall is 2,040 feet long and encompasses an area of 6.05 acres. 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 depth of the key is 2 feet into the siltstone or to the point of refusal. The barrier wall was designed to be between 30 and 36 inches wide (E&E, 2001). Contractor submittals dated August 23, 2000 (Geo-Con) indicated that the wall would be constructed to a minimum width of 30 inches, which was confirmed by the EPA on-scene coordinator, Mike Sibley. The backfill soil consisted of a mixture of bentonite and clean offsite soil such that the permeability of the wall was designed to be less than 1×10^{-7} centimeters per second (cm/sec).

Protective Cap

A protective cap was installed over the top of the barrier wall to protect the wall from heavy equipment traffic. Figure 1-3 provides a detail of the barrier wall protective cap. The cap consists of base aggregate a minimum of 30 inches thick by 8.5 feet wide. An additional 2.5 feet of width were added to the as-built cap with a 1:1 slope on the side walls, for a total minimum cap width of 13.5 feet. The base and walls of the cap trench were covered with a low permeability (specified at 4×10^{-12} cm/sec) geosynthetic clay liner that was overlain by a subgrade stabilization geotextile, which in turn was overlain by the compacted base aggregate. The asphalt cap was constructed over this protective cap.

Asphalt Cap

The asphalt pavement placed in 2000 extended slightly beyond the barrier wall and protective cap, covering a total of 6.75 acres. Of that area, existing structures cover approximately 1.44 acres, and 0.21-acres is concrete (CH2M HILL, 2006a). The asphalt cap served to impede the infiltration of stormwater into the groundwater beneath the area encompassed by the barrier wall and protect people from direct contact with contaminated soils. However, the cap is centrally located in the PWPO facility and is frequently driven over by heavy equipment. Therefore, to remain intact and serve its primary purpose, the cap must be designed to successfully sustain active use without damage. The existing cap design consisted of a 2-inch-thick base course and a 2-inch-thick wearing course, and the design indicated that the wearing course would be over a minimum gravel base of 18 inches. Pavement testing conducted to confirm the specifications of the existing cap (CH2M HILL, 2006d) indicated that the existing asphalt thickness ranged from 3.6 to 6.0 inches (average of 4.8 inches), with aggregate base thickness ranging from 1 to 14 inches (average of 8.8 inches). The variable thickness of aggregate base could have contributed to numerous locations where the asphalt cap has failed since it was installed in 2000.

Groundwater Extraction System

Four 6-inch-diameter groundwater extraction wells with pneumatic pumps were installed within the barrier wall to induce an inward hydraulic gradient and to prevent the water level from rising above the protective cap. PWPO estimates that the total groundwater recovery rate can be as high as 360 gallons per day, depending on the season. The groundwater discharge pipes and air supply pipes are routed underground (24-inch minimum depth) to the closest wastewater receiving tanks or sumps and air supply outlets at the site, where it is conveyed to the existing stormwater treatment system (SWTS) operated by PWPO.

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. If the groundwater elevation rises too close to the surface (for example, because of a leaking water line or a malfunctioning extraction pump), the weight-bearing capacity of the surface diminishes and the asphalt cap could fail under the heavy loads used in the area.

Stockpiled Soil

Stockpiled soil in the northwest corner of the facility consisted of three lined storage cells. The cells were constructed in July – October 2000 and included a perimeter berm for containment, a high-density polyethylene (HDPE) bottom liner, and an HDPE cover. The documentation in the RA report (E&E, 2001) described the Cell 1 berm as 2.5 feet high and the Cells 2 and 3 berms as 5 feet high, with a slope of 1 (vertical) to 2 (horizontal) on both sides and lined with a 20-mil HDPE liner. The liner was anchored by approximately 2 feet of clean soil on top of the berm. A gravel access road was constructed lengthwise across Cells 1 and 2.

In July 2005, EPA conducted an interim action excavating approximately 140 cubic yards (yd^3) of soil from ditches on the east side of Rock Creek Road. An access ramp was constructed on the south side of Cell 2, and the soil from the ditch excavation was placed on top of a small portion of Cell 2. The pile was then covered with a plastic liner and anchored with weights.

Surface Soil

In-place contaminated surface soil addressed as part of this RA was located in the following areas:

- Contaminated soil in the 2.67-acre Treated Pole Storage Area 1 (TPS-1) and the 1.61-acre Treated Pole Storage Area 2 (TPS-2) contaminated with arsenic concentrations greater than 159 milligrams per kilogram (mg/kg).
- Contaminated soil in the 0.4-acre White Pole Storage (WPS) Area.

Within TPS-1, a 2.04-acre asphalt concrete (AC) cap had been installed in October 2000. The cap was installed as an interim action to prevent exposure to arsenic-contaminated surface soil. The sub-base for the AC pavement consisted of 25-millimeter (mm) - 0-mm base aggregate over the previously existing ground surface. The area was graded with a 0.5 percent slope toward the south to an existing drainage ditch, where it was conveyed to the SWTS conveyance system. The AC paving consisted of a 2-inch base course and a 2-inch wear course for an overall depth of 4 inches.

Ditches

Approximately 3,890 linear feet of in-place contaminated ditch soil were addressed as part of this RA. Most of the ditch length is adjacent to the site and included the following areas:

- Railroad Ditch-West (RRD-W): Located at the northwest corner of the site, along the southern edge of the Willamette Pacific Railroad (WPRR) track.
- Railroad Ditch-East (RRD-E): Located at the northeast corner of the site, along the northern edge of the WPRR track.
- Rock Creek Road Ditch (RCRD): Located along the west side of Rock Creek Road from the northeast corner to the southeast corner of the site.
- Highway Ditch (HWYD): Located from the southwest corner of the site along the northern edge of Highway 18B to the southeast corner of the site at the intersection of Hwy 18B and Rock Creek Road.

Sediment was also removed from three culverts underneath Highway 18B, and ten culverts located within the HWYD and RCRD alignments. An area extending 10 feet down-slope from each of the three culvert outlets underneath Highway 18B was planned for excavation as noted below.

Gullies

The culvert outlets of the two gullies, one leading south from the site to Rock Creek (RCG) and one to the South Yamhill River (SYRG), were planned for excavation from each of the culvert outlets to 10 feet down-slope of the culvert. The remainder of the RCG (10 feet down-slope of the outlet to Rock Creek) was also planned for excavation. The remainder of the SYRG (10 feet down-slope of the outlet to the South Yamhill River) was not originally planned for excavation based on the results of soil characterization, but based on observations during excavation at the culvert outlet and data collected during that effort in 2007, the SYRG soils downstream from the culvert were excavated in 2007 and 2008 under a separate EPA contract from the RA construction.

1.1.2 Remedial Action Objectives

Consistent with the *Final Record of Decision, Taylor Lumber and Treating Superfund Site, Sheridan, Oregon* (EPA, 2005) the remedy at TLT was designed and constructed to achieve the following RAOs:

1. Prevent migration of the DNAPL and contaminated groundwater beyond the barrier wall.
2. Reduce or eliminate human exposure through direct contact (incidental soil ingestion, skin contact with soil, and inhalation of dust) with contaminated soils that exceed protective regulatory levels.
3. Reduce or eliminate risks to ecological receptors from contaminated soils in ditches.
4. Restrict human exposure to groundwater with contaminant concentrations that exceed federal drinking water standards both inside and outside the barrier wall.
5. Minimize future migration of contaminated groundwater to adjacent surface waters (Rock Creek, South Yamhill River) to protect ecological receptors.

The remedial construction described in this report addresses the first three RAOs listed above. As set forth in the ROD, surface soils with concentrations of arsenic greater than 159 parts per million (ppm) arsenic will be addressed.

1.2 Design Documents

The Remedial Design included preparation of the following submittals:

- *Final Design and Design Basis Report.* This report contains a final Design Basis Report (DBR), Construction Quality Assurance Plan (CQAP), Soil Sampling and Analysis Plan (SSAP), and construction schedule (CH2M HILL, 2006a), submitted to EPA on December 2, 2006.
- *Final Design Drawings* (CH2M HILL, 2006b), submitted to EPA on December 2, 2006.

SECTION 2

Summary of Remedial Action Construction Activities

This chapter of the FCR provides a chronology of RA construction activities and a summary of major work elements performed during the RA construction.

2.1 Chronology of Events

The RA construction contract was awarded to GES on March 30, 2007. The preconstruction meeting was held onsite on May 10, 2007. Onsite activities commenced in mid May 2007 and continued through late October 2007. A Prefinal Inspection was conducted on September 17 and 18, 2007, with the Final Inspection on October 15, 2007. Unresolved items including non-accepted work were subject to continued negotiations between EPA and GES and its subcontractors. Figure 2-1 provides a detailed As-Built Schedule for RA construction activities performed by GES in 2007, with additions for work performed in 2008 by the ERRS Contractor. This schedule was compiled by CH2M HILL based on information provided by GES and the ERRS Contractor to EPA, and observations by CH2M HILL inspectors. CH2M HILL provided a critical path analysis of the RA construction schedule in a memorandum dated November 25, 2008 (CH2M HILL, 2008f).

2.2 Mobilization and Site Preparation

Contractor mobilization and site preparation activities included preparation and submittal of site-specific work plans, setup of temporary controls and construction facilities, and mobilization of equipment and materials.

2.2.1 Preconstruction Submittals and Work Plans

Site-specific plans prepared by the Contractor included the following submittals:

- Site Management Plan
- Construction Health and Safety Plan (HSP)
- Erosion and Stormwater Control Plan (ESCP)
- Air Quality Monitoring Plan
- Soil Excavation, Grading, and Backfill Plan
- Soil Screening Plan
- Soil Disposal and Transportation Plan
- Asphalt Pavement Plan
- Quality Assurance Project Plan

2.2.2 Mobilization

Mobilization activities included site access improvements, setup of the material staging and screening area, installation of temporary construction facilities including decontamination areas and temporary office trailers, and delivery of construction equipment and materials to the TLT site.

Prior to initiating the work, the Contractor was required to conduct a video survey to document the condition of existing facilities on the PWPO property, adjacent properties, and roadways. This preconstruction video was then submitted to EPA.

Two site trailers were installed just west of the main entrance to the PWPO facility off of Highway 18B to provide office space for the Contractor, EPA, and Engineer personnel on site. Temporary electric, phone, internet, sewer, and potable water connections were made to service the trailers.

A soil screening and stockpile area was set up in the WPS Area just south of Soil Storage Cells 2 and 3. Silt fence was installed around the perimeter of the area, which measured approximately 180 feet x 220 feet (see Figure 1-4).

2.2.3 Site Preparation

Site preparation activities included implementation of stormwater best management practices (BMPs) (for example, silt fence and check dams), vegetation removal and disposal, removing the existing liners over the Soil Storage Cells, and coordination with PWPO for moving stored lumber or equipment from work areas.

Prior to initiation of onsite work, EPA obtained access agreements from Bob Harris for property south of Highway 18B (Tax Lot 5633-700), and from WPRR for right-of-way that abuts the north property line of PWPO. EPA also reached a “no effect” conclusion for species listed under the Endangered Species Act and thus there was no requirement for Section 7 Consultation (EPA, 2007a). The EPA RPM discussed this conclusion with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), and no issues were identified that would change this conclusion.

2.3 Excavation

2.3.1 Subtitle D Excavation

Excavation activities included removal of non-hazardous soils for offsite disposal at a Resource Conservation and Recovery Act (RCRA) Subtitle D disposal facility. Non-hazardous soils were removed from the following onsite areas (see Figure 1-4):

- Soil Storage Cell 1
- Soil Storage Cell 2
- Soil Storage Cell 3

Excavation activities included removal of the HDPE cover over the cells, mixing of the wet soils and bentonite mixture in Cell 2 with dry soils from Cells 1 and 3, removal of the HDPE liner beneath the cells, and excavation of an additional 6 inches of underlying soils to remove chemicals that may have penetrated the bottom liner.

After excavation was complete, EPA's Environmental Services Assistance Team (ESAT) contractor performed screening analysis of arsenic concentrations in the berm soils, as well as in the soils remaining after the excavation of 6 inches of underlying soils, using a hand-held X-ray fluorescence (XRF) analyzer. Several areas of elevated arsenic concentrations were identified and subsequently excavated for Subtitle D disposal.

Excavation activities included removal of clean berm soil from Soil Storage Cells 1, 2, and 3 for use as clean backfill.

2.3.2 Subtitle C Excavation

Excavation activities included removal of hazardous soils for offsite disposal at a RCRA Subtitle C disposal facility. Hazardous soils were removed from the following onsite areas (see Figure 1-4):

- Treated Pole Storage Area 1 (TPS-1)
- Treated Pole Storage Area 2 (TPS-2)
- White Pole Storage Area (WPS)
- Railroad Ditch East (RRD-E)
- Railroad Ditch West (RRD-W)
- Rock Creek Road Ditch (RCRD)
- Highway Ditch (HWYD)
- Rock Creek Gully (RCG)
- South Yamhill River Gully (SYRG)

TPS-1, TPS-2, and WPS Excavation

Excavation activities included removal and stockpiling of asphalt and clean aggregate (onsite gravel) from the TPS-1 area for use as clean backfill.

The excavation approach defined in the design documents for TPS-1, TPS-2, and WPS consisted of excavating soils from surface soil contamination areas in 1-foot lifts (or an alternative thickness as allowed by the Engineer) in each excavation cell. After a lift of soil was excavated from an entire cell, XRF screening was used to predict whether the arsenic cleanup goal had been met for that cell. XRF results were used to indicate whether additional soil removal was required. At the conclusion of soil removal work, final soil confirmation samples were collected from each cell and analyzed in a laboratory for total arsenic to confirm attainment of the soil cleanup level (159 ppm arsenic). This approach is described further in s**ubsection 2.4,** Confirmational Sampling.

In portions of TPS-1 and TPS-2, areas of staining from wood treating chemicals were identified in the excavation. In these areas, excavation proceeded based on visual observations by the Engineer. In general, areas of visual staining extended to the native clay underlying these areas, allowing excavation to full depth in one pass (for example, 2- to 3-foot lift) rather than by 1-foot lifts.

During the excavation of TPS-2, a layer of peeler wood fragments was identified in one cell, and a second area was discovered with large pieces of creosote-saturated wood. Analyses confirmed that the peeler wood fragments were not contaminated with pentachlorophenol, PAHs, or arsenic, and that PAHs were detected in the larger pieces of wood (CH2M HILL, 2007b). Five bagged samples of peeler fragments were also tested using the XRF, and all results were below the arsenic cleanup level. The larger pieces of creosoted wood were recycled by PWPO.

In July 2007, Chemical Waste Management (CWM) notified the GES that two RI/FS soil samples (submitted as part of the waste profile) from within the boundaries of TPS-2 had dioxin/furan concentrations that exceeded the allowable concentrations for Subtitle C disposal. On July 13, the Contractor provided a procedure to address these soils separately from other soils in TPS-2. The Contractor marked these two areas in TPS-2, and subsequently excavated these soils to a depth of 2 feet and stockpiled them within the soil staging area, for a total of approximately 11.6 cubic yards (estimated at 16.69 tons). On August 3, 2007, the Contractor collected samples from the stockpile for dioxin/furan analysis. The Contractor did not notify EPA that the samples were being collected; subsequently, EPA determined that the Contractor had placed soil in Mason jars that had been purchased from a local grocery outlet. Results for several dioxin/furan congeners were above concentrations allowed for direct Subtitle C disposal (Krening, M., September 10, 2007, email correspondence to Karen Keeley, EPA), and were ultimately disposed of in summer 2008 at CWM under a site-specific variance from land disposal restriction (LDR) treatment standards (ODEQ, 2008).

Ditches and Gully Excavation

The excavation methodology in the ditches was based on field observations of sediment depth in the ditches, with XRF screening and confirmation sampling occurring after excavation was completed. Sediments deposited in the ditches were removed down to firmer underlying soil, with the deepest excavation along the flowline of the ditch. Excavation depth on the side slopes of the ditches was shallower to minimize impacts to the adjacent roadways or railroad tracks. In general, excavation depths at the bottom of the ditches ranged from a foot or less (particularly at the upstream end of the ditches) to near 2 feet at the downstream end of RCRD and HWYD where they converge at the culvert leading to the SRYG.

For the RRD-W, EPA and the Engineer placed flags to mark the excavation area. At the western end of the RRD-W, the EPA ESAT contractor used the XRF on the southern side of the RRD-W to confirm that no elevated arsenic concentrations existed in the depressions (apparently from ponded water) that were visible among the trees.

A GES lower tier subcontractor removed sediment from culverts in RCRD, HWYD, and three culverts underneath Highway 18B. The sediments were removed using a vacuum truck. Sediments removed from the culverts were deposited in the soil screening and stockpile area on site where they were mixed with hazardous soils prior to offsite disposal. The vacuum truck had to be remobilized twice to complete all of the removal of sediments after Engineer inspections revealed that not all of the sediment had been removed.

Excavation was also conducted at three culvert outlets along the south side of Highway 18B. Two of these culverts discharged to the SYRG and RCG, respectively, and the third (located approximately 300 feet west of the PWPO entrance on Highway 18B) discharged to an undefined drainage area. Excavation at RCG encompassed the area from the culvert outlet to the downstream extent of the gully where it discharges to Rock Creek. At the SYRG and the remaining culvert outlet, an area approximately 10 feet downstream of the culvert was excavated 1 foot deep to the lateral extent of the definable flow channel.

2.3.3 Excavation Quantities

Table 2-1 provides a summary of excavation quantities, including surface area and approximate depth of excavation.

2.3.4 Water Management During Excavation

The 2007 RA construction activities were performed in dry conditions, and all excavation activities outside of the barrier wall were above the water table. GES employed dry decontamination techniques for equipment, with the exception of minor wet decontamination of excavator buckets and personal protective equipment. These wet decontamination activities were collected in small plastic pools and allowed to evaporate. Due to the dry conditions, excavation above the water table, and minor wet decontamination activities, there was no need to pump water out of the excavations and discharge it to the onsite SWTS.

During the 2007 RA construction of the trench drains within the barrier wall, and again in 2008, during the replacement of those trench drains, groundwater seeped into the trenches, as did stormwater runoff from the adjacent paved areas. During the 2007 RA construction, temporary pumps were used to convey stormwater and groundwater to the adjacent conveyance to PWPO's NPDES-permitted stormwater treatment system. Since the temporary pumps were not fitted with flow meters, no estimate of flow volume conveyed to the SWTS can be made. In 2008, approximately 40,000 gallons of groundwater and stormwater runoff were collected in a temporary storage tank prior to transfer and discharge to the SWTS.

Also, during the excavations performed by the removal program in 2008, water present in the RCRD/Highway 18B culvert was temporarily stored in a Baker Tank. After the removal, approximately 4,000 gallons of water was transferred to a truck and then pumped into the evaporator operated by PWPO (EPA, 2008b).

2.4 Confirmational Sampling

2.4.1 XRF Screening

Prior to initiation of soil excavation at the site, the EPA Region 10 Laboratory staff, which includes ESAT contractors, provided support to conduct a site-specific study to compare field XRF (Innov-X Systems Inc. 4000a SL) results to fixed laboratory (EPA Method 200.2 and 200.7) results (EPA, 2008a). On-site samples were analyzed for arsenic by field XRF with a subset of the samples shipped to the Region 10 Laboratory for confirmation. The purpose was to determine whether the field XRF results would meet the required precision and accuracy for the project. Four possible preparation techniques were examined: in situ, homogenization, sieving and oven drying and grinding. Results are tabulated in **Table 2-2** and depicted in Figure 2-2. Samples that were only bagged and homogenized prior to being analyzed by field XRF produced values most consistent with the laboratory ICP-AES values. Onsite field XRF analysis was performed both in situ and on homogenized samples.

During excavation, a hand-held XRF analyzer was used to provide near real-time analysis of the arsenic concentration in soil. After each excavation cell was completed by the Contractor, EPA's ESAT contractor laid out a grid of sample locations based on the approach outlined in the *Quality Assurance Project Plan* (QAPP) (CH2M HILL, 2007a) and used the XRF to predict whether the excavation had met the cleanup objective of 159 mg/kg of arsenic in soil. The QAPP was developed consistent with the Soil Sampling and Analysis Plan (Appendix C to the *Final Design and Design Basis Report*, CH2M HILL 2006a).

Based on the results of the XRF readings, the Remedial Project Manager (RPM) made technical decisions to excavate additional soils or to cease excavation in that cell. The RPM would then directly communicate the direction to the Contractor's site superintendent, or to the Engineer's field representative.

The Engineer would also take part in onsite discussions with the Contractor's site superintendent, equipment operators, and ESAT technicians to interpret results and implement the RPM's direction in the field. This often required the Engineer's field representative to mark excavation limits with flagging or marking paint and provide guidance to the Contractor based on the RPM's direction. For example, the RPM may communicate to the Engineer that all soils in areas where the XRF analysis indicated soil arsenic concentrations higher than 159 mg/kg should be excavated an additional foot of soil. The Engineer's representative would then assist the ESAT technician in delineating the areas in the field where the XRF indicated arsenic concentrations that were higher than 159 mg/kg and communicating to the Contractor where an additional foot of excavation was to occur.

In general, excavation proceeded until the XRF screening indicated that arsenic concentrations were below the 159 mg/kg cleanup goal. Based on XRF field observations, soils were found to be either contaminated with arsenic above 159 mg/kg, or were far below 159 mg/kg (for example, in the range of 20 mg/kg arsenic, which is close to background). Also, most excavation areas were underlain with clay (for example, at a depth of approximately 3 to 4 ft bgs) and soils above the clay layer were contaminated, while the clay layer consistently tested undetected or at background concentrations for arsenic.

The XRF and visual observation were both used to determine the horizontal limits of excavation in TPS-1 and TPS-2. Where elevated soil arsenic concentrations were identified in the sidewall of the excavation, the limits of excavation were extended. Test pits outside of the excavation were used to delineate the extent of elevated arsenic concentrations outside of the proposed design limits of excavation. Excavation proceeded laterally until the visual indications of wood-treating chemical staining were removed, and the XRF screening indicated that soil arsenic concentrations in the excavation sidewall were below the cleanup level.

2.4.2 Confirmational Sampling

After excavation was completed, and XRF screening analysis confirmed that there was reasonable likelihood that the cleanup goal had been met, soil samples were collected in the excavation areas according to the QAPP.

Figure 2-3 depicts the approximate location of the confirmation sample locations and **Table 2-3** provides a summary of confirmation sample results and **Table 2-4** provides a description of the composite node locations for samples collected in each excavation area.

As shown by the confirmational sampling results, soils remaining after excavation were far below 159 mg/kg, and were much closer to background concentrations of arsenic. Only one of 42 samples exceeded 63 mg/kg (140 mg/kg in Cell A of TPS-2). The average arsenic concentrations for confirmation samples in the ditches (RRD-E, RRD-W, RCRD and HWYD) and RCG was 14.4 mg/kg.

2.5 Soil Screening

An onsite soil screening plant was used to screen the coarse rock fraction of soils from fine-grained soil particles in the following areas:

- TPS-2
- WPS
- RCRD
- RRD-E
- RRD-W

Non-hazardous soils stored in Soil Storage Cell 3 were scheduled for screening; however, because of higher than anticipated clay and moisture content, Cell 3 soils were deemed unsuitable for screening after initial tests using the screening equipment (GES, 2007a). A portion of soils from TPS-1, not originally scheduled for screening, were deemed suitable for screening during construction. As anticipated in the design, only a portion of the soils in RRD-E, RRD-W, and RCRD were suitable for screening.

Fine-grained soil particles passing the screening plant were stockpiled for offsite disposal at a RCRA Subtitle C disposal facility. The coarse rock fraction retained on the screens was stockpiled onsite for later reuse as clean backfill. Quality control testing was conducted on the course rock fraction to determine that no greater than 5 percent by weight passed a number 200 sieve (by ASTM C117) to ensure that only a minimal amount of fine-grained soil remained on the coarse rock fraction to be re-used as onsite backfill.

Table 2-5 provides a summary of estimated soil screening quantities as provided by GES. As reported by GES, the quantities were estimated based on truck counts assuming 17 cubic yards per truck load for off-road dump trucks and 10 cubic yards per truck for highway trucks. Based on site-specific observations, EPA believes that these estimates are biased high.

2.6 Offsite Disposal

2.6.1 Subtitle D Disposal

All non-hazardous soils excavated from Cells 1, 2, and 3 were direct-loaded into highway trucks for offsite disposal at the Riverbend Landfill (13469 SW Highway 18) in McMinnville, Oregon, a RCRA Subtitle D permitted disposal facility. Soils were disposed at Riverbend Landfill pursuant to Permit Number 100327OR, under a Contained-In Determination made by EPA Region 10 (EPA, 2006). Subtitle D disposal was conducted between June 11, 2007 and July 6, 2007.

In 2008, all non-hazardous construction debris from the demolition of the rejected trench drains (estimated at 40 cy) was disposed at the Riverbend Landfill. An additional 140 cy of concrete from the demolition of the trench drains was recycled at Valley Concrete.

2.6.2 Subtitle C Disposal

Hazardous soils excavated from the TLT site were transported via off-road dump truck to an onsite stockpile prior to loading into highway trucks for transport to the Chemical Waste Management (CWM) of the Northwest Landfill in Arlington, Oregon, a RCRA Subtitle C permitted disposal facility. In isolated cases, some hazardous soils were direct-loaded from the excavation into highway trucks for offsite transport.

Two waste profiles were completed (OR100161 and OR100169) for the remedial work. Subtitle C disposal activities commenced on June 19, 2007 and were completed on September 20, 2007. In 2007, 2,196.90 tons (OR100169; F035) and 25,356.51 tons (OR100161; F032/F034/F035), for a total of 27,553.41 tons (5,5107,950 pounds), of soils were disposed at Arlington. An additional 16.69 tons from TPS-2 were generated in 2007 (referred to as the 'dioxin hot spot' soils), but were not disposed of at Arlington due to concentrations of dioxin congeners in the soils. These 16.69 tons were disposed of at Arlington in 2008, after a site-specific variance from land disposal restriction (LDR) treatment standards was granted by the Oregon Department of Environmental Quality (ODEQ, 2008) per CWM's petition to ODEQ (May 14, 2008). This material was loaded into trucks and disposed of by the EPA ERRS contractor, along with the hazardous soils generated and disposed of by the removal program for the Highway 18B culvert and SYRG excavation work.

Table 2-6 provides a summary of offsite disposal quantities. These quantities are based on weight tickets for each truck provided at the disposal facility.

In 2008, 1,233.89 tons of hazardous soils were transported via highway trucks to CWM. These soils were comprised of:

- 16.69 tons of TPS-2 soil from the RA work in 2007
- 64 tons (approximately 94 cy) of soil and gravel sub-base from work to demolish and replace the north-south and east-west trench drains
- 4 tons (approximately 3 cy) of material (primarily CRABS) from the north-south trench drain (below the asphalt cap and outside the CDF)

- 1,149.2 tons of soil from the Highway 18B culvert work by the removal program (soils were excavated from the South Yamhill River Gulley, Highway 18B culvert area, Highway 18B ditch (east-west), and Rock Creek Road Ditch (north-south).

2.7 Backfill

Backfill and grading operations included subgrade preparation, proof rolling, backfilling and compaction in lifts, quality control testing with a nuclear density gauge, production quality control testing, and finish grading and culvert installation.

2.7.1 Backfill Materials

Backfill operations were conducted to fill the excavations to bring the elevation back to grade and enhance drainage at the site. A variety of backfill materials were used for backfill onsite, including:

- Clean berm soil from the perimeter berms around Cells 1, 2, and 3
- Crushed asphalt removed from the TPS-1 area prior to excavation
- Clean onsite gravel removed from beneath the asphalt cover over the TPS-1 area
- Screened rock material retained in the onsite screening plant
- Imported granular fill (3/4 inch-minus gravel)
- Imported Class 50 riprap for erosion protection in ditches
- Class 200 riprap blended onsite from imported Class 50 Riprap and larger rock available onsite
- Imported topsoil for areas in the roadside ditches to be seeded.

After initial attempts by the excavation subcontractor to reduce the size of the asphalt removed from the TPS-1 area with a sheep's foot roller failed, the Contractor mobilized a crushing plant to the site to reduce the broken asphalt to 4 inches or smaller.

Screened rock material was blended with clean berm soil, onsite gravel, crushed asphalt, or imported granular fill to create a suitable backfill product by mixing finer-grained soil particles with the coarse-grained rock retained by the screening plant.

Compaction was achieved using 8-inch lifts for all backfill operations, with the exception of the final lift of imported granular fill, which was placed in a 6-inch lift.

2.7.2 Quality Control Testing

Compaction of backfill materials was monitored with a nuclear density gauge to verify that compaction met project specifications. For the imported 3/4 inch-minus granular fill, 95 percent relative compaction was determined based on a standard Proctor curve for the lower lifts of material placed, while 95 percent relative compaction for the top 6-inch lift of imported granular fill was determined using a modified Proctor curve. The modified Proctor curve was used for the top lift to ensure that compaction met a higher standard on the final lift in order to provide a suitable working surface for PWPO traffic.

In the case of the berm soils, crushed asphalt, screened rock, and onsite gravel that contained a high fraction of large rock, a reliable Proctor curve could not be established and a rolling pattern was established to verify that suitable compaction was met. The method of using a roller pattern consisted of measuring the density of the compacted surface at several locations within a compaction area after each pass with the roller. The density after each pass was then compared to the density after the previous roller pass to determine the increase in density. The field technician would then instruct the roller operator to continue making passes until the difference in density between passes was less than 0.5-pound per cubic foot (lb/ft^3). The method was employed for each lift of backfill for each backfill material in a backfill area. The Contractor ensured that the number of compaction tests per 8 inch lift met or exceeded the frequency requirements set forth in the specifications.

Final density testing on the upper-most lift of gravel surfacing in TPS-1 and TPS-2 was performed by the Contractor without notification to the Engineer or EPA and, as such, these tests were not witnessed. EPA repeatedly asked the Contractor to provide a map of the density test locations, which they did not provide. During the Pre-Final Inspection, the Engineer and representatives of the United States Army Corps of Engineers (USACOE) noted areas where compaction appeared to be deficient.

At EPA's request, the Engineer procured a subcontractor, FEI Inc., Corvallis, OR, to perform independent Quality Assurance testing to verify whether adequate compaction had been achieved in the TPS-1, TPS-2, and WPS areas. Retesting was performed by FEI on October 2, 2007 while co-located tests were performed by a GES testing firm (Carlson Testing) and witnessed by CH2M HILL and GES staff. Test results from both testing firms indicated areas that did not meet compaction standards in TPS-1 and TPS-2. These issues led to rework of compaction in the areas where individual test locations indicated that the required density had not been met. These included areas of TPS-1 and TPS-2. In WPS, the material used was a heterogeneous mixture of imported ¾-inch minus aggregate and clean gravel removed from TPS-1. Because the TPS-1 gravels were larger in size, and the mixture of materials was heterogeneous, the Engineer and Contractor did not reach agreement on a representative Proctor curve to use as a basis for density testing. As such, the Contractor agreed to re-roll the WPS area to ensure that relative compaction was improved. The compaction efforts in TPS-1, TPS-2, and WPS were completed on October, 5, 2007.

2.7.3 TPS-1, TPS-2, and WPS Areas

TPS-1

The TPS-1 area was excavated and subsequently backfilled in two phases. The first phase included only the western half of the TPS-1 area, excluding the existing haul road at the southern edge of the area. Backfill operations in the western half of TPS-1 were conducted between July 6 and July 31, 2007. Backfill materials consisted of clean berm soil, onsite gravel, screened rock and imported granular fill.

The second phase included the eastern half of the TPS-1 area and the existing haul road at the southern edge of the TPS-1 area. Backfill operations in the second phase of TPS-1 were conducted between August 15 and September 12, 2007. Backfill materials consisted of clean berm soil, onsite gravel, screened rock, crushed asphalt, and imported granular fill.

TPS-2

Excavation and backfill of the TPS-2 area was completed in three phases. The first consisted of the northern two-thirds of the area west of the PWPO dryer structure, the second consisted of the southern one-third west of the dryer structure, and the third included all areas east of the dryer structure.

Backfill materials in TPS-2 consisted of imported granular fill (3/4 inch-minus gravel).

WPS

The WPS Area was excavated in two phases, the first consisting of the area along the fence line at the southern edge, and the second consisting of the remaining areas within the active PWPO pole storage area.

Backfill material consisted of onsite gravel removed from beneath the asphalt at TPS-1, and imported granular fill (3/4 inch-minus gravel).

Completion Dates

Based on resolution of compaction issues in TPS-1, TPS-2, and WPS, EPA and the Engineer concluded that TPS-1 and TPS-2 met compaction on October 11, 2007 and that WPS met compaction on October 12; this was confirmed on October 15, 2007 after a visual inspection and review of survey data.

2.7.4 Ditches and Gullies

RRD-E and RRD-W

Backfill materials in the RRD-E and RRD-W areas consisted of imported Class 50 riprap placed in the ditches to a uniform flowline and cross-section.

RCRD

Backfill materials used in the RCRD consisted of Class 50 riprap placed within the excavation to restore a uniform flowline and cross-section. The rock was extended up the ditch side slopes to cover exposed soil per the design details. In isolated areas where the side slopes were too steep to place rock backfill, erosion control mat (ECM) was placed to cover the exposed soil and prevent erosion. After placement of ECM, hydroseed was applied as discussed in **Section 2.10.2** below.

HWYD

The HWYD was scheduled to be backfilled with Class 50 riprap. During construction, the backfill was changed to imported granular fill (3/4 inch-minus gravel) based on comments received from the Oregon Department of Transportation (ODOT). The Contractor placed and compacted the aggregate in the bottom of the ditch to restore the flowline elevation to a uniform slope matching the existing culvert elevations, and placed ECM along exposed soil slopes steeper than 3:1 to prevent erosion. This backfill approach constituted a change of materials from the design drawings and specifications, and is discussed further in **Section 3**. After placement of ECM, hydroseed was applied as discussed in **Section 2.10.2** below.

RCG

Class 50 riprap was placed over the excavated channel cross-section on the steeper slopes immediately downhill from the culvert outlet. Imported topsoil backfill was placed in the flatter sections of the channel. After placement of topsoil, hydroseed was applied as discussed in **Section 2.10.2** below..

Culvert Outlets

Riprap was placed to backfill the excavation at the outlet of two culverts located along the southern shoulder of Hwy 18B.

The first culvert is located approximately 300 feet west of the PWPO entrance on Hwy 18B. This culvert collects a relatively small drainage area with low anticipated flows. Class 50 riprap was used for erosion protection at the culvert outlet.

The second culvert is located at the intersection of Highway 18B and Rock Creek Road and collects all of the water collected in the HWYD and RCRD, as well as the discharge from PWPO's stormwater treatment system. Class 200 riprap was used to armor the channel at the outlet to this culvert.

2.7.5 Soil Screening and Stockpile Area

After completion of the screening operations and offsite disposal of stockpiled RCRA Subtitle C soils, the screening and stockpile area was surveyed to compare the elevation to the original grade of the area prior to construction. Survey stakes were placed to indicate a 3-inch-deep cut from the original ground elevation.

Soils were then excavated from the footprint of the screening and stockpile area to bring the cut elevation to a minimum of 3 inches below the original grade across the area to ensure that all stockpiled soils had been removed. The Contractor performed this work without oversight, and based on survey data submitted by the Contractor in November, 2007, closer to 6 inches on average was removed from the area. Because the area was uneven, it may have been easier for the Contractor to make a deeper uniform cut across the area rather than follow the contours to ensure that a minimum of 3 inches was removed.

During screening and stockpile operations, the Contractor used an earthen ramp for dump trucks to back up and dump their loads into the area. An excavator located in the stockpile area then sorted the soils into separate piles for screening or as stockpile for loading into highway trucks for direct transport to the disposal facility. During the course of these operations, the area where the trucks dumped their loads was excavated well below the depth of the original ground surface in the area. In an email correspondence to EPA on October 11, 2008 (GES, 2007d) the Contractor confirmed that the hole was excavated over the course of stockpiling operations. EPA requested that the Contractor survey this hole to determine how much of the underlying soil had been removed and transported to the landfill. Based on the as-built survey data provided by the Contractor's surveyor, the Engineer used In-Roads™ software to create a 3-D CADD model of the area to calculate the volume of material excavated from this hole. The Engineer's analysis compared the original surveyed surface to the surveyed surface of the bottom of the excavation, and determined that than an estimated 87 cubic yards of material was removed from the hole.

On September 27, 2007, the Contractor backfilled this hole in the following manner (GES, 2007c):

- The subgrade was leveled and a piece of geotextile was placed in the bottom to reinforce the subgrade
- A one-foot lift of surplus class 50 erosion protection rock (left over from ditch backfill activities) was placed over the geotextile.
- A layer of ¾ inch minus aggregate was then placed as a keystone layer.
- The remainder of the hole was filled with ¾ inch minus aggregate placed in 8-inch lifts and compacted with the steel drum roller.
- The final 6-inch lift of backfill was ¾ inch minus aggregate compacted to a higher compaction standard according to the design specifications for surface gravel.

The imported ¾ inch minus aggregate placed as backfill in this hole was not charged to the EPA contract (GES, 2007d).

After the excavation was completed, EPA's ESAT contractor performed XRF screening analysis of the remaining soil to verify that soils containing elevated arsenic concentrations had been removed.

Initially, XRF data were collected at 12 locations throughout the entire area, with more stations sampled in areas where contaminated soils had been stockpiled and loaded into trucks. The average arsenic concentration was 59 ppm, but a few areas had concentrations of arsenic above 100 ppm (maximum of 173 ppm arsenic). The Contractor removed additional soils from areas with arsenic concentrations above 30 ppm arsenic (based on distribution of data). On September 18, 2007, five additional XRF samples were collected from within the area (range of <15 ppm to 30 ppm), and the average arsenic concentration for the area was 15 ppm.

After the XRF analysis was completed, the subgrade was prepared and imported granular fill was placed to restore the area to the original grade.

2.7.6 Soil Storage Cells

The Soil Storage Cell 1, 2, and 3 areas were re-graded after removal of clean soil from the perimeter berms for use as backfill in TPS-1. During clean berm soil excavation and re-grading of the area within the footprint of the cells, the underlying soils were found to contain woody debris, concrete, and large rocks that were unsuitable for use as backfill in TPS-1. The large rocks and concrete debris were segregated from the suitable backfill materials, transported to TPS-1, and buried within the former footprint of Cell 3.

As a result of the discovery of these unsuitable backfill materials, the original cut elevations proposed in the design were not achieved, leaving the Cell 1, 2, and 3 areas slightly higher than designed. The grading plan was field adjusted by the excavation subcontractor to balance cut/fill with the remaining material and to promote positive drainage across the area.

After completion of the grading work, the area was surveyed. The Engineer noted a low spot in the grade in the former Cell 3 area after a rainfall event in September left ponded water.

PWPO planned to add additional aggregate backfill to this area to improve it for heavy traffic immediately after the completion of RA construction. Because of this plan, EPA allowed the low spot identified in Cell 3 to remain. PWPO subsequently improved the entire Cell 1, 2, and 3 area by installing a separation geotextile and additional aggregate backfill.

2.8 Well Abandonment and Alteration

The scope of work of the RA construction included abandonment of a number of wells that were no longer needed for monitoring at the site, or wells that had been previously damaged. Several wells were also scheduled for alteration to bring flush mount monuments up to the grade of the new low permeability asphalt overlay.

Documentation for well abandonment and alteration to EPA was delayed by the Contractor. Well closure logs were not provided until October 5, 2007. The Engineer documented missing, incomplete, and inadequate documentation in a technical memorandum dated October 25, 2007 (CH2M HILL, 2007e). Revised well abandonment and alteration records were submitted by the Contractor on January 10, 2008. The Engineer again reviewed the submittal and documented missing, incomplete, and inadequate documentation in a memorandum dated February 2, 2008 (CH2M HILL, 2008c). On March 5, 2008, the Contractor provided final well abandonment and alteration records that were adequate.

Table 2-7 lists each of the monitor wells or extraction wells, along with the disposition (abandonment or alteration) of each. A total of 17 monitor wells were abandoned A total of 4 monitor wells were altered by installing a 4-inch riser to bring the vault to the new pavement elevation. A total of 3 extraction well vaults were altered (PW-01, PW-02, and PW-03). The fourth extraction well vault (PW-04) was scheduled to be raised 4 inches; however, the Contractor did not complete this item of work. Well abandonment and alteration forms were submitted to the Oregon Water Resources Department by the subcontracted driller.

During construction, the well vault cover and riser for PW-02 was damaged. Based on the Contractor's fabrication method used for the risers, and the mode of failure of the cover, the well vault risers installed in PW-01 and PW-03 could also fail in a similar manner, and were recommended for replacement by the Engineer.

The vault riser and cover for PW-01, PW-02, and PW-03 were replaced under a separate EPA ERRS contract in 2008.

2.9 Low Permeability Asphalt Cap

Installation of a low permeability asphalt cap included the following activities:

- Pavement patching and repair of isolated areas of existing pavement to repair cracking and damage prior to being overlain by the low permeability asphalt cap

- Reconstruction of pavement and subbase in areas where the existing pavement was extensively damaged, indicating unsuitable base materials. The existing asphalt and base material were pulverized and mixed with Portland cement in a process known as Cement Recycled Asphalt Base Stabilization (CRABS). These areas were then finish-graded and compacted prior to placement of low permeability asphalt
- Drainage modifications to replace existing open swales within the barrier wall area with concrete trench drains
- Other modifications, including monitor well abandonment and alteration of monitor well monuments and extraction well vaults to raise the surface completions to match the grade of the new paving work
- Placement of a 4-inch-thick layer of proprietary low permeability asphalt to achieve a permeability of $1x10^{-8}$ cm/sec

2.9.1 Existing Pavement Repair and Reconstruction

Pavement Patch and Repair

A total of 10 areas of significant cracking and pavement damage were identified and delineated within the area not scheduled for pavement reconstruction. Pavement patching and repair consisted of saw cutting the existing pavement outside the limits of the damaged pavement, then excavating the damaged pavement and 12 inches of underlying aggregate and subgrade material, followed by placement and compaction of aggregate backfill in 6-inch lifts prior to re-paving with heavy-duty asphalt. The 10 patched areas totaled approximately 3,979 square feet. Figure 2-4 provides the location of the patches.

Quality control testing included testing the compaction of both the base aggregate and newly placed asphalt with a nuclear density gauge to verify that compaction standards were met. During the compaction testing, the paving subcontractor initially reported that all test results met compaction requirements. The Engineer discovered that the paving subcontractor had compared nuclear density readings against a Standard Proctor Curve (ASTM D698), whereas the specifications required that compaction be met using a Modified Proctor Curve (ASTM D1157). Based on the corrected comparison, 4 of the 10 patches (patches #1, #3, #4, and #5) were found to not have met compaction requirements on at least one lift. As a corrective measure, the paving subcontractor provided a 5-year warranty (from July 1, 2007) against failure of the patches to EPA in lieu of removing and replacing the work. The Baker Rock Resources Warranty Agreement was finalized January 2, 2008.

Pavement Reconstruction

An approximate area of 3.2 acres was identified in the design drawings for pavement reconstruction or CRABS (see Figure 2-4). The paving subcontractor divided the CRABS areas into a total of 5 areas. The design drawings provided control points for the limits of the CRABS areas within the barrier wall, with the limits extending to the edge of the existing pavement outside of the barrier wall.

Prior to the start of pulverizing the existing pavement with a grinding machine, the interior limits were surveyed and marked on the pavement. However, the limits of the existing pavement outside of the barrier wall were not surveyed by the Contractor or its subcontractors.

Several minor changes in the limits of the CRABs areas were proposed by the Contractor or its subcontractors to facilitate ease of construction or allow for minor changes to promote better drainage. The extent of these changes were noted with general references or approximate measurements on the Record Drawings, but were not surveyed prior to placement of the low permeability asphalt cover.

The CRABs operation was complete using two passes of the grinding machine. The first pass was used to pulverize the existing asphalt. After the first pass, portland cement was added to the pulverized asphalt surface. For the second pass, the grinding machine was set to a 12-inch depth and water was added to achieve a uniform mixture with the pulverized asphalt, portland cement, and subgrade soil and aggregate. The application rate of portland cement and mix depth was monitored by a subcontractor field technician, and were submitted to EPA.

After mixing operations were complete, a road grader was used to re-grade the CRABS material prior to compaction with a vibratory roller. During the compaction effort, the density technician monitored the compaction effort with nuclear density gauge readings after each pass of the roller to establish a roller pattern for each area. Roller passes were continued until the density readings showed no more than 0.5-lb/ft^3 increase between passes.

A water truck was used to keep the CRABs surface damp until low permeability pavement was applied.

2.9.2 Low Permeability Asphalt

Placement of the low permeability overlay included the following work activities:

- Removing all stored lumber and equipment
- Cleaning the existing pavement surface by sweeping
- Application of tack coat to the existing pavement and CRABS surface
- Placement of a 4-inch-thick layer of proprietary low permeability asphalt to achieve a permeability no greater than 1x10^{-8} cm/sec

A total area of 5.4 acres (measured from As-Built Survey) was paved with the low permeability asphalt pavement. The paving operations were scheduled for two phases. The first phase included the following areas:

- Area 1: alleyway between the PWPO maintenance shop, treatment buildings, boiler and spray pond
- Area 2: north of the retort loading pad and treatment building and east of the rail spur
- Area 3: north of the retort unloading pad and west of the rail spur
- Area 4: beneath the dry shed canopy east to the PWPO maintenance shop

- Area 5: east of the PWPO spray pond and treatment buildings and south of the retort loading pad

The second phase included the following areas:

- Area 6: south of the dry shed canopy and west to the north-south trench drain
- Area 7: east of the north-south trench drain extending south and east to the limits of paving outside of the barrier wall

These areas are described further in the Contractor's paving plan submittals, and were developed by the paving subcontractor and Wilder Construction (manufacturer of the proprietary MatCon low permeability asphalt mix). Paving issues and concerns were discussed onsite on July 2, 2007.

Phase 1 paving was conducted between July 5 and 9, 2007. At the completion of the first phase of paving, PWPO was scheduled to have 3 days to move materials stored on the southern half of the paved area (areas 6 and 7) to the northern half (areas 2, 3, 4 and 5), which had just been paved.

After the first phase of paving was completed, the asphalt mix remained very soft. Some areas in Area # 1 were soft enough that foot traffic would leave indentations in the surface when the asphalt temperatures were increased as a result of increased solar radiation in the afternoon.

The first meeting on this issue was held July 9, 2007 (GES, 2007b). During a meeting held on July 11, Wilder Construction recommended that the low permeability asphalt be given 10 days to firm up. The first phase of paving occurred during a period of high ambient temperatures, and Wilder's contention was that the high temperatures needed to subside to help the asphalt harden. On July 16, the Engineer inspected the first phase of paving and summarized the assessment and concerns about the paving in a technical memorandum to EPA on July 19, 2007 (CH2M HILL, 2007c). The second phase of paving was shifted to July 26 to 28, 2007. Wilder released the Phase 2 pavement (areas 6 and 7) for unrestricted use on August 1, 2007.

The Contractor applied the stripe to delineate the barrier wall centerline in late August. When the line was laid out at the western edge of the pavement (west of the retort unloading pad), it was evident that the low permeability pavement did not extend beyond the centerline of the barrier wall and to the limits of the existing pavement, as required by the design drawings.

The Contractor remobilized to extend the limits of low permeability pavement in this area on September 18, 2007. This additional pavement failed quality control requirements because of low binder content. This pavement was removed and replaced on October 5, 2007.

Quality Control Testing

Quality control testing for the low permeability asphalt overly was performed to meet manufacturer specifications and overseen by Abatech Consulting Engineers, a lower-tier subcontractor to Wilder Construction.

A comprehensive quality control program was implemented at both the hot mix plant and at the site during placement of the low permeability asphalt. MatCon quality control forms (Forms 1 through 10, dated May through October 2007), as well as binder certification and aggregate test results, are maintained in the EPA site file.

Figure 2-4 shows the location of asphalt cores collected to measure both thickness and permeability. **Table 2-8** summarizes the results. The *Taylor Lumber and Treating Superfund Site, Quality Control Report, MatCon Cover, Revision 3* (Abatech, 2008) provides a detailed summary of quality control activities.

Based on the testing, only one of the core locations (location 4-1) did not meet the specified 1x 10^{-8} cm/sec permeability criteria. Two core locations were found to be significantly thinner than the 4- inch thickness required by the specifications.

2.9.3 Low Permeability Asphalt Deficiencies

After completion of paving operations, several issues of concern with the low permeability paving were identified by the Engineer and EPA, and in an independent review by the USACE, Seattle District (November 26, 2007). These issues include:

- Permeability in hand work areas that did not meet the specified requirement (noted above)
- Softness and rutting under traffic loads and material storage
- Thickness of the pavement in select locations that did not meet the specified requirement
- Warranty language that precluded coverage of normal site usage
- Surface smoothness that did not meet specified tolerances that manifested areas of ponded water referred to as “bird baths”

In February 2008, during an Alternative Dispute Resolution (ADR) meeting held in McMinnville, Oregon, EPA reached agreements with the Contractor and their Subcontractors to resolve these issues. Each of these issues is discussed in the section below, and their resolutions are discussed further in **section 4.11**.

Permeability in Hand Work Areas

After concerns were raised by the Engineer and EPA about permeability in areas close to buildings and other tight areas where the paving rollers could not reach, an additional 4-inch-diameter core was collected from a representative location to determine if permeability was met in the “hand work areas.”

A nuclear density gauge was then used to measure the density of the asphalt at that core location, as well as 12 selected locations representative of the hand work areas. The density readings from the nuclear density gauge were then compared to the laboratory test results for the asphalt core, to provide a correlation between the nuclear density gauge readings and the laboratory results. This correlation was to estimate the percent voids and permeability of the asphalt in the hand work areas based on the density of the asphalt from the nuclear density gauge readings.

The results of this evaluation showed that the low permeability asphalt did not meet the specified 1x 10^{-8} cm/sec permeability criteria.

Softness and Rutting

An area of low permeability pavement east of the PWPO spray pond in paving area #5 has exhibited a higher tendency for rutting from wheel loads and dunnage under stored lumber. The severity of the rutting has raised issues with PWPO for safe and efficient movement of traffic, and for ponding water in the wheel ruts that become a safety concern under freezing conditions.

The resolution of this deficiency is discussed further under **subsection 4.11**, Alternative Dispute Resolution.

Thickness of Pavement

As noted above, two asphalt core locations were identified with thicknesses significantly below the 4 inch requirement specified. The reduced thickness raises concern about the pavements long term ability to withstand traffic loads without rutting or cracking and premature failure.

The resolution of this issue is discussed in **subsection 4.11**.

Surface Smoothness Tolerances

Several areas of low permeability pavement were identified that did not meet the specified surface smoothness tolerances; subsequently, these areas pond water after rainfall events. The Engineer raised concerns that these areas of ponded water, referred to as "bird baths," present a safety concern for equipment and pedestrian traffic under freezing conditions. This concern was later confirmed by PWPO.

The resolution of this deficiency is discussed further under **subsection 4.11**.

Warranty Language

The first version of the MatCon 5-year material and workmanship warranty submitted to EPA (Wilder, 2007) included limitations that excluded coverage from damage caused by traffic loads and material storage activities at the site.

This concern was raised to the Contractor by the Engineer and EPA. The resolution of this deficiency is discussed further under **subsection 4.11**.

Operation and Maintenance

As part of the MatCon warranty, annual inspections are required to document the condition of the pavement. The final approved Operation and Maintenance (O&M) Plan (Wilder, 2008) describes the requirements for maintenance of the MatCon pavement along with the requirements for the annual inspections. The O&M plan requires that the inspection document notable features and surface uses, note locations and types of distresses, take photographs, and locate distresses to ascertain the condition of the MatCon cap. An inspection report is to follow summarizing findings, ratings, and recommendations.

The first annual inspection of the MatCon pavement was conducted on August 11, 2008. The inspection was attended by the EPA RPM and representatives from both Wilder Construction and the Engineer. The Engineer's observations were summarized in a memo to EPA dated August 11, 2008 (CH2M HILL, 2008d). Wilder also submitted a summary report documenting the annual inspection and subsequent O&M activities performed as a result of the inspection.

The findings of the inspection and subsequent activities are described as follows:

- Areas located east of the PWPO spray pond and retort loading areas were rolled with a pneumatic roller to smooth out rutting from dunnage and fork truck traffic. The areas targeted for rolling were based on areas of softness and rutting identified in 2007. The rolling resulted in some improvement in smoothness, but for the most part the ruts and indentations remain. In accordance with the approved O&M plan, the Engineer suggested that additional rolling be carried out on an annual basis.
- A total of six areas were identified north of the PWPO dry shed where the MatCon pavement appeared to be raised with surface cracking. An approximately one square foot area of the MatCon pavement was saw cut and removed to observe the underlying conditions, which revealed water trapped between the MatCon pavement and the underlying asphalt. During the inspection, it was discussed that a possible source of the water could be from infiltration along the joint between the MatCon surface and an adjacent concrete area. It was speculated that water could potentially infiltrate through this joint and then travel laterally between the MatCon pavement and underlying asphalt. The resolution was to saw cut along the edge of the joint to straighten it out, then apply a Crafco sealant to prevent further infiltration.
- Additional areas of pavement distress were identified along the joints between the MatCon and adjacent concrete near the retort unloading pad west of PWPO's treatment plant. Approximately 192 LF along the east/west edge and 54 LF along the north/south edge were noted and scheduled for saw cutting and sealing.
- The white pavement striping delineating the barrier wall centerline has largely worn off. A second coat of paint was recommended.
- An area of MatCon at the far western end of the paved area where traffic enters the pavement from the white pole storage yards was noted as having indentations from gravel being tracked onto the pavement. This area was rolled to try and reduce the indentations.
- A stained area from an hydraulic oil spill onto the MatCon surface was noted. PWPO indicated that this was a single spill event that was cleaned up promptly. Wilder noted that PWPO should continue to clean up spills promptly to avoid prolonged exposure and possible degradation of the MatCon pavement from spills. No damage was noted to the MatCon, and no further action was required.

All follow-up work to the annual inspection was completed by Wilder by October 6, 2008. The results of the annual inspection will also be summarized in an annual inspection report to be submitted to EPA by Wilder in December 2008.

2.9.4 Drainage Modifications

Trench Drains

Prior to RA construction, portions of PWPO's stormwater conveyance system flowed through an existing concrete trench drain and two paved open channels within the barrier wall south of the PWPO treatment plant area. The Remedial Design specified replacement of the existing concrete trench drain and open channels with a pre-cast trench drain insert with a minimum encasement with 4 inches of concrete.

During the submittal process, the RA Contractor proposed substituting the pre-cast trench drain with a cast-in-place concrete trench drain with cast iron grates and frames and reinforcing steel. The Engineer deemed this to be functionally equivalent in terms of performance, and recommended approval of the submittal.

The Contractor's initial schedule proposed completion of drainage modifications prior to installation of the low permeability pavement. Later the Contractor submitted Request for Information (RFI) #07 requesting to install a temporary pipe within the open channels and placement of temporary granular backfill in the channels and installation of pavement prior to completing the trench drains. After completion of paving, the Contractor proposed to saw cut the pavement, excavate the temporary pipe and granular backfill, and use the walls of the excavation as forms for the new cast-in-place trench drain. It was also proposed to leave the existing concrete trench drain in place because of an unforeseen utility crossing that was embedded in the existing trench drain walls.

The Engineer expressed concerns about the sidewalls sloughing off and undermining the new pavement. The Contractor rescinded RFI #07 and replaced it with RFI #08 with minor modifications. The Engineer's response reiterated the concern about undermining of the pavement and the need to ensure the alignment of the trench and positive drainage into the trench as expressed in the RFI #08 response, and recommended that a wider reinforced concrete apron be incorporated to mitigate the concern for undermining the new pavement.

The Contractor proceeded to install the temporary pipe, backfill, and low permeability pavement. The Contractor then saw cut the new pavement, and excavated the temporary backfill, and temporary pipe from the two trench drain alignments. As feared, some of the excavation walls sloughed and undermined the new pavement. The Contractor was required to saw cut the undermined areas wider and install a wider concrete apron in those areas.

The subgrade was then prepared and compacted, and the reinforcing steel was tied and set in place. When it was brought to the attention of the Engineer that the trench drains would be completed in two separate pours, further information was requested of the Contractor regarding water stopping and the Contractor's plans for quality control testing for the concrete, the trench cross-section, and the transition at the existing trench drain. RFIs #12 through #12c pertain to these issues and provide the agreed-upon resolution.

After the two trench drains were poured and the forms were stripped, areas of severe honeycombing and unconsolidated concrete and exposed reinforcing steel were observed in the north-south trench drain. Areas of poor consolidation were also noted around the grate frames in the east-west trench drain. Further inspection by the Engineer's structural engineer identified several other key issues relating to the workmanship of the trench drains and the safety for traffic loads. The grate frames as installed were not plumb and level and were installed outside of manufacturer's tolerances for the gap between grate and frame. This led to concerns about inadequate bearing support and potential failure of the grate and frame system under traffic loads. These concerns were documented in a technical memorandum from the Engineer to EPA on September 12, 2007 (CH2M HILL, 2007d). The EPA subsequently sent notice to the Contractor that the trench drains were rejected on the basis of poor workmanship.

Several rounds of responses and rebuttals between EPA and the Contractor were unsuccessful in resolving the trench drain issues. In February 2008, during the ADR meetings, EPA reached agreements with the Contractor and their Subcontractors to resolve these issues with the trench drains through a deductive change order (see **Section 4.11**).

After completion of the initial RA work by GES in October 2008, PWPO hired SUMCO to replace the existing unlined drainage swale, downstream of the barrier wall, with a buried pipe culvert. A water-tight connection was made with the outlet of the East-West Trench drain and the new section of pipe installed to complete a piped connection for stormwater conveyance from the trench drains to the SWTS.

Subsequent to the agreement with GES for the deductive change, EPA hired EQM Inc., an EPA ERRS Contractor, to design and install replacement trench drains in 2008. EQM's scope of work included removal of the deficient trench drains installed by GES, preparation of subgrade, and pouring new cast-in-place concrete trench drains using new grate rails and re-using the cast-iron grates from the deficient trench drains.

EQM mobilized to the site on July 25, 2008 and started trench drain replacement work on July 26. Initial work on the trench drains was completed on August 29, 2008. CH2M HILL provided construction oversight during the work, and performed an inspection of the replacement trench drains on September 5, 2008. The results of this inspection were transmitted to EPA on September 9, 2008 (CH2M HILL, 2008e). EQM submitted a corrective action plan to EPA on November 20, 2008 for resolution of issues identified in the September 9, 2008 memorandum. CH2M HILL provided responses to EQM's corrective action plan on December 1, 2008. Final resolution of Pre-Final Inspection items and completion of field work are pending.

Work on the well vaults was conducted between October 15 and October 17, 2008. EPA did not request the Engineer to be present at the site for oversight of this work.

Catch Basins

As part of the preparation for placement of the low permeability asphalt, two catch basins were raised 4 inches to match the finished paving elevation. An additional three catch basins scheduled to be raised were left at the original elevation by the Contractor, who modified the grades of the CRABS areas or pavement transition to match the new pavement elevation to the existing catch basin elevation.

2.10 Site Restoration and Demobilization

Site restoration activities included removal of all temporary construction facilities and equipment, repair of site access roads, placement of erosion control mat and hydroseeding of areas where topsoil and/or erosion control mat (ECM) was placed, and maintenance of stormwater BMPs.

2.10.1 Erosion Protection

Site restoration activities included installation and maintenance of temporary stormwater BMPs, including check dams and silt fence, which are to be maintained until a suitable stand of grass is established. ECM was also placed on ditch slopes and embankments 3:1 or steeper in the RCRD, HWYD, and RCG to prevent erosion. Check dams and silt fencing that remained onsite after October 15, 2007 were removed by GES on May 9, 2008. Check dams and silt fencing were left at the RCRD/HWYD intersection for work to be performed in summer 2008 by the ERRS contractor. Check dams remain at this intersection while vegetation recovers.

2.10.2 Hydroseeding

Areas of exposed soil and vegetation disturbed during construction activities, and areas of backfilled topsoil were hydroseeded. These areas included portions of the following locations:

- RCRD
- HWYD
- Topsoil area between HWYD and WPS Area
- 3:1 slope adjacent to RCG
- Lower extent of the RCG channel

The Contractor originally submitted a plan to broadcast seed the areas (allowed under the specifications for areas flatter than 3:1), but because of the impending close of the growing season and fall rains, hydroseeding was required to establish vegetation.

The hydroseed was placed by Earthworks Hydroseeding LLC, a lower-tier subcontractor to GES.

2.10.3 Site Access Road Repair

Site restoration work includes the restoration of gravel site access roads to preconstruction condition or better. The majority of construction traffic used access roads leading from the new site entrance from the service road leading from Highway 18 B to the screening and stockpile area, the roads circumnavigating the screening and stockpile area, and the main east-west access road leading from the WPS yard through the southern edge of TPS-1. At the start of construction, 6 inches of gravel was added to these roads to improve them for construction traffic. At the completion of construction these roads were regraded and rolled to fix potholes and rutting. PWPO also identified several intersections in the WPS yard where construction traffic had caused rutting when turning sharp corners. These areas were restored by adding gravel, grading, and rolling.

2.10.4 Demobilization

Demobilization consisted of the following activities:

- Decontaminating construction equipment (decontamination was completed on September 17, 2007 for all equipment, except for one 345B Caterpillar excavator, which was subsequently decontaminated on September 19, 2007.
- Hauling equipment offsite
- Removing all temporary construction facilities (for example, site trailers)
- Performing a post-construction video survey
- Repairing any damage done during construction (for example, re-setting a "No Trucks" sign along the entrance road into the WPS yard).

Demobilization was completed in mid-December with the removal of the site trailers, which were required to remain on site for a minimum of 30 days after completion of site work.

2.11 Air Monitoring

The contract documents required that the Contractor submit a plan for air monitoring. The Contractor's Air Quality Monitoring Plan was approved by EPA on June 4, 2007. Air monitoring was conducted by Environmental Quality Management, Inc. as a subcontractor to GES.

A meteorological station was set up approximately 0.6 miles east of the site, and three high-volume samplers were set up around the site, with one backup sampler. One high-volume sampler and the backup were set up just west of the PWPO property line on the Bowman property. A second high-volume sampler was set up at the former truck shop located just north of the current PWPO property, and one high-volume samplers was located at residential locations east of the PWPO property along Rock Creek Road.

The meteorological station was installed and started up on May 30, 2007. Air monitoring using the high-volume samplers was conducted from June 4 to September 20, 2007. Daily wind rose data were appended to the Contractor's daily reports. Wind rose data indicated that the samplers were placed at locations that were representative of conditions that are likely to be affected by the site remediation activities.

The results of the air monitoring were summarized in weekly reports, and in monthly reports (June, July, August/September) submitted by the Contractor to EPA. Throughout the project, 253 samples were collected. Analytical turn around time was generally 7 days. The measured and average arsenic and PM_{10} ambient air concentrations were always far less than the allowable amounts. Between July 31 and September 20, 2007, which was the most active remediation phase at the site, the measured arsenic ambient air concentration was always less than 18.9 percent of the allowable amount (0.066 ug/M^3). The average arsenic ambient air concentration (0.0022 ug/M^3) was less than 3.4 percent of the allowable amount. The measured PM_{10} ambient air concentration was always less than 22.8 percent of the allowable amount (150 ug/ M^3). The average PM_{10} ambient air concentration (15.4 ug/M^3) is less than 10.3 percent of the allowable amount.

TABLE 2-1
Excavation Quantities
Taylor Lumber and Treating Superfund Site

Soil Excavation Area	Excavation Area (acres)[1]	Average Excavation Depth (feet)[2]	Excavation Volume (cubic yards)[3]
TPS-1	2.67	2.4	10,492
TPS-2	1.61	1.8	4,578
WPS	0.4	1.0	654
Total	4.68		15,724

Notes:

[1] Excavation area calculated based on as-built survey of excavation limits. Original remedial design estimate was 2.36 acres for TPS-1, 1.57 acres for TPS-2 , and 0.4 acres for WPS for a total of 4.33 acres.

[2] Average excavation depth based on as-built survey of limits of excavation and estimated volume of removal.

[3] Quantity shown is based on as-built survey volume estimate provided by RA Contractor's surveyor initially submitted November 20, 2007and re-submitted on March 5, 2008 . RA Contractor estimated 15,701 cy in progress payment documentation submitted to EPA, as follows: 10,472 cy for TPS-1, 4575 for TPS-2, and 654 for WPS.

TABLE 2-2
Preliminary XRF Study Data
Taylor Lumber and Treating Superfund Site

Location	Sample ID	Sample Date	GPS Coordinates		In-Situ XRF Measurements (mg/kg)							Laboratory Results (mg/kg) (EPA Method 6010)	Concentration Range (Low, Med, Hi)
			N°	W°	1	+/-	2	+/-	3	+/-	Avg		
TL-SS-001	7214000	5/24/2007	45.09794	123.42722	209	6	442	10	321	7	324	178	Hi
TL-SS-002	7214001	5/24/2007	45.09813	123.42766	550	10	363	7	351	8	421	436	Hi
TL-SS-003	7214002	5/24/2007	45.09809	123.42782	60	3	189	6	112	4	120	105	Med
TL-SS-004	7214003	5/24/2007	45.09832	123.42763	272	7	222	7	357	7	284	299	Hi
TL-SS-005	7214004	5/24/2007	45.09871	123.42779	11	3	13	3	13	3	12	14	Low
TL-SS-006	7214005	5/24/2007	45.09867	123.42800	126	5	105	4	100	4	110	97	Med
TL-SS-007	7214006	5/24/2007	45.09879	123.42761	58	3	50	3	63	4	57	66	Low
TL-SS-008	7214007	5/24/2007	45.09902	123.43044	591	8	526	8	665	10	594	450	Hi
TL-SS-009	7214008	5/24/2007	45.09904	123.42915	24	2	38	3	45	3	36	70	Low
TL-SS-010	7214009	5/24/2007	45.09897	123.43040	111	4	83	3	164	4	119	248	Med
TL-SS-011	--	--	--	--	--	--	--	--	--	--	--		--
TL-SS-012	--	--	--	--	--	--	--	--	--	--	--		--

Notes:

1. Samples at locations TL-SS-011 and TL-SS-012 not collected.

TABLE 2-3
Confirmation Sampling Results
Taylor Lumber and Treating Superfund Site

Sample Location	Sample ID	Date Collected	Sample Description	Result[1] (mg/kg)
		TPS-1		
TPS-1 Cell A	7264151	6/25/2007	TPSI- CELL A	7
TPS-1 Cell B	7264153	6/29/2007	CELL B COMPOSITE	9.2
TPS-1 Cell C	7272003	7/6/2007	TPS1- CELL C	7.9
TPS-1 Cell D	7284100	7/9/2007	TPS1- D COMP	6.7
TPS-1 Cell E	7264152	6/25/2007	TPS1-CELL E	8.5
TPS-1 Cell F	7264154	6/29/2007	CELL F COMPOSITE	15
TPS-1 Cell G	7272004	7/6/2007	TPS1- CELL G	8.8
TPS-1 Cell H	7334161	8/18/2007	TPSI- H COMP	10
TPS-1 Cell I	7324150	8/8/2007	TPSI CELL I COMPOSITE	12
TPS-1 Cell J	7324154	8/9/2007	TPSI CELL J	34.6
TPS-1 Cell K	7334158	8/15/2007	TPSI-K COMP	13
TPS-1 Cell L	7334160	8/18/2007	TPSI- L COMP	17
TPS-1 Cell M	7324151	8/8/2007	TPSI CELL M COMPOSITE	62.2
TPS-1 Cell N	7324155	8/9/2007	TPSI CELL N	9
TPS-1 Cell O	7344152	8/24/2007	TPS1- "O" COMPOSITE	7.1
TPS-1 Cell P	7324156	8/10/2007	TPS-I-P-COMP	11
TPS-1 Cell Q	7344150	8/21/2007	TPSI- Q COMPOSITE	7.9
		TPS-2		
TPS-2 Cell A	7294155	7/20/2007	TPS2-CELL A COMPOSITE	140
TPS-2 Cell B	7294152	7/18/2007	TPS2-CELL B COMPOSITE	13
TPS-2 Cell C	7334150	8/13/2007	TPS-2-C- COMP	10
TPS-2 Cell D	7294154	7/20/2007	TPS2-CELL D COMPOSITE	14
TPS-2 Cell E	7294151	7/18/2007	TPS2-CELL E COMPOSITE	16
TPS-2 Cell F	7334151	8/13/2007	TPS-2-F- COMP	21
TPS-2 Cell G	7294156	7/20/2007	TPS2-CELL G COMPOSITE	33.2
TPS-2 Cell H	7294153	7/19/2007	TPS2-CELL H COMPOSITE	16
TPS-2 Cell I	7294150	7/18/2007	TPS2-CELL I COMPOSITE	14
TPS-2 Cell J	7334152	8/13/2007	TPS-2-J- COMP	62.3
TPS-2 Cell K	7334153	8/13/2007	TPS-2-K- COMP	13
TPS-2 Cell L	7334154	8/14/2007	TP2S-L COMP	4.8

TABLE 2-3
Confirmation Sampling Results
Taylor Lumber and Treating Superfund Site

Sample Location	Sample ID	Date Collected	Sample Description	Result[1] (mg/kg)
TPS-2 Cell L	7304154	7/27/2007	TPS2-L CONF	8.3
TPS-2 Cell M	7304153	7/27/2007	TPS2-M CONF	17
TPS-2 Fenceline (East of PWPO Dryer)	7344153	8/24/2007	TPS2- G-K FENCE COMPOSITE	61.5
WPS				
WPS Cell A	7324157	8/11/2007	WPS-A- COMP	15
WPS Cell B	7324158	8/11/2007	WPS-B- COMP	11
WPS Cell C	7324159	8/11/2007	WPS-C- COMP	6.1
RRD-E				
RRD-E (All)	7334157	8/15/2007	RAIL DITCH E	5.4
RRD-W				
RRD-W (All)	7334159	8/16/2007	RAIL DITCH- W	8.7
RCRD				
RCRD North Half	7334155	8/14/2007	RCRD-N	7.6
RCRD South Half	7334156	8/14/2007	RCRD-S	7.8
RCG				
RCG (All)	7344151	8/22/2007	RCG COMPOSITE	48.6
HWYD				
HWYD (East Half)	7324152	8/8/2007	HWY DITCH 1A-E COMPOSITE	8.4
HWYD (West Half)	7324153	8/8/2007	HWY DITCH 2A-E COMPOSITE	14

Notes:

1. Reference: Final results for arsenic soil analyses, confirmational sample results, Remedial Action, Taylor Lumber and Treating Superfund site. Data Release and Quality Assurance Memoranda for May 24 through July 9, 2007; July 18 through July 27, 2007; and August 8 through 24, 2007. Gerald Dodo (EPA Region 10 Laboratory) to Karen Keeley (EPA Region 10 Superfund), Seattle, Washington (EPA, 2007g)
2. Sample locations are shown in Table 2-4 and Figure 2-2.

TABLE 2-6
Offsite Disposal Quantities
Taylor Lumber and Treating Superfund Site

Subtitle D Disposal	Disposal Quantity (Tons)
Soil Storage Cells 1, 2 and 3 (2007)[1]	26,351
Trench Drain Demolition Debris Disposal (2008)[2]	**See Note 3**
Total Subtitle D Disposal Quantity	**See Note 3**
Subtitle C Disposal	**Disposal Quantity (Tons)**
TPS-1, TPS-2, WPS, RCG, RRD-E, RRD-W, RCRD, HWYD, Screening and Staging Area (2007)[1]	27,553
TPS-2 dioxin containing soils (2008)[1]	16.69
Soils from replacement trench drain construction (2008)	64
Cement Recycled Asphalt Base Material excavated during replacement trench drain construction (2008)	4
Soils excavated during the Highway 18B culvert excavation (2008)	1149.2
Total Subtitle C Soil Disposal Quantity	**28,784**

Notes:

1. Quantity estimates from Contractor's Final Progress Payment Request dated 11-28-07.
2. Demolition of the rejected trench drains was conducted by an EPA ERRS contractor in 2008. An estimated 40 cy of demolition debris was disposed of at Riverbend Landfill, and 140 cy of concrete debris was recycled at Valley Concrete.
3. Demolition debris for trench drain demolition is estimated at 150 cubic yards of concrete (recycled) and 20 cubic yards of low-permeability asphalt debris disposed of at Riverbend Landfill (Subtitle D). The ERRS contractor did not provide an estimate of tonnage of demolition debris.

TABLE 2-7
Well Abandonment and Alteration Summary
Taylor Lumber and Treating Superfund Site

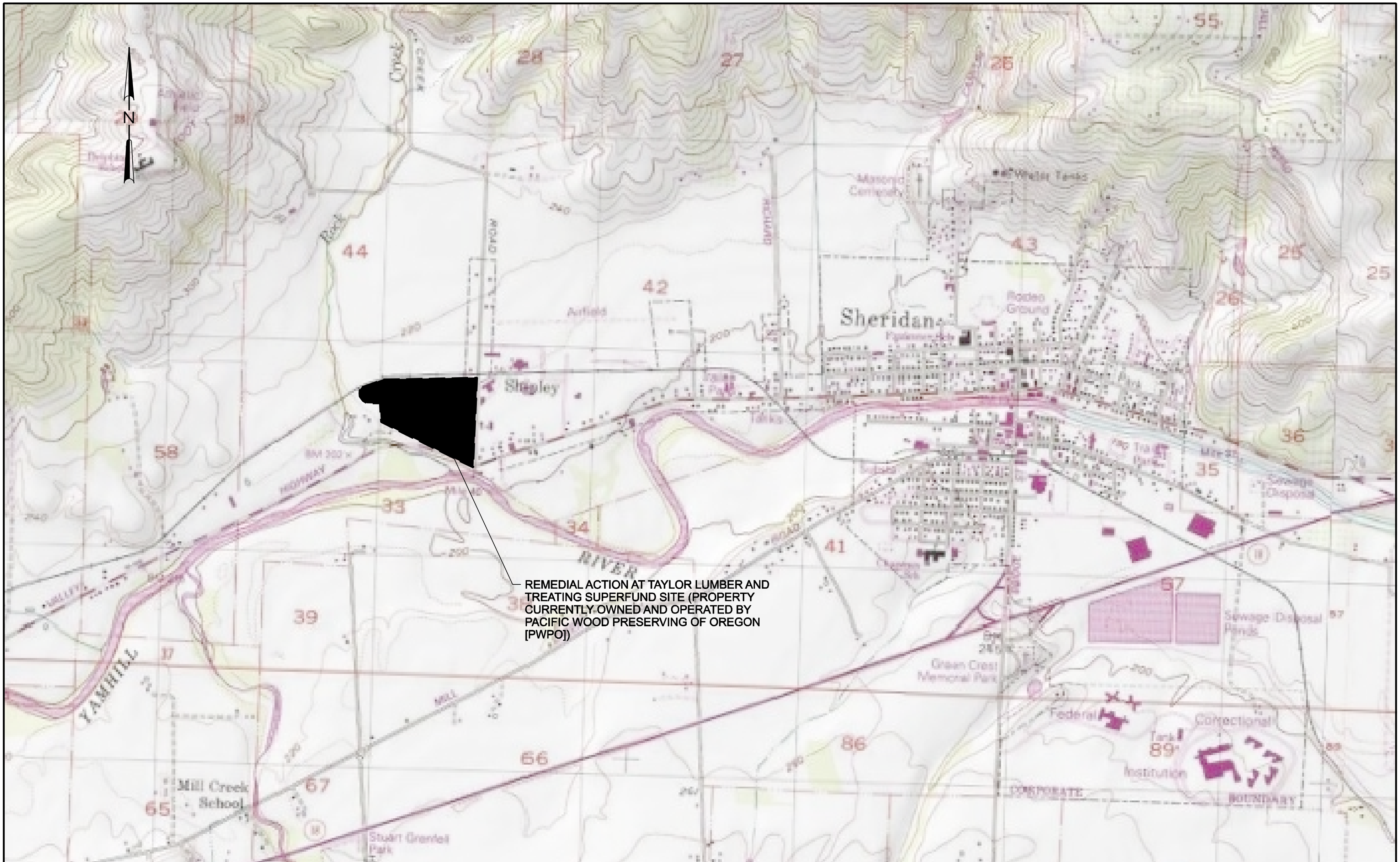
Well	Abandonment	Alteration	Comment
MW-2S	X		
MW-2D	X		
MW-4S	X		
MW-4D	X		
MW-7S	X		
MW-7D	X		
MW-18S	X		
MW-21S	X		
MW-23S	X		
N-1S	X		
N-1D	X		
N-2S	X		
N-2D	X		
N-3S	X		
N-3D	X		
T-2	NA	NA	This well could not be located in the field.
T-4	X		Previously abandoned in place. Surface monument removed.
T-5	NA	NA	This well could not be located in the field.
T-6	X		
PW-1		X	Vault cover raised 4 inches.
PW-2		X	Vault cover raised 4 inches.
PW-3		X	Vault cover raised 4 inches.
PW-4	NA	NA	Alteration was not performed.
MW-14S		X	Surface monument raised 4 inches.
MW-101S		X	Surface monument raised 4 inches.
MW-102S		X	Surface monument raised 4 inches.
MW-104S		X	Surface monument raised 4 inches.

TABLE 2-8
Asphalt Pavement Permeability and Thickness
Taylor Lumber and Treating Superfund Site

Asphalt Core	Thickness (inches)	Permeability (cm/sec)
1-1 4.0		<1x10^{-8}
2-1 4.4		<1x10^{-8}
2-2 5.1		<1x10^{-8}
2-3	**3.9**	<1x10^{-8}
3-1	**3.8**	<1x10^{-8}
3-2 4.9		<1x10^{-8}
4-1 4.0		**<7.9x10^{-8}**
4-2 4.0		<1x10^{-8}
5-1 4.1		<1x10^{-8}
6-1	**3.7**	<1x10^{-8}
6-2	**3.2**	<1x10^{-8}
7-1 4.4		<1x10^{-8}
7-2 4.1		<1x10^{-8}
7-3	**3.3**	<1x10^{-8}

Notes:

Bold values indicate values that did not meet contract specifications



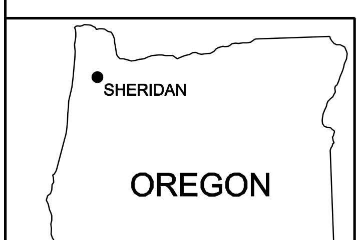


FIGURE 1-1
SITE VICINITY MAP
TAYLOR LUMBER AND TREATING SUPERFUND SITE
SHERIDAN, OREGON

CH2MHILL

24-DEC-2008 ab-fig1-1_342790.dgn

NOTE:

PHOTO TAKEN MARCH 27, 2006

FIGURE 1-2
SITE PHOTO - PRIOR TO REMEDIAL ACTION
TAYLOR LUMBER AND TREATING SUPERFUND SITE

AB-Fig1-2_342790.scr.dgn 12/24/2008

CH2MHILL

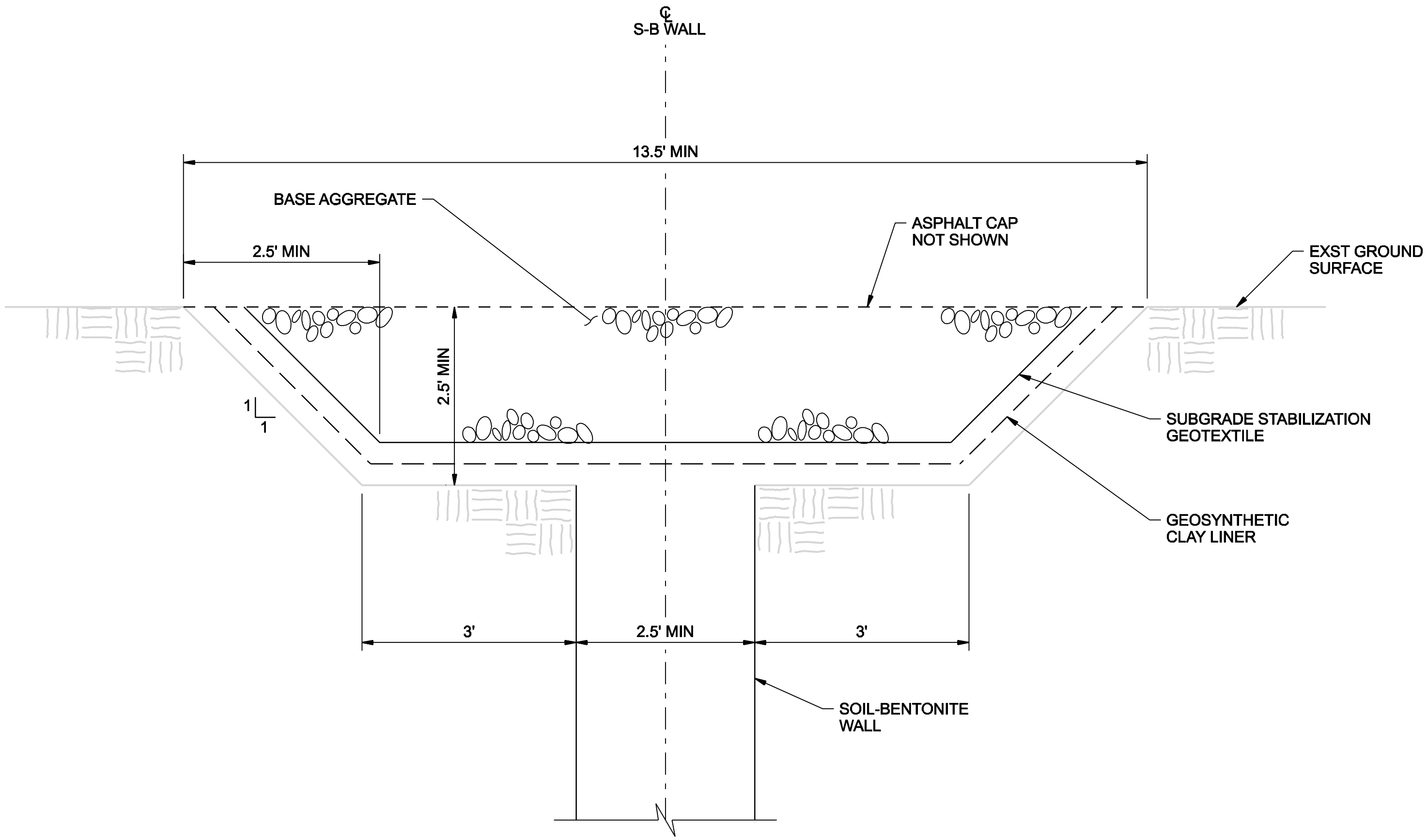


FIGURE 1-3
BARRIER WALL PROTECTIVE CAP DETAIL
TAYLOR LUMBER AND TREATING SUPERFUND SITE

24-DEC-2008 figx-x_342790.dgn

CH2MHILL

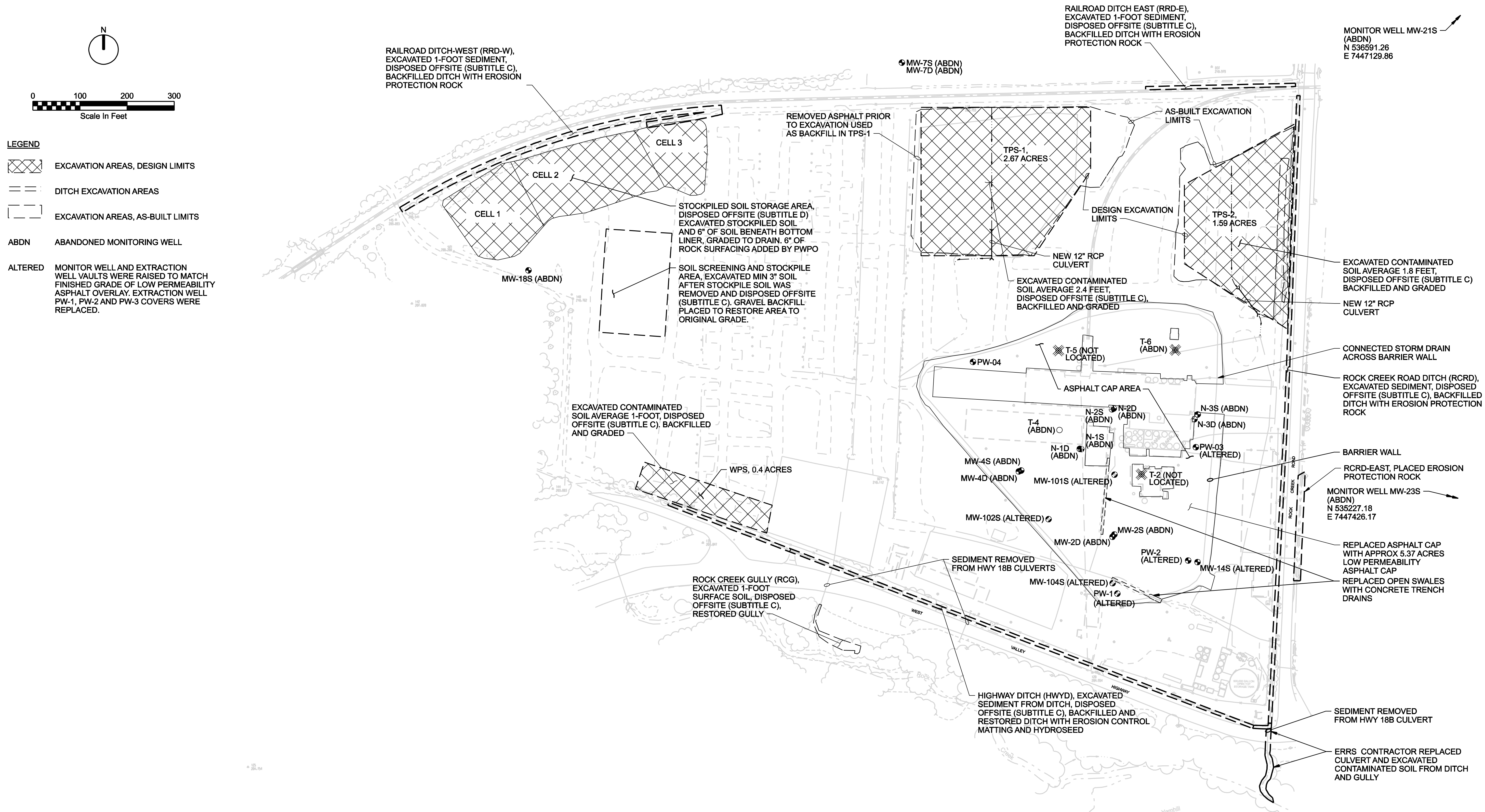


FIGURE 1-4
KEY ELEMENTS OF COMPLETED REMEDIAL ACTION
TAYLOR LUMBER AND TREATING SUPERFUND SITE

AB-Fig1-4_342790.dgn 12/24/2008

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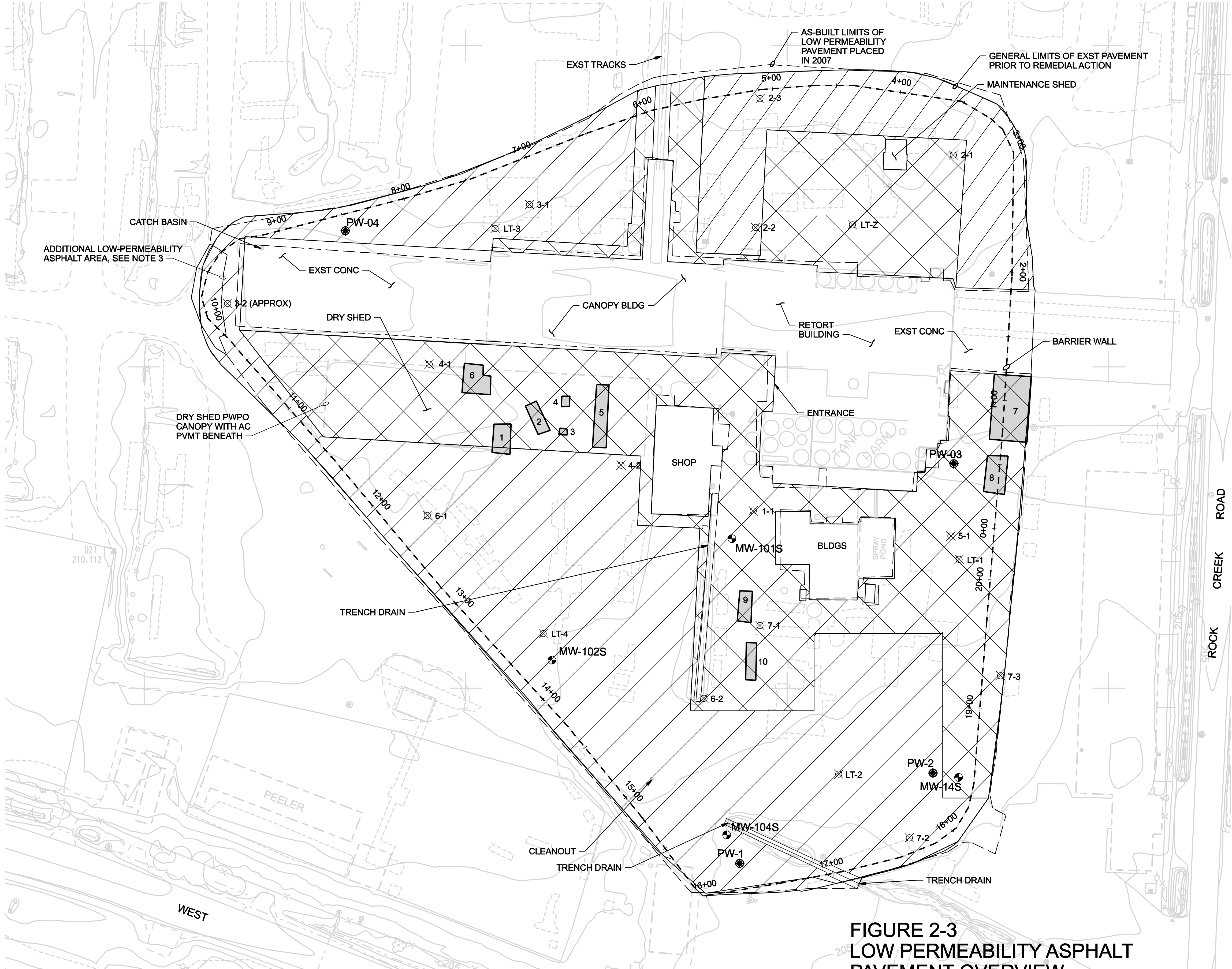


LEGEND:

- ASPHALT CORE LOCATIONS
- MONITOR WELL
- EXTRACTION WELL
- PAVEMENT RECONSTRUCTION AND OVERLAY
- PAVEMENT REPAIR AND OVERLAY
- PATCHES TO EXISTING PAVEMENT
- BARRIER WALL CENTERLINE

NOTES:

1. ASPHALT PATCHES #1, #2, #3 AND #5 FAILED SUBGRADE COMPACTION REQUIREMENTS AND ARE COVERED BY A 5-YEAR SUPPLEMENTAL WARRANTY (DATED JAN 2, 2008) FROM BAKER ROCK RESOURCES.
2. LOW PERMEABILITY ASPHALT OVERLAY MEASURES APPROXIMATELY 5.37 ACRES. (EXCLUDING EXISTING BUILDINGS). OUTER LIMITS OF LOW PERMEABILITY ASPHALT CAP MEASURES APPROXIMATELY 6.75 ACRES (INCLUDING BUILDING ACRES).
3. A 1,455 SF AREA OF LOW PERMEABILITY ASPHALT WAS ADDED AFTER COMPLETION OF PAVING OPERATIONS. THIS AREA WAS ADDED BECAUSE THE ORIGINAL PAVING LIMITS DID NOT EXTEND OUTSIDE OF THE BARRIER WALL CENTERLINE TO THE LIMITS SHOWN IN THE DESIGN DRAWINGS.

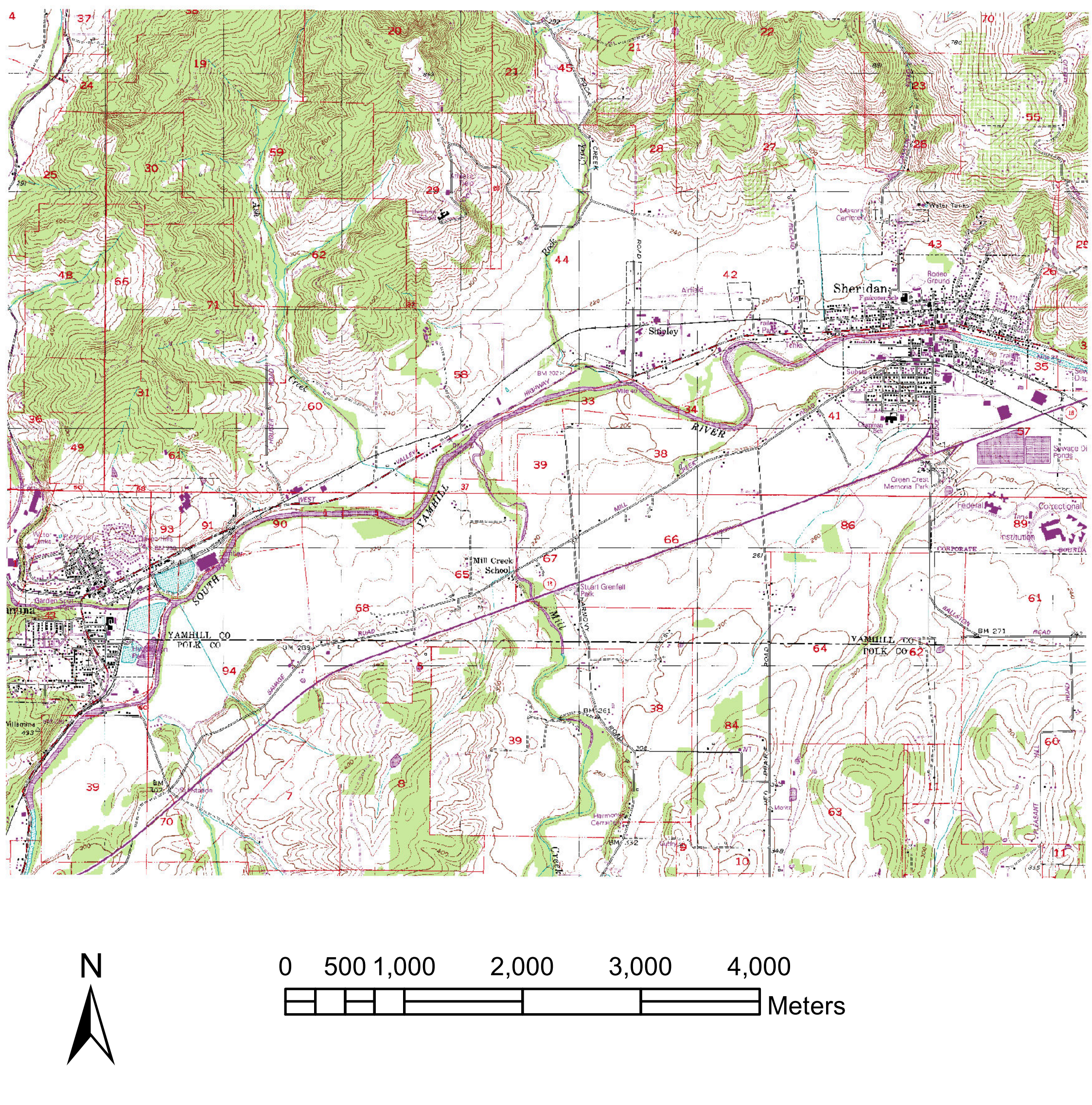
FIGURE 2-3
LOW PERMEABILITY ASPHALT PAVEMENT OVERVIEW

TAYLOR LUMBER AND TREATING SUPERFUND SITE

AB-Fig2-3_342790.dgn 12/24/2008

CH2MHILL

Pacific Wood Processing, Sheridan, Oregon



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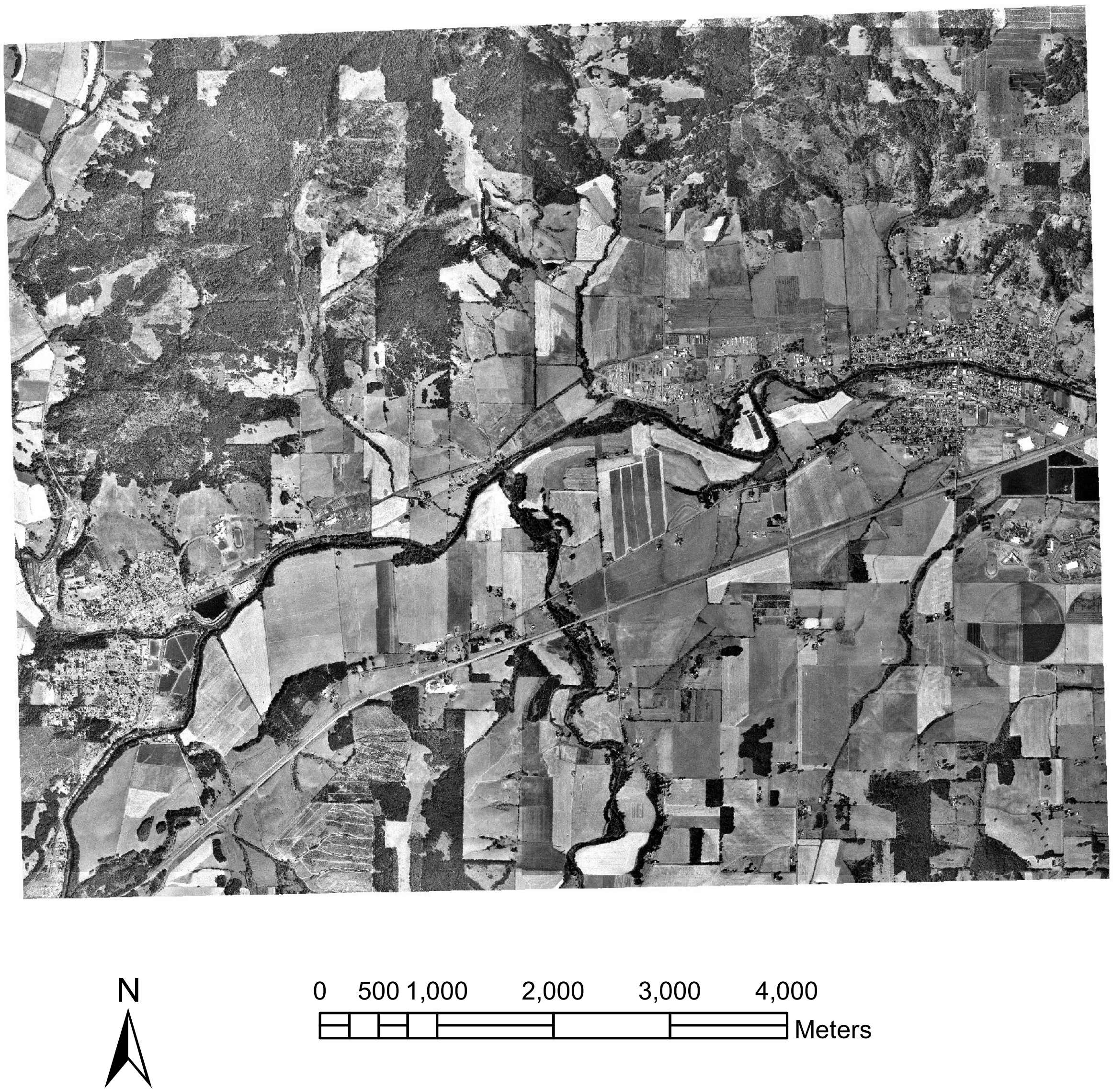

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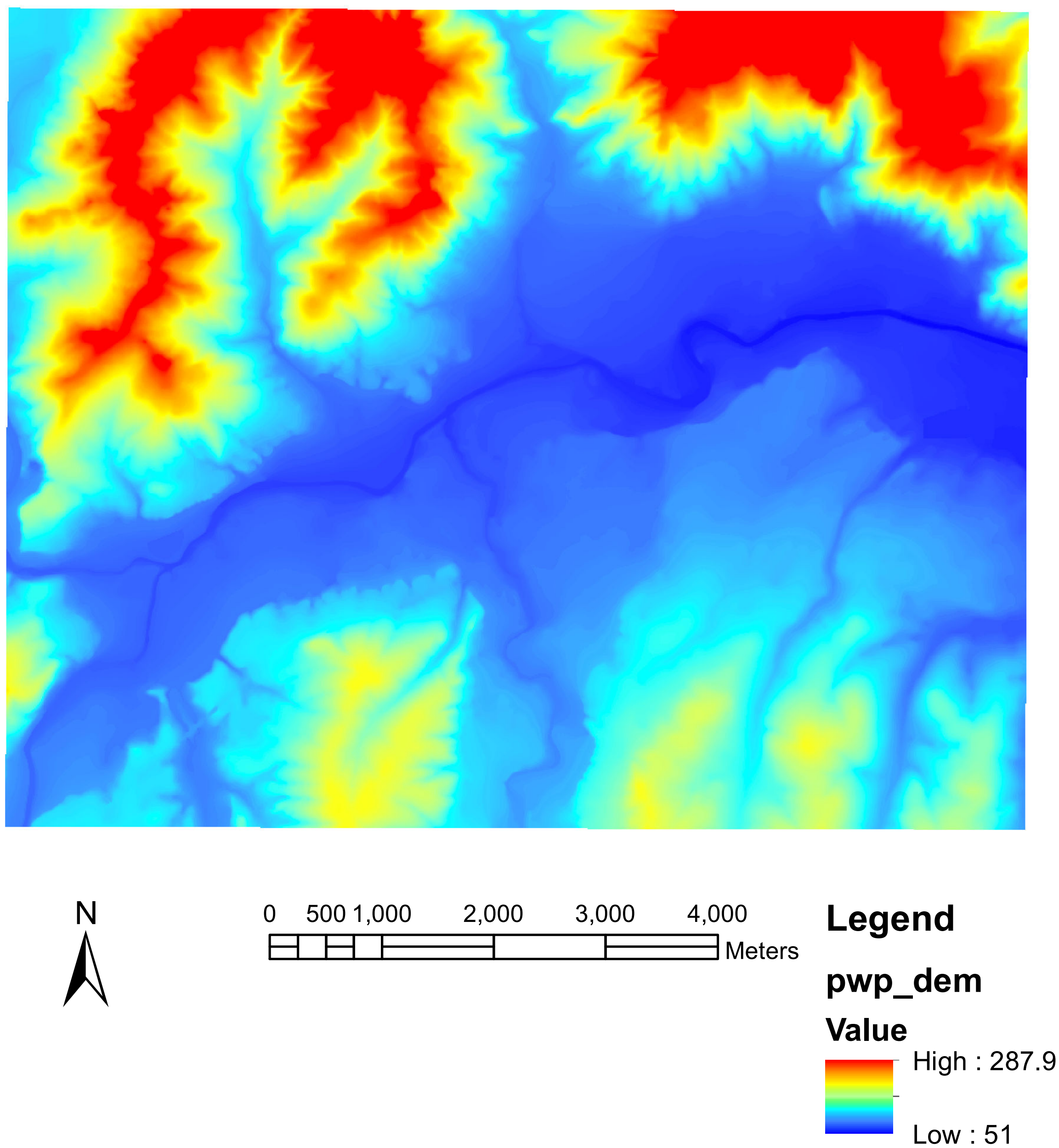

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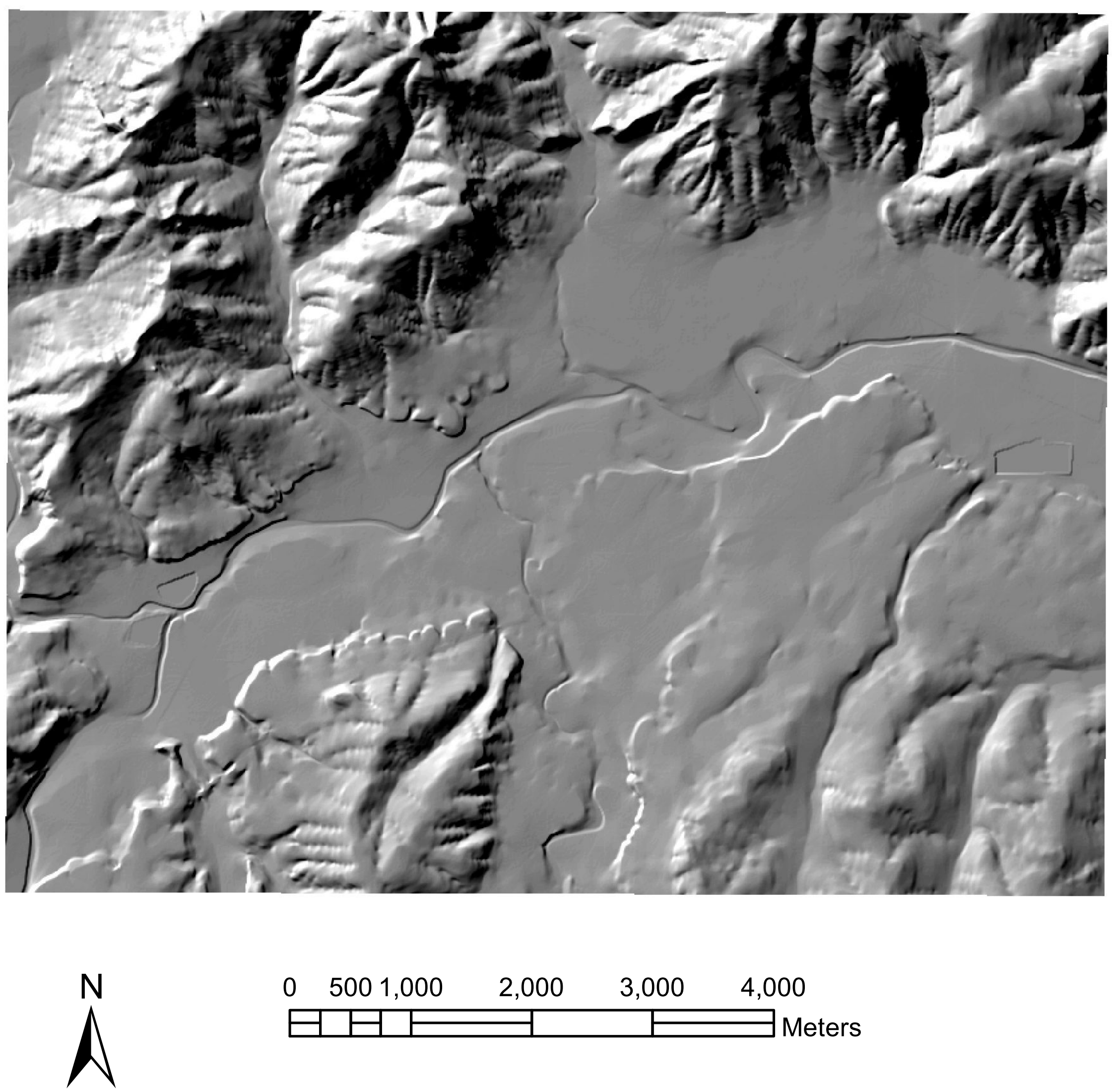

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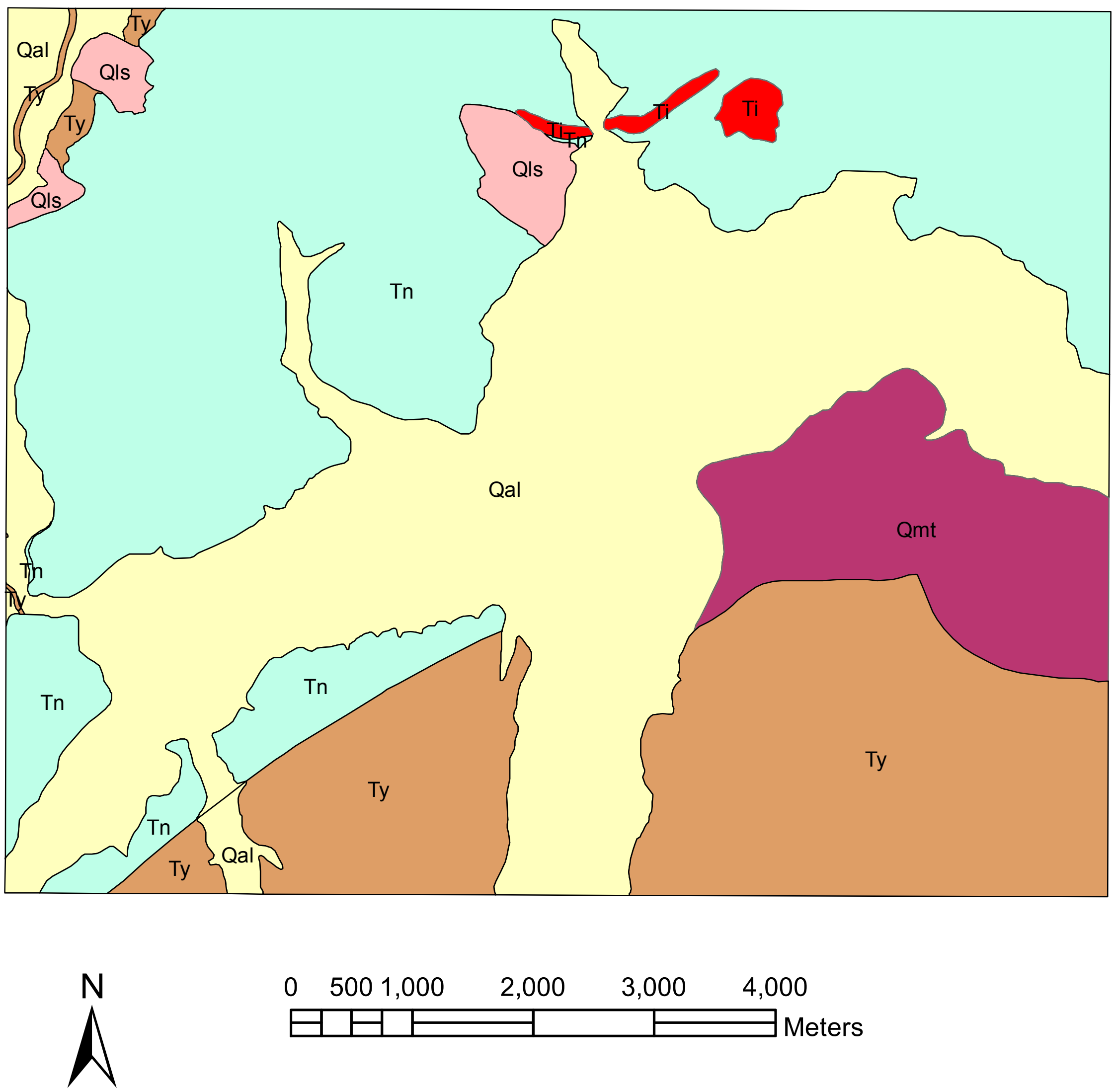

pwp_geology

MAP_UNIT_L

	Qal	Quaternary Alluvium
	Qls	Quaternary Landslides
	Qmt	Quaternary Middle Terrace
	Ti	Teritiary Intrusive
	Tn	Nestucca Formation
	Ty	Yamhill Formation

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the
STATE ENGINEER, SALEM, OREGON 97310
within 30 days from the date of well completion.

Yamh 663

WATER WELL REPORT
STATE OF OREGON
(Please type or print)
(Do not write above this line)

RECEIVED JUN 19 1973 STATE ENGINEER SALEM OREGON

State Well No. 5S/6W-28 ba
State Permit No.

(1) OWNER:
Name David Bowlin
Address 346 N. E. Faulconer, Sheridan Oregon

(2) TYPE OF WORK (check):
New Well [X] Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary [X] Driven ☐
Cable ☐ Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):
Domestic [X] Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

CASING INSTALLED: Threaded ☐ Welded [X]
6" Diam. from 0 ft. to 45 ft. Gage .250
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

PERFORATIONS: Perforated? [X] Yes ☐ No.
Type of perforator used Torch
Size of perforations 1/8 in. by 12 in.
10 perforations from 41 ft. to 44 ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS: Well screen installed? ☐ Yes [X] No
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(8) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? [X] Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "
Bailer test Comp. 6 gal./min. with 59 ft. drawdown after 1 hrs.
Artesian flow g.p.m.
Temperature of water 53 Depth artesian flow encountered ft.

(9) CONSTRUCTION:
Well seal—Material used Cement Grout & Drill Cuttings
Well sealed from land surface to 18 ft.
Diameter of well bore to bottom of seal 9 in.
Diameter of well bore below seal 9 in.
Number of sacks of cement used in well seal 1 sacks
Number of sacks of bentonite used in well seal 0 sacks
Brand name of bentonite
Number of pounds of bentonite per 100 gallons of water lbs./100 gals.
Was a drive shoe used? ☐ Yes [X] No Plugs Size: location ft.
Did any strata contain unusable water? ☐ Yes [X] No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? [X] Yes ☐ No Size of gravel: 3/8 Pea
Gravel placed from 18 ft. to 43 ft.

(10) LOCATION OF WELL:
County Yamhill Driller's well number
NE ¼ NW ¼ Section 28 T. 5S R. 6W W.M.
Bearing and distance from section or subdivision corner

(11) WATER LEVEL: Completed well.
Depth at which water was first found 33Ft. 2GPM ft.
Static level 16 ft. below land surface. Date June 14-73
Artesian pressure lbs. per square inch. Date

(12) WELL LOG: Diameter of well below casing 6 In.
Depth drilled 91 ft. Depth of completed well 85 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. *Report each change in position of Static Water Level and indicate principal water-bearing strata.*

MATERIAL	From	To	SWL
Topsoil	0	1	
Brown Clay	1	18	
Weathered Basalt, Black red & Brown	18	23	
Coarse Grained Basalt, Black	23	42	
Gray Shale	42	91	

Work started June 11 19 73 Completed June 14 19 73
Date well drilling machine moved off of well June 14 19 73

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] Ernest Johnson (Drilling Machine Operator) Date June 17, 19 73
Drilling Machine Operator's License No. 604

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Name Wilcox Drilling & Pump Co. (Person, firm or corporation) (Type or print)
Address P. O. Box 569, McMinnville, Oregon
[Signed] James H. Wilcox (Water Well Contractor)
Contractor's License No. 428 Date June 17, 19 73

(USE ADDITIONAL SHEETS IF NECESSARY)

SP*45656-119

6

Yam H
861

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OCT - 8 1991
WATER RESOURCES DEPT
SALEM, OREGON

55/6W/28 ad

STATE OF OREGON
WATER WELL REPORT
(as required by ORS 537.765)

(START CARD) # 35945

(1) OWNER: Well Number:
Name Dean + Patricia Johnson
Address 2440 N. Evans
City McMinnville State Ore. Zip 97128

(2) TYPE OF WORK:
[X] New Well [ ] Deepen [ ] Recondition [ ] Abandon

(3) DRILL METHOD
[X] Rotary Air [ ] Rotary Mud [ ] Cable
[ ] Other

(4) PROPOSED USE:
[X] Domestic [ ] Community [ ] Industrial [ ] Irrigation
[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval Yes [ ] No [X] Depth of Completed Well 122 ft.
Explosives used Yes [ ] No [ ] Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
11	0	20	Cement	0	20	7
6	20	122				

How was seal placed: Method [ ] A [ ] B [ ] C [ ] D [X] E
[ ] Other
Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	+1	20	160	[ ]	[X]	[X]	[ ]
Liner:	4"	2	122	160	[ ]	[X]	[X]	[ ]

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
[X] Perforations Method Electric Drill
[ ] Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
82	122		150	5/8	Circular	[ ]	[X]

(8) WELL TESTS: Minimum testing time is 1 hour
[ ] Pump [ ] Bailer [X] Air [ ] Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
30	Air Lift	122	1 hr.

Temperature of water 53 Depth Artesian Flow Found
Was a water analysis done? [ ] Yes By whom
Did any strata contain water not suitable for intended use? [ ] Too little
[ ] Salty [ ] Muddy [ ] Odor [ ] Colored [ ] Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Yamhill Latitude Longitude
Township 5S N or S. Range 6W E or W. WM.
Section 28 SE ¼ NE ¼
Tax Lot Lot Block Subdivision
Street Address of Well (or nearest address) Rock Cr. Rd.
1 mile past Taylor Lumber 90° Corner

(10) STATIC WATER LEVEL:
42 ft. below land surface. Date 10-2-91
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found 90

From	To	Estimated Flow Rate	SWL
90	95	12	42
110	115	18	42

(12) WELL LOG: Ground elevation Appox 250

Material	From	To	SWL
Topsoil	0	2	
Brown + Red Decomposed Clay.	2	10	
Firm Gray Shale w/ unstable layers.	10	85	
White limestone w/ gray soapstone.	85	111	
Firm Gray Shale w/ White limestone	111	122	

Date started Oct. 1 91 Completed Oct. 2 91

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.
WWC Number
Signed Not Appl. Date

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. all work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.
WWC Number 795
Signed Randall L. Wilcox Date Oct. 2 91

\b ·

STATE OF OREGON
MONITORING WELL REPORT
(as required by ORS 537.765 & OAR 690-240-095)

YAMH 1862

5S/6W/33ab

Start Card # 45787

(1) OWNER/PROJECT: WELL NO.

Name TAYLOR LUMBER AND TREATING

Address 22125 S.W. ROCK CREEK RD.

City SHERIDAN State OR. Zip 97378

(2) TYPE OF WORK:

[X] New construction [ ] Repair [ ] Recondition
[ ] Conversion [ ] Deepening [ ] Abandonment

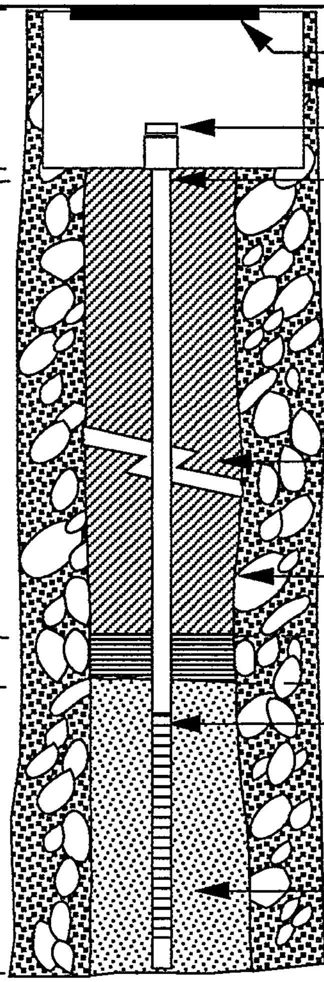
(3) DRILLING METHOD

[ ] Rotary Air [ ] Rotary Mud [ ] Cable
[X] Hollow Stem Auger [ ] Other

(4) BORE HOLE CONSTRUCTION

Special Standards Yes [ ] No [X] Depth of completed well 20 ft.

Land surface



Vault 0 ft. TO 1 ft.

Water-tight cover
Surface flush vault
Locking cap

Casing diameter 4 in. material P.V.C
Welded [ ] Threaded [X] Glued [ ]

Liner diameter ____ in. material ____
Welded [ ] Threaded [ ] Glued [ ]

Seal 0 ft. TO 2 ft.

Well seal: Material CEMENT Amount 5 60# BAGS

Borehole diameter 12 in.

2-4 Bentonite plug at least 2 ft. thick

Filter pack 4 ft. TO 20 ft.

Screen material P.V.C.
interval(s): From 5 To 20
From ____ To ____
Slot size .02 in.

Filter pack Material SAND Size 8X12 in.

(6) LOCATION OF WELL By legal description

Well Location: County Yamhill

Township 5 (N or S) Range 6 (E or W) Section 33

1. NW 1/4 of NE 1/4 of above section

2. Street address of well location 22125 S.W. ROCK CREEK RD. SHERIDAN OR 97378

3. Tax lot number of well location 800

4. ATTACH MAP WITH LOCATION IDENTIFIED.

(7) STATIC WATER LEVEL:

6 Ft. below land surface. Date 8-26-92

Artesian Pressure ____ lb/sq. in. Date ____

(8) WATER BEARING ZONES:

Depth at which water was first found 13

From	To	Est. Flow Rate	SWL

(9) WELL LOG: Ground elevation ____

Material	From	To	SWL
CLAY	0	15	
GRAVEL SILTY SAND	15	20	

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WATER RESOURCES DEPT.
SALEM, OREGON

Date started 8-26-92 Completed 8-26-92

(5) WELL TEST:

[ ] Pump [ ] Bailer [ ] Air [ ] Flowing Artesian

Permeability ____ Yield ____ GPM

Conductivity ____ PH ____

Temperature of water 54 °F/C Depth artesian flow found ____ ft.

Was water analysis done? [X] Yes [ ] No

By whom? EMCON

Depth of strata to be analyzed. From ____ ft. to ____ ft.

Remarks:

Name of supervising Geologist/Engineer STEVE TAYLOR

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

Signed David Abernathy MWC Number 10025 Date 8-26-92

(bonded) Monitor Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

Signed [signature] MWC Number 1001 Date 9/4/92

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

16

STATE OF OREGON
MONITORING WELL REPORT
(as required by ORS 537.765 & OAR 690-240-095)

YAMH 1863

5S/6W/33Ab

Start Card # 45988

(1) OWNER/PROJECT: WELL NO.

Name TAYLOR LUMBER + TREATING
Address 22125 S.W. ROCK CREEK RD.
City SHERIDAN State OR Zip 97578

(2) TYPE OF WORK: BORING WITH WATER SAMPLE

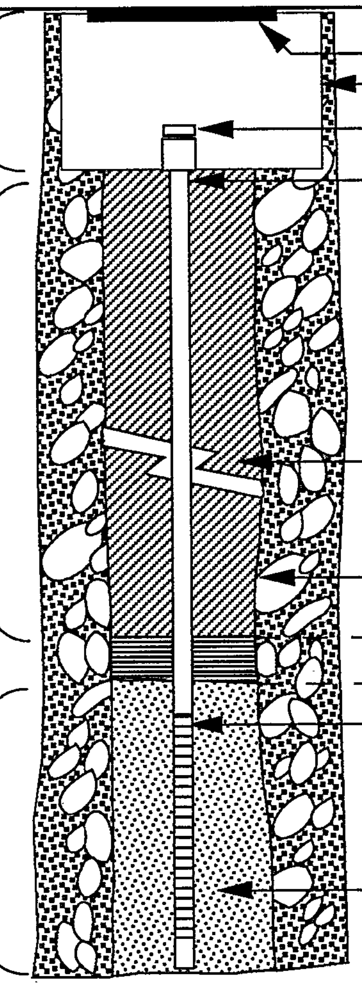
[X] New construction [ ] Repair [ ] Recondition
[ ] Conversion [ ] Deepening [ ] Abandonment

(3) DRILLING METHOD

[ ] Rotary Air [ ] Rotary Mud [ ] Cable
[X] Hollow Stem Auger [ ] Other

(4) BORE HOLE CONSTRUCTION

Special Standards Yes [ ] No [X] Depth of completed well 18 ft.



Land surface

Vault ___ ft. TO ___ ft.

Water-tight cover
Surface flush vault
Locking cap

Casing
diameter ___ in.
material ___
Welded [ ] Threaded [ ] Glued [ ]

Liner
diameter ___ in.
material ___
Welded [ ] Threaded [ ] Glued [ ]

Seal 0 ft. TO 18 ft.

Well seal:
Material BENTONITE
Amount 8-50# BAGS

Borehole diameter 8 in.

Bentonite plug at least 2 ft. thick

Filter pack ___ ft. TO ___ ft.

Screen
material ___
interval(s):
From ___ To ___
From ___ To ___
Slot size ___ in.

Filter pack:
Material ___
Size ___ in.

(5) WELL TEST:

[ ] Pump [ ] Bailer [ ] Air [ ] Flowing Artesian

Permeability ___ Yield ___ GPM
Conductivity ___ PH ___
Temperature of water 55 °F/C Depth artesian flow found ___ ft.
Was water analysis done? [X] Yes [ ] No
By whom? EMCON
Depth of strata to be analyzed. From ___ ft. to ___ ft.
Remarks: ___

Name of supervising Geologist/Engineer STEVE TAYLOR

(6) LOCATION OF WELL By legal description

Well Location: County Yamhill
Township 5 (N or S) Range 6 (E or W) Section 33
1. NW 1/4 of NE 1/4 of above section.
2. Street address of well location 22125 SW ROCK CREEK RD. SHERIDAN OR 97578
3. Tax lot number of well location 800
4. ATTACH MAP WITH LOCATION IDENTIFIED.

(7) STATIC WATER LEVEL:

16 Ft. below land surface. Date 8-26-92
Artesian Pressure ___ lb/sq. in. Date ___

(8) WATER BEARING ZONES:

Depth at which water was first found 17.5

From	To	Est. Flow Rate	SWL

(9) WELL LOG: Ground elevation ___

Material	From	To	SWL
GRAVEL FILL	0	7	
CLAY	7	15	
GRAVEL SAND	15	18	

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WATER RESOURCES DEPT.
SALEM, OREGON

Date started 8-26-92 Completed 8-26-92

(unbonded) Monitor Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

Signed David Abernathy MWC Number 10025 Date 8-26-92

(bonded) Monitor Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

Signed [signature] MWC Number 1201 Date 9/4/92

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

STATE OF OREGON
WATER WELL REPORT
(as required by ORS 537.765)

YAMH 2941

RECEIVED
OCT 21 1993
WATER RESOURCES DEPT.
SALEM, OREGON

5S/6W/33bc

(START CARD) # 52930

(1) OWNER:
Well Number
Name Charles Scott
Address 32150 S.W. West Valley Hwy.
City Sheridan State Or. Zip 97378

(2) TYPE OF WORK:
[X] New Well [ ] Deepen [ ] Recondition [ ] Abandon

(3) DRILL METHOD:
[X] Rotary Air [ ] Rotary Mud [ ] Cable
[ ] Other

(4) PROPOSED USE:
[X] Domestic [ ] Community [ ] Industrial [ ] Irrigation
[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval [ ] Yes [X] No Depth of Completed Well 162 ft.
Explosives used [ ] Yes [X] No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
11"	0	18	Cement	0	18	7
6"	18	162				

How was seal placed: Method [ ] A [ ] B [ ] C [ ] D [X] E
[ ] Other
Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	+1	18	.25	[X]	[ ]	[X]	[ ]
Liner:	4"	0	162	160	[ ]	[X]	[X]	[ ]

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
[X] Perforations Method Electric Drill
[ ] Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
122	162		150	5/8"	Circular	[ ]	[X]

(8) WELL TESTS: Minimum testing time is 1 hour
[ ] Pump [ ] Bailer [X] Air [ ] Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
4	Air Lift	162	1 hr.

Temperature of Water 53° Depth Artesian Flow Found
Was a water analysis done? [ ] Yes By whom
Did any strata contain water not suitable for intended use? [ ] Too little
[ ] Salty [ ] Muddy [ ] Odor [ ] Colored [ ] Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Yamhill Latitude Longitude
Township 5S N or S. Range 6W E or W. WM.
Section 33 SW ¼ NW ¼
Tax Lot Lot Block Subdivision
Street Address of Well (or nearest address) SAME

(10) STATIC WATER LEVEL:
4 ft. below land surface. Date 10-14-93
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found 65

From	To	Estimated Flow Rate	SWL
65	66	1	4
97	98	1 1/2	4
121	122	1 1/2	4

(12) WELL LOG:
Ground elevation Appox 130'

Material	From	To	SWL
Topsoil	0	2	
Brown Clay.	2	10	
Blue Clay.	10	14	
Firm Gray Shale w/ unstable layers w/ white limestone.	14	162	

Date started 10-12-93 Completed 10-14-93

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.
WWC Number
Signed Not Appl. Date

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.
WWC Number 795
Signed Randall L. Wilcox Date 10-14-93

Oregon
Theodore R. Kulongoski, Governor

Department of Environmental Quality
Western Region - Salem Office
750 Front St. NE, Ste. 120
Salem, OR 97301-1039
(503) 378-8240
(503) 378-3684 TTY

July 31, 2008

Sheldon Stewart
Pacific Wood Preserving Of Oregon, Inc.
PO Box 40
Sheridan, OR 97378-0040

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

RE: NPDES Permit Modification Issuance
File Number: 87487
Facility: Pacific Wood Preserving Of Oregon, Inc., 22125 SW Rock Creek Rd, Sheridan
Yamhill County

Dear Mr. Stewart:

The Department has completed its review of your request for modification of National Pollutant Discharge Elimination System (NPDES) Permit number 101267 and the comments received regarding the preliminary draft permit. Your NPDES permit modification has been issued and is enclosed.

This permit will be considered the final action on permit application number 973044.

You are urged to carefully read the permit and take all possible steps to comply with conditions established to help protect Oregon's environment against pollution.

If you are dissatisfied with the conditions or limitations of this permit modification, you have 20 days to request a hearing before the Environmental Quality commission or its authorized representative. Any such request shall be made in writing to the Director and shall clearly state the grounds for the request.

Questions regarding permit, discharge monitoring reports, inspections and other technical questions may be addressed to April Graybill in the Salem Office at (503) 378-6967.

Sincerely,

Mark E Hamlin

for John J. Ruscigno
Water Quality Manager
Western Region North

JJR:jjc
Enclosure

cc: April Graybill/WQ Source File, DEQ-Salem
DMR Processing Unit, DEQ-OIS
EPA, Seattle

MODIFICATION
This Modification Shall be Attached to and Made a Part of Permit #101267

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT
Department of Environmental Quality
Western Region - Salem Office
750 Front St. NE, Suite 120, Salem, OR 97301-1039
Telephone: (503) 378-8240

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

Pacific Wood Preserving of Oregon, Inc.
PO Box 40
Sheridan OR 97378

SOURCES COVERED BY THIS PERMIT:

Type of Wastewater	Outfall Number	Outfall Location
Treated storm water runoff, treated extracted groundwater, boiler blowdown	003	South Yamhill River RM 38.9
Storm water runoff	005	Rock Creek RM 0.1

FACILITY TYPE AND LOCATION:

Wood Preserving
22125 Rock Creek Road
Sheridan, OR 97378

RECEIVING STREAM INFORMATION:

Basin: Willamette
Sub-Basin: Yamhill
Stream: South Yamhill
LLID: 1231445452258-38.9-D
County: Yamhill

EPA REFERENCE NO: OR002972-6

This permit was originally issued on December 29, 2004 in response to Application No. 990062 received July 30, 1999. This modification is in accordance with OAR 340-045-0055. This permit is issued based on the land use findings in the permit record.

Mark E Hamlin
for John J. Ruscigno, Water Quality Manager
Western Region North

July 31, 2008
Date

ADDENDUM NO. 1

Modification #1: NPDES Permit No. 101267, Face Page, Outfall Number 003, Type of Wastewater is modified to add "cooling tower blowdown".

Modification #2: NPDES Permit No. 101267, Schedule B, is modified to add temperature monitoring as Schedule B, Condition 1.c. – Outfall 003. The added modified Condition 1.c. shall read as follows:

c. Treated Effluent - Outfall 003 (May 1st through October 31st) (See Note 5)

Item or Parameter	Minimum Frequency	Type of Sample
Temperature	Weekly	Measurement

Note 5 – Sampling is required only during weeks when discharging from Outfall 003.

SCHEDULE A

1. **Waste Discharge Limitations not to be exceeded after permit issuance.**

a. Treated Effluent - Outfall 003

Parameter	Monthly Average (µg/L)	Daily Maximum (µg/L)
Arsenic, Total	48	850
Copper	12	18
Zinc	110	120
Pentachlorophenol	13	20
pH	Shall be within the range of 6.0 – 9.0	

b. Storm Water Outfall 005

Parameter	Limitations
Oil & Grease	Shall no exceed 10 mg/L
pH	Shall be within the range of 6.0 – 9.0
Floating Solids	No visible discharge permitted
Debris*	No discharge permitted

* Debris is defined as anything that will be retained by a 5 mesh screen.

2. Except as provided for in OAR 340-045-0080, no wastes shall be discharged and no activities shall be conducted which violate Water Quality Standards as adopted in OAR 340-041-0445 except in the following defined mixing zone:

Outfall 003:
The mixing zone shall not extend more than 100 feet downstream from the outfall location and 10 feet out from the shoreline. The zone if initial dilution shall not extend more than 10 feet downstream and 10 feet out from the shoreline.

Outfall 005:
The mixing zone shall not exceed that portion of the South Yamhill River within 15 feet from the point of entry of the discharges.

SCHEDULE B

1. **Minimum Monitoring and Reporting Requirements to be met after permit issuance** (unless otherwise approved in writing by the Department).

The permittee shall monitor the parameters as specified below at the locations indicated. The laboratory used by the permittee to analyze samples shall have a quality assurance/quality control (QA/QC) program to verify the accuracy of sample analysis. If QA/QC requirements are not met for any analysis and cannot be re-analyzed, then the results shall be included in the report, but not used in calculations required by this permit. When the permittee cannot re-analyze the existing sample, then they shall re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.

a. Treated Effluent - Outfall 003 (See Note 1, 4)

Item or Parameter	Minimum Frequency	Type of Sample
Arsenic, Total	Quarterly (See Note 2)	Grab
Mercury, Total	Quarterly (See Note 2)	Grab
Dioxins/Furans	2/year (See Note 3)	Grab
Copper, Total	Monthly	Grab
Zinc, Total	Monthly	Grab
Pentachlorophenol	Monthly	Grab
Ammonia	Quarterly	Grab
Boron	Quarterly	Grab
pH	Monthly	Grab

b. Storm water outfall 005 (See Note 4)

Item or Parameter	Minimum Frequency	Type of Sample
Oil & Grease	Quarterly	Visual Observation
pH	Quarterly	Grab
Floating Solids	Quarterly	Visual Observation
Debris	Quarterly	Visual Observation

Notes:

1. Sampling is required only during months and/or quarters when discharging from the storm water treatment system.

2. Mercury monitoring must be conducted in accordance with EPA Method 1631 or according to any test procedure that the Department has authorized and approved in writing. Mercury monitoring may be discontinued after two years of sampling unless otherwise notified in writing by the Department. Arsenic monitoring must be conducted in accordance with EPA Method 1632 or according to any test procedure that the Department has authorized and approved in writing.

3. Dixon/Furan monitoring must be conducted in accordance with EPA Method 1613. All dioxin and furan congener results of this test shall be reported. Two effluent samples shall be collected within one year of permit issuance space at least thirty days apart. No additional sampling shall be required unless notified in writing by the Department.

4. Quarterly sampling periods are defined as January-March, April-June, July-September, and October – December. During any sampling period that no discharge occurs from the storm water treatment system into

outfall 003 or any quarter that does not produce enough runoff to adequately collect a sample in outfall 005, no sampling is necessary in the respective outfall.

2. **Reporting Procedures**

a. Monitoring results shall be reported on approved forms. The reporting period is the calendar month. Reports must be submitted to the appropriate Department office by the 15th day of the following month.

b. For compliance, the analytical results below the level of detection should be reported as Not Detected and the detection limit reported next to it.

SCHEDULE D

Special Conditions

1. This permit authorizes the discharge of storm water, boiler blowdown, and extracted groundwater only. It does not authorize the discharge of process waters. Discharge of boiler blowdown is limited to when the storm water system is in operation and treating storm water to insure there is adequate dilution.

2. The permittee shall implement a contingency plan for prevention and handling of spills and unplanned discharges and the plan shall be in force at all times. A continuing program of employee orientation and education shall be maintained to ensure awareness of the necessity of good in-plant control and quick and proper action in the event of a spill or accident.

3. An environmental supervisor shall be designated to coordinate and carry out all necessary functions related to maintenance and operation of waste collection, treatment, and disposal facilities. This person must have access to all information pertaining to the generation of wastes in the various process areas.

4. Each batch of treated wood must be processed so as to minimize drippage and rainwater leaching if it is stored in the open. Drippage prevention can include vacuum drying in the retort and allowing the treated wood to stand on the drip pad until the preservative has dried and set into the wood.

5. All freshly treated wood must be kept on the drip pad until visible drippage has ceased, pursuant to the requirements of 40 CFR 264.573(k).

6. Transfer of chemicals and storage of full and empty chemical containers shall be conducted on a containment pad such that spillage or contaminated runoff is collected and returned to the plant's collection and recirculation system. In areas where it may be cost prohibitive or impractical to construct containment pads, the facility shall insure that it is strictly employing its spill contingency plan to prevent or minimize any spills and to respond immediately if a spill occurs. The Department shall be notified per Schedule F, Section D.5 of any spills that occur.

7. The drip pad and containment pads shall be maintained free of cracks, corrosion or other deterioration that could cause hazardous waste to leak from the pads pursuant to requirements of 40 CFR 264.573(c)

8. If a condition is detected that could lead to a release of hazardous waste, the condition must be repaired within a reasonably prompt period of time following discovery or the pad must be removed from service pursuant to requirements of 40 CFR 264.573(m).

9. The drip pad and containment pads shall be operated and maintained in a manner to prevent tracking of hazardous waste off the drip pad by personnel or equipment pursuant to requirements of 40 CFR 264.573(j).

10. Prior to constructing or modifying wastewater treatment facilities, detailed plans and specifications must be approved in writing by the Department. Minor deviations from Department approved designs shall not require Department approval if these deviations are deemed necessary by the permittee to facilitate proper construction or operation of the treatment system.

11. Prior to the inclusion of extracted groundwater from additional wells into the treatment system, permittee shall notify the Department and receive written authorization.

12. Permittee shall notify the Department and receive approval prior to the use of additional wood treating chemicals.

7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs, upon request by the Department, the permittee shall take such steps as are necessary to alert the public about the extent and nature of the discharge. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

8. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in such a manner as to prevent any pollutant from such materials from entering public waters, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and shall be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties of Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years or both.

5. Reporting of Monitoring Results

Monitoring results shall be summarized each month on a Discharge Monitoring Report form approved by the Department. The reports shall be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

c. For the purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

11. Changes to Discharges of Toxic Pollutant - **[Applicable to existing manufacturing, commercial, mining, and silvicultural dischargers only]**

The permittee must notify the Department as soon as they know or have reason to believe of the following:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:

(1) One hundred micrograms per liter (100 µg/L);

(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/L);

(2) One milligram per liter (1 mg/L) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

SECTION E. DEFINITIONS

1. BOD means five-day biochemical oxygen demand.
2. TSS means total suspended solids.
3. mg/L means milligrams per liter.
4. kg means kilograms.
5. m^3/d means cubic meters per day.
6. MGD means million gallons per day.
7. Composite sample means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.
8. FC means fecal coliform bacteria.
9. Technology based permit effluent limitations means technology-based treatment requirements as defined in 40 CFR 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-41.
10. CBOD means five day carbonaceous biochemical oxygen demand.
11. Grab sample means an individual discrete sample collected over a period of time not to exceed 15 minutes.

12. Quarter means January through March, April through June, July through September, or October through December.
13. Month means calendar month.
14. Week means a calendar week of Sunday through Saturday.
15. Total residual chlorine means combined chlorine forms plus free residual chlorine.
16. The term "bacteria" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.
17. POTW means a publicly owned treatment works.

WOOD PRESERVING RESOURCE CONSERVATION AND RECOVERY ACT COMPLIANCE GUIDE

A GUIDE TO FEDERAL ENVIRONMENTAL REGULATION

JUNE 1996

Office of Compliance
Office of Enforcement and Compliance Assurance
U.S. Environmental Protection Agency
401 M Street, SW (MC 2221-A)
Washington, DC 20460

EPA-305-B-96-001

LIST OF ACRONYMS

ACA	Ammonical Copper Arsenate
ACC	Acid Copper Chromate
ACQ	Ammonical Copper Quat
ACZA	Ammonical Copper Zinc Arsenate
ARARs	Applicable or Appropriate Requirements
ASTSWMO	Association of State and Territorial Solid Waste Management Officials
AWPI	American Wood Preservers Institute
CAA	Clean Air Act
CAP	Consumer Awareness Program
CBA	Copper Azole
CC	Ammonical Copper Citrate
CCA	Chromated Copper Arsenate
CDDC	Copper Dimethyldithiocarbomate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (commonly known as Superfund)
CFR	Code of Federal Regulations
CIS	Consumer Information Sheet
CWA	Clean Water Act
DOT	U.S. Department of Transportation
EHS	Extremely Hazardous Substance
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FR	Federal Register
HAPs	Hazardous Air Pollutants
HSWA	Hazardous and Solid Waste Amendments (to RCRA)
LDR	Land Disposal Restrictions
LEPC	Local Emergency Planning Committee
LQG	Large Quantity Generator
MSDS	Material Safety Data Sheet
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	National Response Center
NSPS	New Source Performance Standards
OSHA	Occupational Safety and Health Act/Administration
PE	Professional Engineer
PEL	Permissible Exposure Limit
POTW	Publicly-Owned Treatment Works
PPE	Personal Protective Equipment

RCRA	Resource Conservation and Recovery Act
RQ	Reportable Quantity
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SERC	State Emergency Response Commission
SIP	State Implementation Plan
SQG	Small Quantity Generator
TCLP	Toxicity Characteristic Leaching Procedure
TPQ	Threshold Planning Quantity
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
TRI	Toxic Release Inventory
UIC	Underground Injection Control
UST	Underground Storage Tank
WAP	Waste Analysis Plan

SECTION 2
OVERVIEW OF THE WOOD PRESERVING INDUSTRY

Industry Overview

Note: *This section has been included to give State and EPA inspectors at wood preserving facilities a brief overview of the industry. Much of the information presented in this section is common knowledge to members of the wood preserving industry.*

Surface Protection versus Wood Treatment

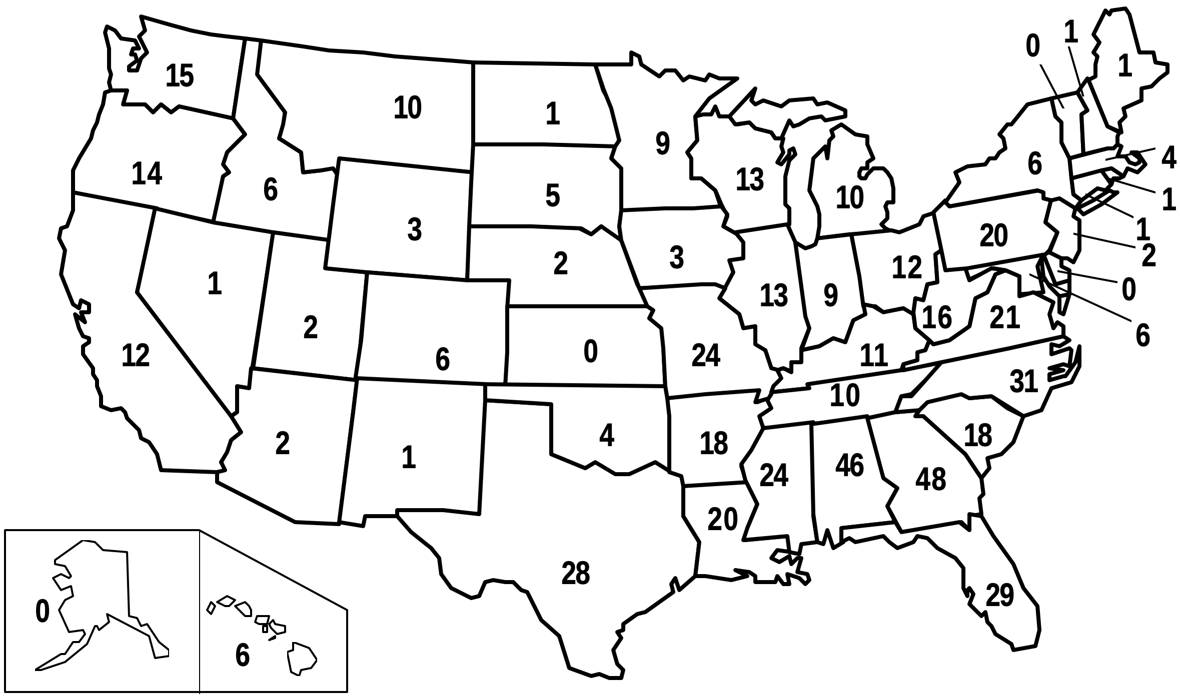
The purpose of wood preserving, also called wood treatment, is to provide long-term protection from the damaging effects of fungi, insects, and marine borers, thereby extending the usable life of wood products. This is accomplished through the application of an EPA registered preservative solution to timber. Wood treatment is different from surface protection processes in that **surface protection** is characterized by non-pressure applications to the surface of the wood that are designed to provide short-term cosmetic protection against mold and sap stains. **Wood preserving**, on the other hand, involves the penetration of preservative solutions into wood to preserve its structural integrity and improve its resistance to weathering, water, and ground contact. Wood surface protection and wood preserving are often confused since, historically, chlorophenolic formulations were used in both processes. Chlorophenolic formulations are now only used in wood preserving. In addition, while EPA has chosen to specifically identify wastes from the wood preserving industry that use chlorophenolic formulations as hazardous wastes, the Agency also concluded that the regulation of chemicals that are now used in surface protection is not warranted on the Federal level.

Almost all timber is processed in some way before being sold. The following wood products are normally treated in a preservation process before commercial distribution: dimensional lumber (i.e., lumber that has been cut to a specific shape or size) that will endure prolonged exposure to the ground or weather, railroad ties, telephone poles, telephone cross arms, bridge beams, fencing, window sills, doors, and pilings.

Geographic Distribution of Wood Preserving

Wood preserving facilities are located in varying numbers in almost every State. As indicated in Exhibit 1, the highest concentration of facilities is in the Southeast and Northwest where there is a ready supply of raw wood. Exhibit 2 illustrates the size of wood preserving operations in the industry.

Exhibit 1
Geographic Distribution of Wood Preserving Facilities



Total: 551   **Puerto Rico 6**

Source: These figures were compiled through consultation with field personnel in each State or EPA Region. Because exhaustive confirmation was not done on the number of facilities in all States, these numbers should be considered estimates.

Exhibit 2
Industry Facility Size Distribution - 1992

Type of Facility	Facilities with 1 to 19 employees	Facilities with 20 to 99 employees	Facilities with 100 or more employees	Total
SIC 2491 - Wood Preserving	307	168	11	486

Source: Based on 1992 Bureau of the Census Data.

According to 1992 census data, of the total of 486 wood preserving facilities, a large portion of them, approximately 63 percent, employed between 1 and 19 people, 34 percent employed between 20 and 99 people, and 2 percent of the facilities employed over 100 people. The bulk of wood preserving facilities are small operations, that are usually supplied with preservative formulation by several larger national chemical companies. The chemical supply companies frequently offer their clients training and guidance on complying with environmental regulations as well as professional services such as hazardous waste management and engineering. There also appears to be a trend in the industry toward larger companies acquiring independent wood preserving companies and operating them as subsidiaries.

Note: *EPA has not attempted to reconcile the Bureau of the Census data with its own facility count. This data is mentioned because it gives a valuable indication of the relative size of wood preserving facilities.*

Wood Preserving Process

The preservation process that is applied to a particular bundle, or **charge**, of wood varies with the type of wood being treated and any particular product specifications that the wood treater may need to consider (e.g., wood that is used for construction of outdoor structures warrants a higher degree of protection due to prolonged exposure to climatic elements). Wood is porous and each wood preserving process takes advantage of this fact to impregnate the wood with preservative. In most cases, the process begins with a preliminary **conditioning step** that assures a prescribed moisture content in the wood. Less moisture allows more preservative to penetrate and remain in the wood, providing increased protection.

To change the moisture content, a variety of steps can be taken. These include: air or kiln drying; Boulton drying, which consists of pulling a vacuum on the treating cylinder while the wood is immersed in a heated oil-borne solution; or steam conditioning, which consists of heating the wood in the treating cylinder with steam for several hours then rapidly vacuuming the wood to remove moisture. The pressure or treatment cylinder where the preservative is actually applied to the wood is commonly called a **retort**.

After conditioning, preservative solution is applied to the wood. Most facilities use pressurized cylinders (retorts) to apply the preservative solution. This involves placing charges of wood into the retort and applying the preservative under a pressure system until sufficient penetration and retention of the preservative into the wood has occurred. The desired degree of penetration and retention is determined by prescribed product specifications and will dictate how long the pressure is applied. Excess preservative is drawn from the wood through a vacuum system, and pumped back into the process tank, where it will be used again in the same process.

A small percentage of facilities use non-pressurized dip tanks to treat wood. This involves simply lowering the charges into a vat of preservative, usually an oil-borne preservative. The charge is then allowed to soak in the vat until a predetermined degree of penetration is reached. Penetration is sometimes aided by heating and then cooling the preservative.

There are a number of common pressure processes currently used by the wood preserving industry to treat wood. These include full-cell, modified full-cell, and empty-cell processes. Also, a variety of preservatives are used, which are either water- or oil-borne. The different wood preserving processes and solutions are discussed below.

Oil-Borne Processes

Two primary types of pressure vacuum treatments, empty-cell and full-cell, are used to apply oil-borne preservatives. Examples of **oil-borne preservatives** include creosote, creosote petroleum mixtures, copper napthenate, and pentachlorophenol. Creosote is commonly used to treat railroad ties, telephone poles, pilings, and bridge beams, while pentachlorophenol is most often mixed into solution with oil to treat telephone poles.

The most widely used process is called **empty-cell.** In this process, the cells of the wood are merely coated with preservative. The empty-cell process obtains deep penetration of preservative and attempts to leave the cell walls of the wood treated, while leaving a minimum of excess preservative in the void spaces of the cells. Because a smaller amount of preservative is used compared to the full-cell processes, the product is lighter and easier to ship. The empty-cell process also results in less expensive treatment costs for the facility since less preservative remains in the wood.

One type of empty-cell process is the **Lowry** process, which entails filling the retort with preservative while maintaining atmospheric pressure. When the retort is filled with preservative, pressure is applied, forcing preservative into the wood. This compresses the air contained in the cells of the wood, allowing preservative to fill the balance of the cell. Once the desired amount of preservative has been injected, usually over the course of several hours, the retort is drained and a final vacuum is applied. During this last step, much of the preservative in the cells is forced out by the remaining air in the cells of the wood, which expands as it is subjected to the vacuum and then returned to ambient pressure. This vacuum also minimizes drippage after the charge is removed from the retort and is placed onto the drip pad.

The most widely used empty-cell process is the **Rueping** process in which air pressure is applied and maintained in the retort prior to filling the retort with preservative. When the retort is completely filled with preservative, pressure is applied to force the solution into the wood. Once the pressure is released, the retort is drained and the final vacuum is applied. As a result of internal pressure, even more preservative is forced out of the wood than in the Lowry process.

The second type of wood preserving process is called the **full-cell** (or **Bethell**) process because it results in a higher retention level by nearly filling the wood cells with preservative. In this process, most of the air in the retort is pumped out, creating a strong vacuum which is then held to draw most of the air out of the wood. The retort is then filled with preservative without breaking the vacuum, forcing preservative into the cell spaces that have been created by the evacuated air. When the retort is completely filled with preservative, pressure is applied to force the solution into the wood. Once the pressure is released, the preservative is pumped out of the retort and a final vacuum is drawn to force out excess preservative. When the vacuum is released, much of the remaining surface preservative is drawn back into the wood, reducing the amount of drippage once the charge is taken out of the retort. Exhibit 3 on the next page illustrates the oil-borne wood preserving process.

Full-cell and modified full-cell processes are used to apply water-borne preservatives. The full-cell process utilized at water-borne facilities is very similar to that used for oil-borne preservatives. The modified full-cell process applies a weaker, or lower, initial vacuum to retain more air in the cells of the wood. Once the pressure treatment phase is complete, the remaining air (now expanding because pressure has stopped) displaces the preservative which is, in turn, forced out of the wood. By forcing more preservative out of the wood, weight is minimized and subsequent shipping costs are reduced. Exhibit 4 illustrates the water-borne wood preserving processes.

Water-borne preservatives contain active ingredients that are inorganic metal oxides, or less frequently salts, and are commonly used to treat dimensional lumber and telephone poles. This type of preservative includes oxine copper, ammonical copper citrate (CC), copper azole (CBA), copper dimethyldithiocarbomate (CDDC), chromated copper arsenate (CCA), ammonical copper arsenate (ACA), acid copper chromate (ACC), ammonical copper zinc arsenate (ACZA), and ammonical copper quat (ACQ). As this Guide will discuss, wastes that are generated by wood preserving facilities, especially those using creosote, chlorophenolic, or arsenical-based preservatives, have the potential to be considered hazardous waste under RCRA. Wastes commonly generated in the wood preserving industry are discussed in more detail in Section 6 of this Guide.

Past mismanagement of toxic chemicals at wood preserving facilities has caused significant contamination of soil and groundwater at some sites. As of May 1996, more than 45 wood preserving sites had been placed on Superfund's National Priorities List (NPL) for priority cleanup of contamination. The majority of contamination has been found at older facilities that operated for many years before current environmental regulations and disposal options existed. Along with other poor waste management practices, contamination is generally caused by excess preservative, called **kickback**, that has been allowed to drip onto the ground from treated charges of wood.

A growing concern over the presence of dioxins and furans in chlorophenolic wastes found at some facilities, coupled with the desire to prevent the release of arsenic into the groundwater, has led EPA to regulate the wood preserving industry under RCRA. In 1990, the first RCRA regulations specifically addressing many wood preserving wastes were published. These standards require owners/ operators of many wood preserving operations to comply with RCRA. Subsequently, EPA promulgated rules requiring tighter management of hazardous waste generated by the wood preserving industry. As a result, many facilities in the industry have invested heavily in cleaning up existing contamination and complying with regulatory standards for facility construction and proper waste management.

Health Concerns Associated with Wood Preserving Industry

The primary reason behind RCRA's preservative containment requirements is to keep preservative chemicals out of ground and surface waters. Contamination of soil and groundwater is a serious problem because it can move considerable distances as it is picked up by water moving through the soil and the water table. Because there are few, if any, naturally occurring organisms in the environment that can readily break down these chemicals. Once the contamination enters the ground it has the potential to linger for long periods of time and cause extensive contamination to surrounding subsurface environments.The wood preservatives creosote, pentachloro-phenol, and inorganic arsenicals contain toxic constituents that have the potential to cause skin, eye, and respiratory irritation as well as more serious ailments in humans, if humans are overexposed to them. Some of these constituents have been classified as carcinogens through epidemiological exposure studies on animals. Exposure of aquatic plant and animal life to these toxic constituents has also been found to have adverse effects.

Toxic constituents in wastes generated by the wood preserving industry have been found to have chronic systemic effects on laboratory animals as well as humans and have been determined to be present in sufficient concentrations to pose a substantial threat to human health and the environment. For example, previous studies of pentachlorophenol have shown it to be highly toxic to humans. Exposure to pentachlorophenol can cause contact dermatitis, damage to vision, and upon ingestion, lung, liver, and kidney damage. Inhalation of pentachlorophenol can result in acute poisoning, centering on the circulatory system with possible accompanying heart failure. Other studies have shown pentachlorophenol to be a carcinogen.

One of the most commonly used preservatives in the wood preserving industry is chromated copper arsenate, or CCA. This formulation contains water, arsenic acid, chromic acid, and copper oxide. Overexposure to CCA can damage mucous membranes and tissues of the respiratory system and cause chemical burns on the skin and even skin lesions. Ingestion of large amounts of CCA may have more serious effects. Chronic exposure to significant doses of the chemical components of CAA can lead to mental confusion, loss of coordination, and impaired senses of touch, pain, and temperature. CCA is also considered a possible carcinogen.

From this data, it is clear that many of the chemicals used in the wood preserving industry have the potential to threaten human health when handled in an unsafe manner. As a result, it is crucial that plant employees, and anyone else coming into contact with preservative solutions containing these constituents, be extremely cautious when handling the chemicals. Some recommended precautions are discussed below.

Health Precautions for Plant Personnel

In order to minimize exposure to wood preserving chemicals, operators of wood treatment equipment should closely follow company policy and all applicable Federal, State, and local regulations concerning use and management of those chemicals. At a minimum, facility personnel should:

- Use preservatives in accordance with the EPA approved manufacturer's label.
- Follow pesticide label and Occupational Safety and Health Act (OSHA) requirements for personal protective equipment.
- Avoid direct contact with the chemicals by wearing protective gloves and washing hands and other exposed skin before eating, using tobacco products, or using the rest room.
- Enter the retort or other confined space only in accordance with an OSHA confined space entry plan.
- Wear a respirator in process areas at inorganic arsenial wood treating plants, unless PEL air monitoring has demonstrated that it is safe not to wear one.

Additional information is available on the subjects discussed above:

- For more information on the wood preserving process, consult The Preservation of Wood, A Self Study Manual for Wood Treatment. Revised by F. Thomas Milton, University of Minnesota, College of Natural Resources, Department of Forest Products, 1994.
- Preservative Treatment of Wood by Pressure Methods. ID, McLean, USDA Agriculture handbook, No. 4D, December 1952 (Reprinted with corrections September 1960).
- Wood as an Engineering Material; Wood Handbook, Chapters 17-19. USDA Agriculture Handbook, No. 72, Revised 1974.
- Wood Deterioration and its Prevention by Preservative Treatment. Darrel D. Nicholas, editor, with the assistance of Wesley E. Loos, Syracuse University Press, 1973 (two volumes).

SECTION 3
GENERAL OVERVIEW OF RCRA

Introduction

This section of the Compliance Guide contains a basic discussion of the requirements imposed on wood preserving facilities by RCRA. This section will cover the following general topics:

- Why the RCRA program was developed
- Identification of hazardous waste
- Generators of hazardous waste
- Hazardous waste management
- Land disposal restrictions
- RCRA permitting
- Closure of hazardous waste management units
- Underground storage tank requirements
- State authorization.

Note: *Readers who are already familiar with the RCRA program may not find it necessary to read this section of the Guide, but rather, should move directly to Section 4.*

Why the RCRA Program was Developed

RCRA, an amendment to the Solid Waste Disposal Act, was enacted in 1976 to ensure the safe disposal of the huge volumes of municipal and industrial solid waste generated nationwide. RCRA has been amended by Congress several times, most significantly in November 1984, by the Hazardous and Solid Waste Amendments (HSWA). These amendments significantly expanded the scope and requirements of RCRA, resulting in the regulation of much of the waste generated in this country, both hazardous and non-hazardous.

Many of the wood preserving facilities in the United States were in operation long before the inception of the RCRA program. Although RCRA creates a framework for the proper management of hazardous and non-hazardous waste, it does not directly address the problems of hazardous waste associated with inactive or abandoned sites, or spills of chemicals that may require emergency response. Many wood preserving sites, both inactive and operating, already contain significant soil and groundwater contamination as a result of years of chemical use prior to the enactment of environmental regulations. RCRA's Corrective Action Program plays a role in requiring the cleanup of such historically contaminated sites; however, this type of problem can also be addressed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLA, commonly known as Superfund, mandates the cleanup of historically contaminated sites. In addition to such remedial activities, Superfund also requires owners/operators of facilities to notify EPA in the event of a release of certain hazardous substances into the environment. See Section 8 for more information on the Superfund program.

RCRA Program Goals

The RCRA program is based upon three distinct goals aimed at creating a safe and effective hazardous waste management system. They are:

- Protection of human health and the environment
- Reduction of waste and conservation of energy and natural resource
- Reduction or elimination of the generation of hazardous waste.

RCRA is divided into ten sections, or **subtitles**, that provide EPA with a framework to achieve these goals. For example, Subtitle D governs the management of non-hazardous solid waste, while Subtitle I creates a regulatory program for the management of underground storage tanks. **Subtitle C**, which addresses hazardous waste management, is the subtitle which has the greatest impact on the regulation of wood preserving facilities.

RCRA Subtitle C

Subtitle C of RCRA establishes a "cradle-to-grave" management system for controlling hazardous waste from its point of generation to final disposal. The objective of Subtitle C is to ensure that hazardous waste is handled in a manner protective of human health and the environment. Pursuant to Subtitle C, EPA has issued regulations regarding the generation, transportation, treatment, storage, and disposal of hazardous waste. Facilities affected by these regulations must be maintained and operated in a manner that will minimize danger to human health and the environment. Many of the regulations that specifically address the wood preserving industry concern the construction, operation, and maintenance of hazardous waste drip pads. These drip pad requirements are found in a specific subsection of Subtitle C called **Subpart W**. Those within the wood preserving industry commonly refer to the drip pad regulations as the "Subpart W standards" or "RCRA Subpart W."

SECTION 4
RCRA WASTE GENERATED BY WOOD PRESERVING

Introduction

The wastes produced from the wood preserving processes discussed in Section 2 have been the subject of substantial regulatory action in recent years. In 1990, EPA issued final regulations that specifically listed wood preserving wastes from facilities that use chlorophenolic formulations, creosote formulations, and inorganic preservatives containing arsenic or chromium. The types of wastes identified include wood preserving wastewaters, process residuals, preservative drippage, and spent preservatives. In addition to these specific identified wood preserving wastes, wood preserving facilities can also generate other "listed" and "characteristic" wastes depending on the processes and chemicals used. Listed and characteristics wastes, as defined under RCRA, are discussed in Section 3 of this Guide.

This section of the Compliance Guide discusses three general types of hazardous waste generated by wood preserving facilities: wastewaters; process residuals; and preservative drippage. It also discusses some of the exclusions from RCRA that may apply to these wastes at various stages of the wood preserving.

Health Concerns of Wood Preserving Wastes

Wastes from the wood preserving industry can be considered hazardous because they are listed as a hazardous waste or they exhibit a characteristic of hazardous waste. EPA has data demonstrating that constituents found in wastes generated by the wood preserving process, such as chlorophenolics, creosote, and inorganics (i.e., arsenic and chromium) are systemic toxicants and/or carcinogens. Systemic toxicants are constituents that may have long-term chronic effects other than cancer or mutations. Carcinogens are constituents that have the potential to cause cancer. Some of these wastes may also contain high levels of dioxins. Given the high concentrations of these chemicals typically present in wastes produced by the wood preserving industry, the potential for harmful exposure to human if chemicals are mishandled, can be significant. Potential for exposure is most likely to occur through contact with contaminated groundwater or chronic occupational exposure.

For example, previous studies of pentachlorophenol have shown it to be highly toxic to humans. Exposure to pentachlorophenol can cause contact dermatitis, damage to vision, and upon ingestion, lung, liver, and kidney damage. Inhalation of pentachlorophenol can result in acute poisoning, centering on the circulatory system with possible accompanying heart failure. Other studies have also shown pentachlorophenol to be a carcinogen.

One of the most commonly used preservatives in the wood preserving industry is chromated copper arsenate, or CCA. This formulation contains water, arsenic acid, chromic acid, and copper oxide. Overexposure to CCA can damage mucous membranes and tissues of the respiratory system, or cause chemical burns on the skin or skin lesions. Ingestion of large amounts of CCA may have more serious effects. Chronic exposure to significant doses of CCA can lead to mental confusion, loss of coordination, and impaired senses of touch, pain, and temperature. CCA is also considered a possible carcinogen.

Due to these and other health concerns, EPA found it necessary to specifically identify wood preserving wastes as hazardous under RCRA.

Exhibit 9 provides an overview of the material inputs and pollution outputs from the Wood preserving process.

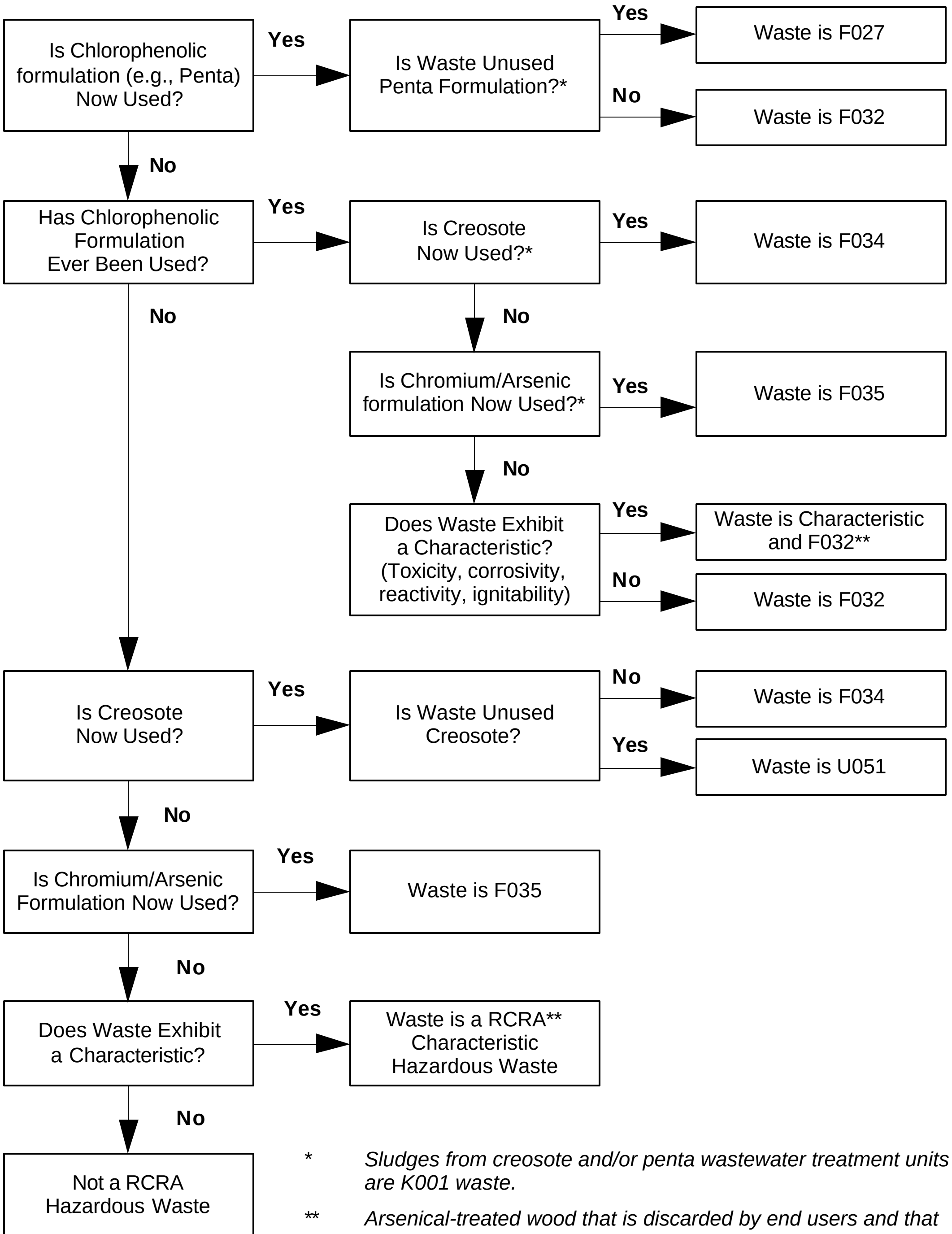
Exhibit 9
Wood Preserving Process Inputs and Pollution Outputs

Material Input	Air Emissions	Process Waste	Other Waste
Wood; water; carrier oils; creosote; inorganic formulations of arsenic, chromium, copper, zinc; penta-chlorophenol; borates; ammonium compounds	Boiler emissions, air-borne arsenic, polycyclic organics, penta-chlorophenol, volatile organic compounds from carrier oils and creosote	Dripped formulation mixed with rainwater, wash down water, detergent, kiln condensate, contact cooling water	Sump and retort sludges, process residuals including discarded clothing and gloves, banding, wood stickers, saw dust and splinters from the drip pad, contaminated soils from storage yard clean-up

Wastewater

Wastewaters produced during the wood preserving process that are regulated under RCRA can be generated during various stages of wood preserving operations.These include wastewater generated during steam conditioning wood in treatment cylinders prior to applying preservative, preservative formulation recovery and generation wastewater, water used to wash excess preservative from the surface of preserved wood while

Exhibit 12
Hazardous Waste Identification for the Wood Preserving Industry



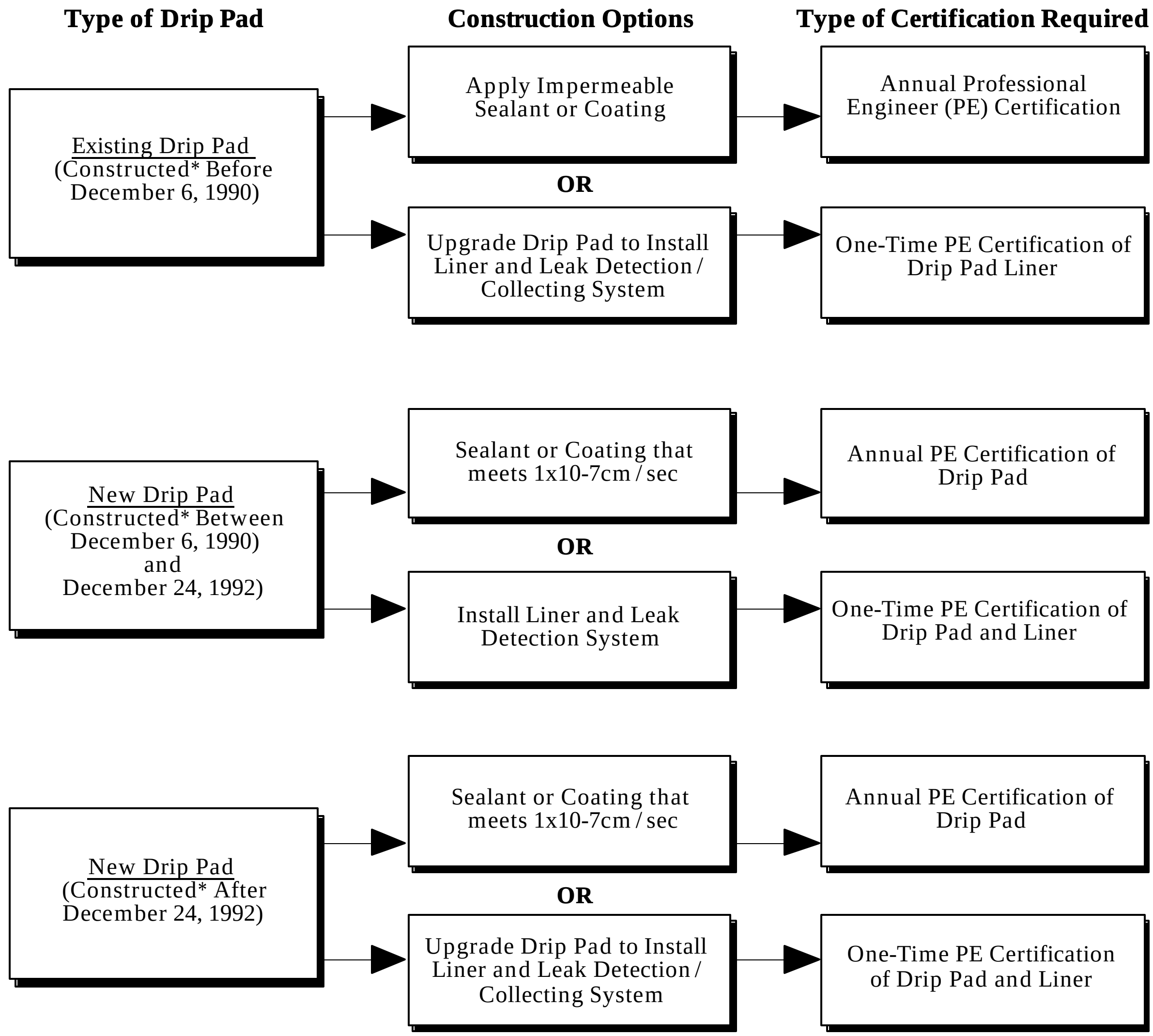
* *Sludges from creosote and/or penta wastewater treatment units are K001 waste.*

** *Arsenical-treated wood that is discarded by end users and that exhibits only hazardous waste characteristics D004-17 is excluded from RCRA regulation*

Note: *Possible F032 waste code deletion if equipment is cleaned according to procedures specified in §261.35. Also see: 57 Federal Register, December 24, 1992, p61493 - Provisional Elimination of F032 Waste Code*

Exhibit 16

Drip Pad Construction and Certification Requirements



* “Under Construction” includes those drip pads for which an owner / operator signed or entered into a binding financial agreement for construction prior to this date.

Inspections

Drip pads must be inspected weekly and after storm events. The inspection must include checks for deterioration of the run-on and run-off control systems, the presence of leakage, proper functioning of the leak detection system, and deterioration of the drip pad surface. Records of drip pad inspections should be maintained at the facility for at least three years from the date of inspection. Exhibit 17 contains information concerning a facility's obligations with respect to drip pad inspection and maintenance.

SECTION 8
ADDITIONAL FEDERAL STATUTORY REQUIREMENTS

Clean Water Act

In 1972, Congress passed the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA). The goal of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's surface waters by prohibiting the discharge of pollutants to surface waters in toxic amounts.

The CWA regulates both direct and indirect discharges. Direct discharges or "point source" discharges are from sources such as pipes and sewers. Indirect discharges through publicly-owned treatment works (POTWs) are regulated by the industrial waste pretreatment program.

NPDES Program

The National Pollutant Discharge Elimination System (NPDES), promulgated pursuant to CWA §402, is the national program for issuing, monitoring, and enforcing permits for direct discharges of pollutants to the navigable waters of the United States. NPDES permits, issued by either EPA or an authorized State, contain industry-specific, technology-based and/or water quality-based effluent limits, and establish pollutant monitoring and reporting requirements. A facility that intends to discharge into the nation's waters must first obtain an NPDES permit. A permit applicant must provide quantitative analytical data identifying the types of pollutants present in the facility's effluent discharge. The permit will then set forth the conditions and effluent limits under which a facility may discharge.

The NPDES permit application, whether for a new discharge or for an existing discharge, requires extensive information about the facility and the nature of the discharge from the facility. EPA application forms include Form 1 (general information), Form 2 (detailed information on existing sources), Form 2D (detailed information on new sources and new discharges), Form 2E (for facilities that discharge only non-process wastewater), and Form 2F (for stormwater discharges). State application forms must, at a minimum, require the information required by EPA's forms.

One of the primary purposes of the NPDES permit is to establish effluent limitations. The CWA mandates a two-part approach to establishing effluent limitations. First, all dischargers are required to meet specific established treatment levels. The effluent limitations for the wood preserving industry are found in 40 CFR Part 429. Second, more stringent requirements must be met where necessary to achieve water quality goals for the particular body of water into which the facility discharges.

Stormwater Discharges

In 1987, Congress amended the CWA and created a program for the comprehensive control of stormwater discharges. Pursuant to that delegated authority, EPA established a stormwater program which requires facilities to obtain a permit for stormwater discharges associated with industrial activity, including discharges to a municipal storm sewer.

All wood treating plants, regardless of size, must obtain an NPDES permit for stormwater discharges. The permit is a legally enforceable agreement between the regulatory agency (either EPA or the State) and the industrial facility that governs the quality of stormwater effluent released into receiving waters, such as creeks, streams, ponds, and rivers.

EPA published permit application requirements for stormwater discharges associated with specific industrial activities in the *Federal Register* on November 16, 1990 (55 FR 47990). The regulations outline three permit application options for stormwater discharges associated with industrial activity:

1 - Submit an individual application. An individual permit application requires detailed quantitative information based on sampling of stormwater discharges collected during storm events.

2 - Participate in a group application. Group applications allow similar dischargers to apply as a group for a permit. This type of permit reduces the cost of compliance for group members and the administrative costs for regulators. Additional information on group applications is provided in the September 29, 1995, *Federal Register* (60 FR 50804).

3 - File a Notice of Intent (NOI) to be covered under a general multi-sector stormwater permit. Under the multi-sector permit, stormwater dischargers have to develop site-specific pollution prevention plans based on industry-specific best management practices specified in the permit.

NPDES stormwater permits are issued by the EPA Regional office or by States authorized by EPA to administer the program. Contact your EPA Regional office to determine who is administering the program in your facility's jurisdiction.

Pretreatment Program

Industrial discharges that do not discharge directly into waters of the U.S., but instead discharge into a public sanitary sewer system are regulated under the CWA pretreatment program (CWA §307(b)). The national pretreatment program controls the indirect discharge of pollutants to POTWs by industrial users. Facilities regulated under §307(b) must pretreat their wastewater before discharging. The goal of the pretreatment program is to protect municipal wastewater treatment plants from damage that may occur when hazardous, toxic, or other wastes are discharged into a sewer system. Discharges to a POTW are regulated primarily by the POTW itself, rather than by the State or EPA. EPA has developed technology-based pretreatment standards for categories of industrial users of POTWs; different standards apply to existing and new sources within each category.

EPA's Office of Water, at (202) 260-5700, will direct callers with questions about the CWA to the appropriate EPA office. EPA also maintains a bibliographic database of Office of Water publications which can be accessed through the Ground Water and Drinking Water resource center, at (202) 260-7786.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), regulates chemicals with pesticidal properties that are sold in commerce as poisons. Many of the chemicals used by the wood preserving industry are regulated under FIFRA.

Wood preserving formulations must be registered with EPA by the producer. To register a chemical, an application package that includes product chemical composition and health risk data must be submitted to EPA.

Under FIFRA, products are classified as either a restricted-use or general-use pesticide. This classification must appear on product labels. Wood preserving formulations containing creosote, pentachlorophenol, and inorganic salts such as chromated copper arsenate are classified as restricted-use pesticides. The application of such formulations is therefore limited to licensed pesticide applicators or an individual under the direct supervision of a licensed pesticide applicator. Wood preserving facilities using these formulations must have at least one employee who is licensed to apply restricted-use pesticides. The standards for licensing are established by the Federal government or by State governments with Federal approval. (A list of State contacts for licensing is provided in Appendix B).

In addition to the licensing requirements, wood preserving facilities using arsenic are required to either conduct air monitoring on personnel working in areas where arsenic exposure might occur or require operators to wear respirators. This air monitoring and associated recordkeeping must be done in accordance with EPA's Permissible Exposure Limit (PEL) Monitoring Program. The analytical results from the PEL Monitoring Program must be submitted annually to PEL Monitoring, U.S. EPA.

Wood Products Contact
PEL Monitoring (2223A)
Manufacturing Branch
U.S. Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

In order to educate consumers on the safe and proper handling of wood treated with creosote, pentachlorophenol, and inorganic arsenicals, a voluntary **Consumer Awareness Program** was established jointly by EPA and the wood preserving industry. Through the program, a Consumer Information Sheet (CIS) containing information about treated wood is distributed to end-users at the time of sale or delivery. The CIS contains language agreed upon by EPA and the wood treatment industry. The primary responsibility for ensuring that the CIS is distributed to the consuming public resides with the wood treaters. They are responsible for distributing CISs and signs and placards to their retailers, wholesalers, and distributors, and attaching a CIS to each bundle or batch of pressure treated wood as well as to each invoice.

EPA's National Pesticides Telecommunications Network, at (800) 858-PEST, answers questions and distributes guidance regarding the registration of pesticides, labeling, the PEL Modeling Program, and the Consumer Awareness Program. The Network operates weekdays from 6:30 a.m. to 4:30 p.m., PST, excluding Federal holidays.

Clean Air Act

The Clean Air Act (CAA) is the principal Federal statute governing air pollution and is administered by EPA. EPA may grant States the authority to administer certain provisions of the CAA following approval of State Implementation Plans (SIPs).

Currently, the CAA does not impact wood preserving processes directly, however several portions of the Act may affect facility operations. For instance, boilers burning sawdust for fuel may be regulated for particulates emitted to the atmosphere. Some States regulate kilns using natural gas for fuel, and require a permit for their use. If you use a fuel oil or diesel back-up, your State may require emissions data on sulfur dioxide.

Title I of the CAA established New Source Performance Standards (NSPSs), which are national emission standards for new stationary sources falling within particular industrial categories. The NSPS regulations in 40 CFR 60.110b - 60.117b might apply to an oil borne wood processing facility if the facility uses a process tank that has a design capacity of over 40 cubic meters and was built after July 23, 1984.

Pursuant to the CAA, EPA has established National Emission Standards for Hazardous Air Pollutants (NESHAPs). NESHAPs are national standards oriented toward controlling particular hazardous air pollutants (HAPs). Wood treating plants are not currently regulated under these rules. Although arsenic, copper, chromium, and pentacholorphenol are listed as HAPs, no standards have been established for them.

Under the CAA Title V, each industrial source of air emissions that is defined as a Òmajor sourceÓ must submit a permit application. One purpose of the permit is to include all air emissions requirements that apply to a given facility in a single document. A Òmajor sourceÓ is defined as a stationary source that:

- Emits or has the potential to emit 100 tons per year of any pollutant listed under §302 of the CAA.

- Emits or has the potential to emit certain criteria pollutants (volatile organic compounds, nitrogen oxides, sulfur oxides, carbon monoxide, lead, and particulates) in non-attainment areas designated under Title I.

- Emits or has the potential to emit 10 tons per year of any HAP (listed in CAA §112(b)), or 25 tons per year of any combination of HAPs, or any source subject to NSPSs or NESHAPs.

Most wood treating facilities will be considered minor sources of air pollution; however, documentation to establish this classification may be requested by EPA or the State. One method of calculating emissions potential is to review equipment specifications provided by the designer or supplier. Other calculation methods include evaluating the quantities of chemicals purchased and processed per year.

In the 1990 Clean Air Act Amendments, Congress added subsection (r) to CAA section 112 for the prevention of chemical accidents. The goals of the chemical accident prevention provisions are to focus on chemicals that pose significant hazard to the community should an accident occur, to prevent their accidental release, and to minimize the consequences of such release. Regulations for the §112(r) Risk Management Program are currently being established by EPA. To date, EPA has established the list of chemicals and thresholds for on-site storage and use, but not the requirements for risk management plans. These rules may be applicable to wood preserving facilities. EPA's EPCRA Hotline will be able to provide specific information about this reporting requirement when it is published in the *Federal Register*.

EPA's Control Technology Center, at (919) 541-0800, provides general assistance and information on CAA standards. The Stratospheric Ozone Information Hotline, at (800) 296-1996, provides general information about regulations promulgated under Title VI of the CAA, and EPA's EPCRA Hotline, at (800) 535-0202, answers questions about accidental release prevention under CAA §112(r). In addition, the Technology Transfer Network Bulletin Board System (modem access (919) 541-5742) includes recent CAA rules, EPA guidance documents, and updates of EPA activities.

Comprehensive Environmental Response, Compensation, And Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, commonly known as Superfund, authorizes EPA to respond to releases, or threatened releases, of hazardous substances that may endanger public health, welfare, or the environment. CERCLA also enables EPA to force parties responsible for environmental contamination to clean it up or to reimburse the Superfund for response costs incurred by EPA. The Superfund Amendments and Reauthorization Act (SARA) of 1986 revised various sections of CERCLA, extended the taxing authority for the Superfund, and created a free-standing law, SARA Title III, also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). A discussion of the EPCRA regulations follows the discussion of CERCLA.

The CERCLA hazardous substance release reporting regulations found in 40 CFR Part 302 direct persons in charge of facilities to report to the National Response Center (NRC) any release of a hazardous substance which within a 24-hour period equals or exceeds a designated reportable quantity (RQ). The NRC, located at U.S. Coast Guard Headquarters ((800) 424-8802), is a national communications center continuously staffed to handle activities related to spills and releases.

Hazardous substances and RQs are defined and listed in 40 CFR §302.4. Arsenic, chromium, cresote, and pentachlorophenol are a few of the hazardous substances listed in 40 CFR §302.4 often found at wood preserving facilities and for which reporting may be required. The RQs for these substances are:

- Arsenic - 1 lb.
- Chromium - 5,000 lbs.
- Creosote - 1 lb.
- Pentachlorophenol-10 lbs.

The Superfund Hotline can provide RQs for other specific hazardous substances and assist in determining which releases are reportable. A report of a release may trigger a response by EPA, or by one or more Federal or State emergency response authorities.

EPA implements hazardous substance responses according to procedures outlined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300). The NCP includes provisions for permanent cleanups, known as remedial actions, and other cleanups referred to as "removals." EPA generally takes remedial actions only at sites on the National Priorities List (NPL), which currently includes approximately 1300 sites. As of May 1996, approximately 45 sites were on the NPL because of contamination stemming from wood preserving operations.

EPA's RCRA/Superfund/UST Hotline, at (800) 424-9346, answers questions and references guidance pertaining to the Superfund program. The Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding Federal holidays.

Emergency Planning And Community Right-To-Know Act

The Superfund Amendments and Reauthorization Act (SARA) of 1986 created the Emergency Planning and Community Right-to-Know Act (EPCRA), also known as SARA Title III. This law was designed to improve community access to information about potential chemical hazards and to facilitate the development of chemical emergency response plans by State and local governments. EPCRA required the establishment of State Emergency Response Commissions (SERCs), responsible for coordinating certain emergency response activities and for appointing Local Emergency Planning Committees (LEPCs).

EPCRA regulations, at 40 CFR Parts 350-372, establish four types of reporting obligations for facilities which store or manage specified chemicals:

- **EPCRA §302 - Emergency Planning** requires facilities to notify their SERC and LEPC of the presence of any extremely hazardous substance (EHS) in excess of the substance's threshold planning quantity (TPQ) (the list of EHSs and TPQs is in 40 CFR Part 355, Appendices A and B). EPCRA §302 also directs facilities to appoint an emergency response coordinator. It is unlikely that this section of EPCRA is applicable to the wood preserving industry because the types of chemicals generally stored do not meet the regulatory definition of an extremely hazardous substance.

- **EPCRA §304 - Emergency Release Notification** requires facilities to notify the SERC and LEPC in the event of a release exceeding the reportable quantity of either a CERCLA hazardous substance or an EPCRA extremely hazardous substance which may affect persons beyond the facility's boundaries.

- **EPCRA §§311/312 - Hazardous Chemical Inventory Reporting** requires facilities at which a hazardous chemical, as defined by the Occupational Safety and Health Act, is present in an amount exceeding a specified threshold to submit material safety data sheets (MSDSs) and hazardous chemical inventory forms (also known as Tier I and II forms) to the SERC, LEPC, and local fire department by March 1 of every year. This information helps the local government respond to a spill or release of the chemical. Many of the chemicals used by wood treaters are defined as hazardous chemicals.

- **EPCRA §313 - Toxic Chemical Release Inventory** requires manufacturing facilities included in SIC codes 20 through 39, which have ten or more full-time employees, and which manufacture, process, or use specified chemicals in amounts greater than threshold quantities, to submit an annual toxic chemical release report by July 1 of every year. The SIC code for lumber and wood products is 24. This report, commonly known as the Form R, covers releases and transfers of toxic chemicals to various facilities and environmental media, and allows EPA to compile the national Toxic Release Inventory (TRI) database.

All information submitted pursuant to EPCRA regulations is publicly available, unless protected by a trade secret claim.

EPA's EPCRA Hotline, at (800) 535-0202, answers questions and distributes guidance regarding EPCRA regulations. A guidance document, ÒTitle III Section 313 Release Reporting Guidance, Estimating Chemical Releases from Wood Preserving Operations,Ó is available from the Hotline. The EPCRA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding Federal holidays.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) mandates that EPA establish regulations to protect human health from contaminants present in drinking water. The law authorizes EPA to develop national drinking water standards and to create a joint Federal-State system to ensure compliance with these standards. The SDWA also directs EPA to protect underground sources of drinking water through the control of underground injection of liquid wastes.

The SDWA may be of concern to the wood preservers if dry wells are used. If water contaminated with wood preservative is allowed to drain into a dry well, it could lead to contamination of underground sources of drinking water. Under the SDWA, a permit program for the safe disposal of wastes through controlled underground injection has been established. The Underground Injection Control (UIC) program (40 CFR Parts 144-148) regulates five classes of injection wells and may be applicable to wood treaters. UIC permits include design, operation, inspection, and monitoring requirements. Wells used to inject hazardous wastes must also comply with RCRA corrective action standards to be granted a RCRA permit, and must meet applicable RCRA land disposal restriction standards.

EPA's Safe Drinking Water Hotline, at (800) 426-4791, answers questions and distributes guidance pertaining to SDWA standards. The Hotline operates from 9:00 a.m. through 5:30 p.m., EST, excluding Federal holidays.

DOT's Hazardous Materials Transportation Act (HMTA)

The Department of Transportation (DOT) regulates all aspects of the shipping and receiving of hazardous materials when those activities are performed in commerce. ÒIn commerceÓ includes the shipping of hazardous materials typically found at wood treatment sites, such as chromium, pentachlorophenol, arsenic, and creosote, to an industrial facility for use in industrial processes.

Hazardous materials are those materials that DOT has determined may harm human health and the environment during shipping. Hazardous materials include specific hazardous chemicals, such as arsenic acid, but also include general hazardous categories, or classes. The DOT Hazardous Materials Table (49 CFR Part 172.101) includes a list of all hazardous materials, as well as requirements for proper shipment of listed items. The Hazardous Materials Table also provides information on proper containers and labels, as well as vehicle requirements.

DOT requires that proper shipping papers accompany all shipments of hazardous waste or hazardous materials. Shipping papers indicate what is being shipped, the quantity being shipped, and the particular hazards of the material. When shipping wood preserving chemicals, an Annotated Bill of Lading may be used that includes all required DOT shipping information. For shipping hazardous waste, a RCRA hazardous waste manifest must be used.

DOT's Hazardous Materials Information Line, at (800) 467-4922, provides general assistance and information on HMTA regulations. The Information Line operates weekdays from 8:00 a.m. to 5:30 p.m., EST, excluding Federal holidays.

Pollution Prevention Act

Congress enacted the Pollution Prevention Act in 1990 to promote pollution prevention in existing regulatory programs, including EPCRA, RCRA, CWA, and CAA. The first step in pollution prevention is the development and implementation of a pollution prevention plan. Wood preserving facilities are impacted by pollution prevention regulations related to the generation of hazardous and non-hazardous waste in the treating process, and through other activities and stormwater control measures.

For assistance in developing a facility pollution prevention plan, contact the regulatory Hotlines for the EPCRA, RCRA, CWA, and CAA programs.

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) grants EPA the authority to create a regulatory framework to collect data on chemicals in order to evaluate, assess, mitigate, and control risks which may be posed by their manufacture, processing, and use. Wood treating plants may be affected by a TSCA reporting requirement promulgated pursuant to section 8(c) of TSCA and found at 40 CFR §717. These regulations enable employees, consumers, the general public, or environmental advocacy