Final Report

Taylor Lumber and Treating Superfund Site Final Construction Report

Prepared for

U.S. Environmental Protection Agency

Task Order Number 036-RD-RD-10F1
EPA Contract Number 68-S7-04-01

March 2009

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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

1.0 Introduction

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 x 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.

- *Final Design Specifications* (CH2M HILL, 2006c), submitted to EPA on December 2, 2006; contains the final contract specifications.

1.3 Remedial Action Construction Overview

The EPA awarded the Remedial Action Construction contract EP-R7-07-08 to Guardian Environmental Services (GES) of Bear, Delaware on March 30, 2007. RA construction activities included the following:

- Mobilization and site preparation activities
- Erosion control
- Air monitoring
- Abandonment of groundwater monitoring wells
- Excavation of non-hazardous and hazardous soils
- Screening of non-hazardous and hazardous soils
- Offsite disposal of non-hazardous and hazardous soils
- Backfill and grading of excavations
- Repair and reconstruction of existing asphalt pavement within the barrier wall area
- Drainage modifications within the existing paved area within the barrier wall area
- Installation of a low permeability asphalt cap over the existing paved area
- Site restoration

Figure 1-4 provides an overview of key elements of work completed during the RA construction. A detailed summary of RA construction activities is provided in **Section 2** of this FCR. In addition to the scope of work defined in the remedial design drawings and specifications, additional scope was added under separate EPA contracts based on field observations during RA construction. These items are discussed in **Section 3** of this FCR.

1.4 FCR Organization and Content

The content of the FCR, is organized as follows:

- **Section 1**—Introduction: contains general information about the TLT RA construction.

- **Section 2**—Summary of Remedial Action Construction Activities: presents a description of the key elements of the RA construction, a chronology of construction activities, and a summary of excavation, screening, and offsite disposal quantities.

- **Section 3**—Deviation from Design Material and Specifications: presents a summary of deviations from contract design drawings and specifications.

- **Section 4**—Remedial Construction Documentation: provides a listing and brief description of key documentation from the RA construction.

Throughout the FCR the roles and responsibilities of EPA, the remedial action contractor (Contractor), the remedial action oversight contractor (Engineer), and the facility owner (PWPO or Owner) are defined and discussed.

2.0 Summary of Remedial Construction Activities

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.

2.12 Correction of Incomplete and Deficient Work

Several items of incomplete or otherwise deficient work that were not resolved in 2007 were scheduled for completion in 2008 by GES and its subcontractors, as well as under separate contracts issued by EPA at a later date. These items are discussed below.

Trench Drains

During the 2007 RA construction activities, the trench drains installed by the Contractor were rejected on the basis of safety, material workmanship, and performance concerns. In February 2008, during an Alternative Dispute Resolution (ADR) meeting held in McMinnville, Oregon, EPA and GES agreed to a deductive change order for the anticipated replacement cost of the trench drains. This work was completed under the EPA ERRS contract in 2008. Appendix A provides a summary report detailing this work.

Well Vaults and Risers

During the 2007 RA construction activities, the well vault cover, frame, and riser of extraction well PW-02 was damaged. Because of similar materials and fabrication methods employed for the risers at extraction wells PW-01 and PW-03, the risers for all three extraction wells were deemed to be deficient and recommended for replacement.

This work was completed in 2008 under the EPA ERRS contract. A summary of this work is provided in Appendix A.

3.0 Deviations from Design Drawings and Specifications

SECTION 3

Deviations from Design Drawings and Specifications

This section presents a summary of deviations from the design drawings and specifications during the RA construction.

3.1 Change Orders

Changes to the scope of the project were documented in change orders. The majority of these changes related to quantity variation in excavation, screening, and backfill materials. **Table 3-1** summarizes project costs including each of the change orders.

3.2 Trench Drain

As noted in **subsection 2.9.4**, the Contractor proposed a cast-in-place concrete trench drain as opposed to the pre-cast trench drain specified in the design documents. **Subsections 2.9.4** and **2.12** provide a detailed summary of the changes to the trench drain.

In 2008, EPA tasked the ERRS contractor (EP-R7-07-02; Task Order 18; 4-22-08) to perform the following work to correct deficiencies in the RA work performed by GES:

- Removal and replacement of the two trench drains originally installed by GES, which were determined by EPA to be structurally and functionally inadequate. The trench drains are located within the asphalt pavement that covers the Treatment Plant area;
- Repair of one damaged well vault (extraction well PW-2), and repair/extension of three well vault risers (extraction wells PW-1, PW-2, and PW-3), which is necessary to ensure the vaults match the elevation and grade of the new asphalt surface.

In addition to the trench drain and well vault riser construction, the ERRS contractor also applied a sealant to the joints at the perimeter of the trench drains and well vault covers. The sealant application was consistent with Wilder recommendations. A Crafco EZ-100 Melter/Applicator was used to apply the Crafco Parking Lot Sealant, consistent with the Product Data Sheet, Part No. 34200, dated January 2008.

Appendix A provides a detailed summary of the ERRS Contractor's trench drain and well vault work in 2008.

3.3 Soil Screening

As discussed in **subsection 2.6**, several changes were made to the scope of soil screening activities. Primary changes included deletion of screening of Cell 3 soils, and addition of screening of selected soils from TPS-1.

3.4 Rock Creek Gully Limits

The design documents included provisions for the Contractor and Engineer to coordinate in the field to identify the limits of the RCG channel. During the design, the limits of the channel in its downstream reach were difficult to define because the grade flattened and the flow appeared to fan out into a dense area of blackberries and brush.

The Contractor cleared out the vegetation and discharged approximately 1,000 gallons of clean water from a water truck into the lower reaches of the channel to trace its flow path. Because of the dry summer soil conditions and extensive shrinkage cracking in the soil, the water discharged to the channel was quickly absorbed and it was not feasible to trace its flow path to the downstream limits of the channel. Further vegetation clearing was required to discover the full extent of the channel, which was ultimately traced further to the southeast than was assumed in the design.

3.4.1 TPS-2 Drainage Modification

During the excavation of the TPS-2 area, the Engineer’s representative observed PWPO traffic patterns in the area south of TPS-2 to be different than those assumed in the design. Two culverts were proposed in the design to allow PWPO traffic to cross the drainage swale leading from TPS-2 to an existing catch basin south of the TPS-2 area. These two culverts were designed to allow PWPO traffic to access the rail tracks south of the PWPO dryer for loading of materials, and to allow PWPO pole lifters to access the TPS-2 area. In discussion with PWPO personnel, the Engineer’s representative determined that the southernmost culvert would interfere with PWPO traffic south of the TPS-2 area where a log skid is used to rotate poles prior to loading them into the retorts.

Because of this conflict, the Engineer proposed a no cost/no schedule impact solution to alter the culvert alignment and to allow the water from the culvert to flow in an open channel to the catch basin approximately 40 feet to the south. The channel was graded with gentle slopes to allow PWPO traffic to cross the open channel. This solution was based on the premise that the depth of rock backfill observed in the excavation of TPS-2 to the north (on the order of 18 to 24 inches deep) would support PWPO traffic loads and the small amount of open channel flow collected by the drainage swale in TPS-2.

The EPA accepted this proposal, and gave the Contractor technical direction as a no cost or schedule change.

After completion of the work and following the first rains of the fall, PWPO observed that their traffic was creating ruts in the open channel between the culvert and catch basin. In February 2008, the EPA RPM and Engineer met with SUMCO, a small local excavation contractor in Sheridan, Oregon, to discuss a solution to be completed under a separate contract.

A solution was devised to use the leftover 12-inch-diameter reinforced concrete pipe culverts (from the WPS culvert deletion) to make a direct connection from the culvert outlet to the catch basin.

In September 2008, EPA tasked SUMCO (Purchase Order EP-08-0000186) to complete this work. SUMCO installed approximately 50 lineal feet of 12-inch reinforced concrete pipe

(RCP) (surplus from the 2007 RA work) to connect the southern end of the existing TPS-2 drainage culvert to an existing catch basin that flows to the onsite stormwater treatment system.

SUMCO installed 9 feet of RCP extending from the outlet of the TPS-2 culvert to a 30-degree elbow and an additional 42 feet of RCP connecting to the catch basin. The catch basin wall was penetrated to make the connection, which was aligned with the center line of the catch basin rim, and grout was used to seal the pipe at the penetration to the catch basin wall. The piping was placed at a uniform slope from the existing culvert to the catch basin. The 12-inch RCP was placed on ¾ inch minus crushed aggregate bedding. Backfill in the pipe zone and above the pipe consisted of 1-½ inch minus aggregate. The backfill was graded to match the surrounding grade.

3.4.2 WPS Area Grading Modification

During observation of the excavation and backfill activities of the WPS area, the Engineer's representative proposed to delete the culvert designed to drain water from the WPS Area and revise the grading plan to allow water to sheet flow to open channels. The culvert deletion and grading plan changes were proposed to allow water to drain underneath the perimeter fence south of the WPS Area into the HWYD through existing open channels, to eliminate a concentrated point discharge and minimize the backfill quantity required. The EPA accepted this proposal, and gave the Contractor technical direction as a no cost or schedule change.

3.4.3 HWYD Backfill

The Contractor submitted a traffic control plan to ODOT for permits to close lanes of traffic along Highway 18B during construction activities. The permit reviewer's response to the Contractor's plan, ODOT commented that they did not want to use Class 50 riprap for erosion control in the HWYD. The Contractor and ODOT came to agreement that 3/4 inch-minus aggregate would be acceptable backfill for the HWYD and this proposal was passed along to EPA in RFI #11. Based on the Engineer's review, EPA agreed that the 3/4 inch-minus aggregate was acceptable for use as backfill in the HWYD, and noted that the aggregate should be placed to the same limits on the ditch slopes.

Subsequently, the Contractor placed and compacted the aggregate in the bottom of the ditch but did not extend the aggregate up the slopes, leaving exposed soil susceptible to erosion. This condition was noted in the Preliminary Assessment of Incomplete Work and Prefinal Inspection documents.

The EPA then contacted ODOT's representative to discuss the condition of the HWYD, and scheduled a meeting for September 21, 2007 between ODOT, Engineer, and Contractor representatives. Prior to the meeting, the contractor extended the aggregate backfill further up the ditch side slopes between the intersection of HWY 18B and the PWPO entrance driveway along Highway 18B. Subsequent to the meeting with ODOT, the Contractor agreed to place ECM along exposed soil slopes steeper than 3:1 and to hydroseed all exposed soil and ECM along the highway ditch.

3.5 RCRD Contamination Area

During excavation of the southern portion of the RCRD, an area of wood-treating chemical contamination was found in the ditch bottom between the PWPO truck entrance on Rock Creek Road and the intersection of Rock Creek Road and Highway 18B.

The wood-treating chemicals observed consisted of a 3- to 4-inch-thick layer of black tar-like substance, underlain by sand, gravel, and rounded cobbles heavily stained with liquid wood-treating chemicals.

The lens of stained soil was at a depth where excavation could potentially jeopardize the slope stability of the embankment supporting Rock Creek Road and Highway 18B. As a result of this concern, and the unforeseen conditions, excavation was halted and temporary cover was placed over the stained soils. Subsequent to this discovery, the Contractor excavated the culvert outlet on the south side of Highway 18B, where the RCRD and HWYD discharge to the South Yamhill River through the SYRG. Further pockets of similar wood-treating chemicals were observed during this work.

The Engineer's representative used a shovel to dig a small hole in the channel bottom further downstream from the limits of the excavation at the culvert outlet and determined that the wood-treating chemicals extended further downstream beneath the channel bottom toward the South Yamhill River.

Based on the immediate threat of release, and the potential delays to completion of the overall RA construction, EPA mobilized an ERRS contractor (EQM) to further investigate the contamination and stabilize the situation.

The RA contractor was then asked to place a temporary cover of bentonite powder and geotextile overlain by riprap to temporarily seal off the pockets of wood-treating chemicals.

EPA tasked the ERRS contractor (EP-R7-07-02; Task Order 13) to perform the following work under Superfund removal authority (EPA, 2007d):

- Soil sampling and excavation and offsite disposal of contaminated soils in and around the culvert buried under Highway 18B, including areas at the intersection of Highway 18B and Rock Creek Road, west up the HWYD, north up the RCRD, under Highway 18B, and downstream of the culvert to the South Yamhill River Gully (SYRG).

This work was initiated on August 21, 2007, and completed during dry weather conditions in August 2008. The ERRS contractor demobilized from the site on August 29, 2008.

Specific work performed by the ERRS contractor is summarized below:

- Contaminated soils were excavated from the SYRG on the south side of Highway 18B, the Rock Creek Road Ditch on the north side of Highway 18B, a small portion of the Highway 18B Ditch on the northwest portion of the Highway, and the culvert underneath Highway 18B.

- Highway 18B was closed on August 1, 2008 so that contaminated soils could be excavated and the under-roadway culvert could be replaced. Oregon DOT provided the culvert pipe, which they indicated needed to be replaced due to its deteriorated condition. The ERRS contractor cut and removed the asphalt road surface along the culvert alignment and excavated down to a depth of approximately 9 feet to remove the failed culvert and contaminated material encountered. The material excavated from the trench was stockpiled for later offsite transportation and disposal at Chemical Waste Management (CWM) in Arlington, OR.

- A new 36-inch-diameter high-density polyethylene (HDPE) culvert with exterior corrugations and a smooth interior was then installed at the bottom of the trench at a sufficient slope for proper water flow. The trench was then backfilled with the Oregon DOT-approved ¾ inch minus, and the material was compacted in lifts during backfill.
- Contaminated soils were stockpiled nearby on plastic sheeting at the adjacent property at 1504 W Main Street, owned by Kelly Zobrist (Tax Lots 2100, 2200 and 2201). Plastic sheeting was also used to cover the stockpile to prevent erosion and run-off. The contaminated soil was transported to the CWM Subtitle C facility in Arlington, OR. Soil samples were collected beneath the area where stockpiling occurred, and soil contamination was identified as being below residential Preliminary Remediation Goals. Six inches of clean fill was placed over the area and it was seeded.
- The ditch on the south side of Highway 18B was reshaped and stabilized by placing rocks, rip rap, and logs to divert water flow and to prevent bank erosion during times of high water flow.

The ERRS contractor's final report on this work is scheduled to be completed and submitted to EPA in December 2008.

3.6 Miscellaneous Tasks

EPA issued two additional purchase orders for small tasks performed in support of the Remedial Action:

- In 2007, EPA tasked SUMCO (Purchase Order EP-07-0000117) to perform storm drain work in an area where failing asphalt was identified prior to placement of the new low permeability asphalt pavement (north of retort loading area). EPA identified that a storm drain pipe and catch basin serviced this area, but the pipe dead-ended and was not connected through the slurry wall to piping leading to a catch basin outside of the barrier wall. This piping connection should have been constructed to direct stormwater flow to the onsite stormwater treatment system. In June 2007, SUMCO connected the existing pipe and catch basin with a new 8-inch drain pipe through the protective cap above the slurry wall into an existing catch basin and storm drain line on the outside of the wall to complete the connection. Both ends of the pipe in the protective cap above the slurry wall were plugged with bentonite. The new pipe was installed 16 to 18 inches bgs.
- In 2008, EPA tasked SUMCO (Purchase Order EP-08-0000098) to perform minor work in the north end of the North-South trench drain within the Treatment Plant Area. EPA had observed soils, which appeared to be contaminated with wood-treating product, leaking from the annular space around a concrete pipe that entered the upstream end of North-South trench drain. SUMCO cleaned out the contaminated soil and eliminated the

potential for soil discharging into the trench drain by filling the annular space with oakum fibers soaked in polyurethane grout (specifically HYDRO ACTIVE Sealfoam NF). This work was consistent with CH2M HILL's (January 10, 2007) recommendations. Work was completed July 3, 2008. In addition to the EPA work, Wilder Construction hired Roger Langeliers Construction Company to assist Wilder with routing and sealing the concrete pad on the west side of the site as identified during the August 11, 2008 inspection. The asphalt blocks that were removed to evaluate the blistering and cracking were also resealed. This work was completed on October 6, 2008, and will be described in the Annual Inspection Report by Wilder.

4.0 Remedial Action Construction Documentation

SECTION 4

Remedial Construction Documentation

This section of the FCR provides a listing and brief description of key documentation that was produced by the Contractor, Engineer, and EPA during the RA construction.

4.1 Daily Reports

Daily construction reports were produced by both the RA contractor and the Engineer. The Contractor's daily reports were submitted via email along with wind rose data from the meteorological station.

The Contractor submitted daily reports via email to EPA for the period of May 15 to October 15, 2007. The Engineer submitted daily reports from May 29 to September 21, 2008 for the period in which Engineer representatives were on site full-time. The Engineer's daily reports were compiled on CD and transmitted to EPA in draft format in December 2007, with final edited versions (for format and grammar) submitted to EPA in January 2008 via a secure file transfer protocol (FTP) site. The Engineer's photographs of oversight activities were also transmitted to EPA on CD.

4.2 Weekly Progress Meetings

Weekly progress meetings were held at the site and by conference call during the construction period. Weekly meeting minutes were compiled by the Engineer and forwarded to EPA for review.

4.3 Submittals

RA construction submittals required in the specifications were submitted to the EPA and Engineer for review and approval. The Contractor submitted a total of 76 submittals and 20 re-submittals to EPA via email. Submittal review comments were provided to EPA via email. Review comments or final submittal approval were then provided to the Contractor by EPA. A complete record of Contractor submittal documents and Engineer responses was compiled by the Engineer and submitted to EPA in electronic format as a separate transmittal.

4.4 Requests for Information

A total of 14 RFIs were submitted to the EPA and Engineer by the Contractor during construction. **Table 4-1** provides a summary of construction RFIs, including the RFI number, title, and a brief description of the subject matter. A complete record of RFI documents and Engineer responses was compiled by the Engineer and submitted to EPA in electronic format as a separate transmittal.

4.5 Preliminary Assessment of Incomplete Work

On August 31, 2008, the EPA and Engineer performed a Preliminary Assessment of Incomplete Work to document major aspects of the construction work that had not been completed as of the required Phase 1 completion date of August 31, 2007 specified in the contract. The assessment listed incomplete work items with photo documentation (EPA, 2007b).

Work that was not completed per the contract-required date of August 31, included the following:

Rock Creek Gully – Grading of rock and topsoil and verification of proper ditch drainage was incomplete.

Highway 18B Ditches – Rock placement on side slopes, grading, placement of erosion control matting, verification of proper ditch drainage, and density test results for backfill were incomplete.

Rock Creek Road Ditches – Rock placement on side slopes and bottom, placement of erosion control matting, and verification of proper ditch drainage was incomplete. Materials appeared to deviate from approved gradation.

WPS – Backfilling, grading and compacting of backfilling, and perimeter transition areas were incomplete. The wearing surface did not appear to be a compact wearing surface.

TPS-1 - Backfilling, grading and compacting of backfilling, and installation of drainage culvert and French drain was incomplete.

TPS-2 - Backfilling, grading and compacting of backfilling, installation of drainage culvert and French drain, fence re-installation, and submittal of dioxin soil data was incomplete.

Offsite disposal of Subtitle C soils – Incomplete.

Trench Drains – Incomplete.

Low Permeability Overlay – Incomplete. The overlay was not placed to specified limits; well vaults and covers were incomplete; QC concerns were identified for bird bathing, soft pavement, transition areas, and other punchlist items.

Baker Rock Warranty – Not provided.

Well Abandonment – Well abandonment logs not provided.

Survey Records and Drawings – Incomplete.

Overall – Survey data to confirm excavation limits for hazardous soils were not available. A complete record of QC results was not available, which adversely affected the ability of the EPA and Engineer to inspect the work.

4.6 Pre-Final Inspection

On September 17 and 18, 2007, the EPA and Engineer conducted a pre-final inspection of the RA construction work completed by the Contractor. The pre-final inspection listed several work items and documentation (for example, record drawings and as-built survey) that were incomplete or deficient. The pre-final inspection document was sent to the Contractor on September 19, 2007 (EPA, 2007c).

Incomplete and inadequate work identified included the following:

- RRD-E, RRD-W – Placement of erosion and sediment controls and restoration of side slopes was incomplete.
- HWYD – Placement of erosion and sediment controls and restoration of side slopes was incomplete; written releases from ODOT regarding right-of-way; topsoil was not applied per specification.
- RCRD – Placement of erosion and sediment controls and restoration of side slopes was incomplete; topsoil was not applied per specification; excessive fines were noted in erosion protection rock; verification that the ditch drained properly was incomplete.
- RCG – Placement of erosion and sediment controls was incomplete; topsoil was not applied per specification; woody debris was not removed from work areas.
- TPS-1; TPS-2; WPS – Lines and grades were not confirmed (survey of finished elevations not provided); compaction not achieved per specifications and plans; production QC data for backfill gradation was not provided; field reports for compacted densities were missing; survey data for planned excavations were not provided.
- Staging Area – Incomplete removal of Subtitle C soils; survey and volume estimate for "large hole" dug by Contractor was not provided; verification that a minimum of 3 inches of soil was removed from the staging area was not provided; verification of equipment decontamination was not provided; access roads were not restored.
- Cells 1, 2, and 3 – Inadequate grading was noted; punchlist items.
- Trench Drains – Rejected by EPA as nonconforming work.
- CRABS – QC data were not provided.
- Low permeability Overlay – See **Section 2.9** of this FCR.
- Survey and QC Data – Missing and incomplete.
- Record Drawings – Specification requirements not met.

4.7 Final Inspection

On October 15, 2007, the EPA and Engineer conducted a final inspection of the Phase 1 and Phase 2 RA construction work completed by the Contractor. The final inspection documented work items that had been completed since the final inspection. Several minor work items (for example, minor access road repairs) were documented that the Contractor promptly completed. Several other items, including completion of record drawings and as-built survey documentation, as well as deficient work, were identified in the final inspection document that were subject to subsequent negotiations between EPA and the Contractor and its subcontractors. The final inspection document was sent to the Contractor on October 16, 2007 (EPA, 2007e).

The final inspection stated the following:

Overall, physical construction work at the site is complete, and minor punchlist items and site restoration have been completed. Unresolved issues include the trench drains, asphalt overlay, and risers/vaults for the extraction wells. Administrative and project documentation, including but not limited to survey information, record drawings, the as built topographic survey, and cost documentation, have not been completed for this project. Site demobilization has not yet occurred.

With regards to physical construction work, the most important item for GES to verify is that proper drainage (e.g., flowlines, invert elevations for culverts) has been achieved in the three areas that were excavated and backfilled (see specifics below). If drainage is not acceptable, additional field work would need to occur in the short term.

4.8 Record Drawings

Record drawings consist of a full-size set of design drawings that the Contractor is responsible for marking up as construction progresses to document any departures from the design related to change orders or RFIs. The specifications require that the documents are kept up to date and accurate through the duration of construction. The record drawings, along with the as-built survey, provide a basis for completion of as-built drawings.

The record drawings were inspected by EPA and the Engineer on multiple occasions throughout the project, including formal inspections during the Preliminary Assessment of Incomplete Work, the Pre-Final Inspection, and Final Inspection. Numerous deficiencies in the accuracy and completeness of the Contractor's record drawings were noted by the Engineer after these inspections and these were provided in the corresponding documentation submitted to the Contractor. The Contractor submitted the final record drawings in November 2007. The Engineer provided additional review and noted many of the same deficiencies previously identified, as well as additional items. The Engineer submitted a technical memorandum on January 9, 2008 (CH2M HILL, 2008a) documenting deficiencies in the record drawings, which was promptly forwarded to the Contractor by EPA. Because of the inaccuracy and incompleteness of the record drawings, EPA negotiated a deductive change order with the Contractor during the ADR meetings in February 2008.

4.9 As-Built Survey

As required in the contract, the Contractor was responsible for providing an as-built topographic survey. Throughout the project, the EPA repeatedly requested survey data from the Contractor to allow for evaluation of completed site work, and in the majority of cases the Contractor did not provide survey data to EPA. Frequently, the Contractor stated that survey data would be provided only at project completion. After the Contractor had demobilized from the site, the Contractor and their subcontracted surveyor submitted

AutoCAD files and text files containing survey notes on November 20, 2008. The Engineer noted several deficiencies in the as-built survey that were summarized in a technical memorandum to EPA on January 9, 2008 (CH2M HILL, 2008b), which EPA then submitted to the Contractor.

Because of the inaccuracy and incompleteness of the record drawings, EPA negotiated a deductive change order with the Contractor during the ADR meetings in February 2008.

4.10 As-Built Drawings

The as-built drawings consist of as-built topographic survey and record drawing information compiled into a complete set of engineering drawings that document the work completed during the RA construction. The as-built drawings were to be submitted to EPA in December 2008 by the Engineer under separate cover.

4.11 Alternative Dispute Resolution

After negotiations between EPA and the Contractor failed to produce acceptable agreements, the EPA and Contractor agreed to participate in an ADR process through the Civilian Board of Contract Appeals.

A site walk-through was conducted on February 5, 2008 as a first step in the ADR process. The site walk was attended by an administrative law judge, EPA, Engineer, Contractor, and subcontractor personnel. The purpose of the site walk was to provide a project overview to the administrative law judge presiding over the ADR process. A non-binding ADR meeting was held in McMinnville, Oregon, on the afternoon of February 5, 2008, and all day on February 6, 2008. The purpose of the ADR meetings was to provide an open forum for EPA and the Contractor to discuss the Contractor's claims and EPA's concerns regarding incomplete or deficient work.

As a result of the meetings, several issues were resolved, including the following:

- A deductive change order was negotiated for trench drain and well vault riser replacement
- A deductive change order was negotiated for deficient record drawings
- The Contractor agreed to work with EPA to resolve issues related to the as-built survey
- Wilder Construction agreed to modify the warranty language to allow coverage of damage by normal equipment and material storage activities at the site and to cover any pavement failure in areas identified where pavement thickness did not meet the required 4 inches. The final MatCon Material and Workmanship Warranty is dated March 3, 2008, and was signed by James Price, EPA CO, on May 29, 2008.
- Wilder Construction agreed to address softness and rutting issues with rolling and/or diamond grinding the rutted areas east of the PWPO spray pond and treatment area. This work occurred under the Warranty on August 11, 2008 (CH2M HILL, 2008d).

- Wilder Construction agreed to provide interpretation of asphalt stiffness testing results previously provided, and agreed to change wording in the MatCon operations and maintenance plan and warranty to address actual traffic loads and usage at the site. Wilder also agreed to meet with PWPO to discuss the dunnage issue and will assist the site operator in finding alternatives to the current operations that will impose lower surface contact pressures while minimizing impact to the efficiencies of the current operating procedures. The final MatCon Operation and Maintenance Plan (OMP) is dated March 3, 2008.
- Baker Rock Resources (paving subcontractor) agreed to address three major "bird bath" areas by diamond grinding the areas to improve drainage. This work was completed on May 7, 2008. After the work, PWPO indicated that the drainage was not improved.
- EPA and the Contractor agreed to meet to discuss negotiation of the outstanding change orders.

Subsequent to the meeting, the Contractor documented the agreements reached in the meeting with a technical proposal to EPA dated February 13, 2008. The Engineer and EPA reviewed the technical proposal and provided a detailed response on February 26, 2008. The Contractor provided a revised proposal to EPA dated March 5, 2008, correcting deficiencies with the proposal. The EPA responded on March 11, 2008, accepting the proposal.

4.12 Preliminary Close Out Report

The EPA completed the Preliminary Close Out Report (PCOR) on September 30, 2008. The PCOR documents that construction activities have been completed at the site, in accordance with *Close Out Procedures for National Priorities List Sites* (OSWER Directive 9320.09A-P, January 2000).

5.0 References

SECTION 5

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Tables

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^{o}	W^{o}	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 2-4
Confirmation Sampling Composite Node Locations
Taylor Lumber and Treating Superfund Site

Location	Sample ID	Distance From Cell Corner (feet)	
TPS1 – Cell A	7264151	E of NW cell corner	S of NW cell corner
Loc 1		42	8
Loc 2		52	66
Loc 3		35	11
Loc 4		23	64
TPS1 – Cell B	7264153	E of NW cell corner	S of NW cell corner
Loc 1		39	12
Loc 2		62	71
Loc 3		8	48
Loc 4		75	25
TPS1 – Cell C	7272003	E of NW cell corner	S of NW cell corner
Loc 1		56	80
Loc 2		17	9
Loc 3		16	17
Loc 4		27	72
TPS1 – Cell D	7284100	E of NW cell corner	S of NW cell corner
Loc 1		107	0
Loc 2		129	24
Loc 3		61	7
Loc 4		129	6
TPS1 – Cell E	7264152	E of NW cell corner	S of NW cell corner
Loc 1		21	40
Loc 2		11	75
Loc 3		20	21
Loc 4		64	17
TPS1 – Cell F	7264154	E of NW cell corner	S of NW cell corner
Loc 1		43	61
Loc 2		34	15
Loc 3		68	59
Loc 4		14	3
TPS1 – Cell G	7272004	E of NW cell corner	S of NW cell corner

TABLE 2-4
Confirmation Sampling Composite Node Locations
Taylor Lumber and Treating Superfund Site

Location	Sample ID	Distance From Cell Corner (feet)	
Loc 1		29	34
Loc 2		66	32
Loc 3		63	49
Loc 4		63	66
TPS1 – Cell H	7334161	E of NW cell corner	S of NW cell corner
Loc 1		61	27
Loc 2		19	16
Loc 3		111	11
Loc 4		131	25
TPS1 – Cell I	7324150	E of NW cell corner	S of NW cell corner
Loc 1		51	16
Loc 2		19	70
Loc 3		65	40
Loc 4		50	60
TPS1 – Cell J	7324154	E of NW cell corner	S of NW cell corner
Loc 1		13	36
Loc 2		54	11
Loc 3		70	50
Loc 4		38	74
TPS1 – Cell K	7334158	E of NW cell corner	S of NW cell corner
Loc 1		48	44
Loc 2		75	16
Loc 3		50	18
Loc 4		48	69
TPS1 – Cell L	7334160	E of NW cell corner	S of NW cell corner
Loc 1		47	20
Loc 2		28	11
Loc 3		47	16
Loc 4		77	70
TPS1 – Cell M	7324151	E of NW cell corner	S of NW cell corner
Loc 1		60	13

TABLE 2-4
Confirmation Sampling Composite Node Locations
Taylor Lumber and Treating Superfund Site

Location	Sample ID	Distance From Cell Corner (feet)	
Loc 2		2	73
Loc 3		50	30
Loc 4		50	65
TPS1 – Cell N	7324155	E of NW cell corner	S of NW cell corner
Loc 1		20	60
Loc 2		70	62
Loc 3		25	25
Loc 4		66	15
TPS1 – Cell O	7344152	E of NW cell corner	S of NW cell corner
Loc 1		57	25
Loc 2		60	55
Loc 3		38	20
Loc 4		46	42
TPS1 – Cell P	7324156	E of NW cell corner	S of NW cell corner
Loc 1		8	83
Loc 2		21	56
Loc 3		19	121
Loc 4		31	15
TPS1 – Cell Q	7344150	E of NW cell corner	S of NW cell corner
Loc 1		11	33
Loc 2		60	48
Loc 3		18	66
Loc 4		34	28
TPS2 – Cell A	7294155	E of NW cell corner	S of NW cell corner
Loc 1		63	44
Loc 2		50	29
Loc 3		8	80
Loc 4		43	15
TPS2 – Cell B	7294152	E of NW cell corner	S of NW cell corner
Loc 1		16	2
Loc 2		76	4

TABLE 2-4
Confirmation Sampling Composite Node Locations
Taylor Lumber and Treating Superfund Site

Location	Sample ID	Distance From Cell Corner (feet)	
Loc 3		54	56
Loc 4		66	78
TPS2 – Cell C	7334150	E of NW cell corner	S of NW cell corner
Loc 1		17	25
Loc 2		52	19
Loc 3		18	39
Loc 4		27	2
TPS2 – Cell D	7294154	E of NW cell corner	S of NW cell corner
Loc 1		71	79
Loc 2		37	34
Loc 3		64	56
Loc 4		27	74
TPS2 – Cell E	7294151	E of NW cell corner	S of NW cell corner
Loc 1		12	44
Loc 2		29	49
Loc 3		65	9
Loc 4		22	49
TPS2 – Cell F	7334151	E of NW cell corner	S of NW cell corner
Loc 1		50	50
Loc 2		2	74
Loc 3		46	46
Loc 4		77	41
TPS2 – Cell G	7294156	W of SE cell corner	N of SE cell corner
Loc 1		48	3
Loc 2		16	67
Loc 3		70	12
Loc 4		118	16
TPS2 – Cell H	7294153	E of NW cell corner	S of NW cell corner
Loc 1		0	71
Loc 2		39	9
Loc 3		72	64

TABLE 2-4
Confirmation Sampling Composite Node Locations
Taylor Lumber and Treating Superfund Site

Location	Sample ID	Distance From Cell Corner (feet)	
Loc 4		34	16
TPS2 – Cell I	7294150	E of NW cell corner	S of NW cell corner
Loc 1		61	35
Loc 2		74	28
Loc 3		60	23
Loc 4		70	15
TPS2 – Cell J	7334152	E of NW cell corner	S of NW cell corner
Loc 1		52	25
Loc 2		23	52
Loc 3		8	57
Loc 4		2	36
TPS2 – Cell K	7334153	E of NW cell corner	S of NW cell corner
Loc 1		33	17
Loc 2		75	35
Loc 3		13	43
Loc 4		56	40
TPS2 – Cell L	7334154	E of NW cell corner	S of NW cell corner
Loc 1		12	1
Loc 2		54	62
Loc 3		6	19
Loc 4		52	12
TPS2 – Cell L	7304154	E of NW cell corner	S of NW cell corner
Loc 1		2	2
Loc 2		80	44
Loc 3		8	56
Loc 4		1	16
TPS2 – Cell M	7304153	E of NW cell corner	S of NW cell corner
Loc 1		33	59
Loc 2		64	29
Loc 3		35	70
Loc 4		68	34

TABLE 2-4
Confirmation Sampling Composite Node Locations
Taylor Lumber and Treating Superfund Site

Location	Sample ID	Distance From Cell Corner (feet)	
WPS – Cell A	7324157	E of NW cell corner	S of NW cell corner
Loc 1		87	23
Loc 2		73	27
Loc 3		55	14
Loc 4		76	18
WPS – Cell B	7324158	E of NW cell corner	S of NW cell corner
Loc 1		32	52
Loc 2		67	9
Loc 3		35	26
Loc 4		72	35
WPS – Cell C	7324159	E of NW cell corner	S of NW cell corner
Loc 1		44	30
Loc 2		60	38
Loc 3		66	39
Loc 4		14	11

TABLE 2-5
Soil Screening Quantities
Taylor Lumber and Treating Superfund Site

Soil Excavation Area	Screening Volume (cubic yards)[1]
TPS-1	4,386
TPS-2	2,125
WPS	654
Ditches and Gullies	**Excavation Volume (cubic yards)**
RRD-W	240
RCRD	220
Total	**7,625**

Notes:

1. Soil screening estimates based on Contractor's truck counts estimating 17 cubic yards per truckload for TPS-1, TPS-2, and WPS, and 10 cubic yards/load for RRD-W, RCRD. EPA believes that these estimates are biased high based on field observations and inspections.
2. Final Quantity Estimates are Subject to change based on Claims negotiation with GES.

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

TABLE 3-1

Construction Cost Summary

Taylor Lumber and Treating Superfund Site

No.	Description	Qty	Unit	Unit Cost	Contract Value	% or Qty Complete	Total Value [1,2]
Original Contract							
1	Mobilization	1	LS	145,000.00	145,000.00	100%	145,000.00
2	Site Access Modifications	1	LS	115,000.00	115,000.00	100%	115,000.00
3	Site Preparation	1	LS	45,000.00	45,000.00	100%	45,000.00
4	Utility Location, Protection, and Abandonment	1	LS	30,000.00	30,000.00	100%	30,000.00
5	Stormwater Management	1	LS	55,000.00	55,000.00	100%	55,000.00
6	Air Quality Monitoring	1	LS	130,000.00	130,000.00	100%	130,000.00
7	Excavation of Soil Storage Cells	1	LS	140,000.00	140,000.00	100%	140,000.00
8	Excavation of Ditches and Gullies	1	LS	90,000.00	90,000.00	100%	90,000.00
9	Drainage Modifications	1	LS	140,000.00	140,000.00	100%	140,000.00
10	Site Backfill and Grading	1	LS	100,000.00	100,000.00	100%	100,000.00
11	Backfill and Erosion Protection in Ditches	1	LS	140,000.00	140,000.00	100%	140,000.00
12	Asphalt Paving (repair and reconstruction)	1	LS	300,000.00	300,000.00	100%	300,000.00
13	Asphalt Paving (low permeability overlay)	1	LS	1,275,000.00	1,275,000.00	100%	1,275,000.00
14	Monitor Well Abandonment and Alteration	1	LS	40,000.00	40,000.00	100%	40,000.00
15	Site Restoration	1	LS	50,000.00	50,000.00	100%	50,000.00
16	Surveying	1	LS	55,000.00	55,000.00	100%	55,000.00
17	Quality Control Testing	1	LS	100,000.00	100,000.00	100%	100,000.00
18	Record Drawings	1	LS	15,000.00	15,000.00	100%	15,000.00
19	Bonding and Insurance Premiums	1	LS	235,000.00	235,000.00	100%	235,000.00
20	Demobilization	1	LS	30,000.00	30,000.00	100%	30,000.00
	Totals				**3,230,000.00**		**3,230,000.00**
Unit Price Bid Schedule							
21	Excavation of Treated Pole Storage Area 1	7,694	CY	6.00	46,164.00	7694	46,164.00
22	Excavation of Treated Pole Storage Area 2	5,130	CY	9.00	46,170.00	4575	41,175.00
23	Excavation of White Pole Storage Area	1,330	CY	9.00	11,970.00	654	5,886.00
24	Screening of Soils from TPS-2	5,130	CY	9.00	46,170.00	3944	35,496.00
25	Screening of Soils from WPS	1,330	CY	9.00	11,970.00	654	5,886.00

TABLE 3-1

Construction Cost Summary

Taylor Lumber and Treating Superfund Site

No.	Description	Qty	Unit	Unit Cost	Contract Value	% or Qty Complete	Total Value [1,2]
26	Screening of Soils from Rock Creek Ditch	200	CY	9.00	1,800.00	220	1,980.00
27	Screening of Soils from Railroad Ditch-East	151	CY	9.00	1,359.00	0	0.00
28	Screening of Soils from Railroad Ditch-West	732	CY	9.00	6,588.00	240	2,160.00
29	Screening of Soils from Ditch Soil Stockpile	140	CY	9.00	1,260.00	0	0.00
30	Screening of Soils from Soil Storage Cell 3	6,040	CY	9.00	54,360.00	20	180.00
31	RCRA Subtitle D Soil Transport and Disposal	18,685	TN	32.00	597,920.00	18685	597,920.00
32	RCRA Subtitle C Soil Transport and Disposal	21,809	TN	82.00	1,788,338.00	21809	1,788,338.00
33	Onsite Reuse of Granular Fill	6,492	CY	13.00	84,396.00	2880	37,440.00
34	Imported Granular Fill	3,865	CY	13.00	50,245.00	3533	45,929.00
	Totals				**2,748,710.00**		**2,608,554.00**
Contract Modifications							
MOD7	Trench Drain-Deduction	1	LS	(125,000.00)	(125,000.00)		-125,000.00
MOD7	Well Vaults/Risers-Deduction	1	LS	(4,500.00)	(4,500.00)		-4,500.00
MOD7	Record Drawings - Deduction	1	LS	(5,000.00)	(5,000.00)		-5,000.00
	Bonding and Insurance Premiums (added by GES after contract award)	1	LS	822.00	822.00		822.00
	Revised Contract Value				**5,845,032.00**		
	Revised Total Value						**5,704,876.00**
Change Orders (Contract Modification #9)							
1-R3	Additional Asphalt Pavement Repair					100%	19,926.00
2-R	Cell 3 Test Pits					100%	1,785.00
3-R	Additional RCRA Subtitle D Soil Trans & Disposal					100%	245,309.12
4-1	Add RCRA Subtitle C Soil T&D (3271)					100%	268,222.00
4-R	Add RCRA Subtitle C Soil T&D > 115%					100%	202,876.20
5	Backfill Material (6480 tons)					100%	87,480.00
5-1	Backfill Material (7,715 tons)					100%	94,993.29
7-R	Asphalt Cap Remobilization Costs					100%	0.00
8	Fence Relocation					100%	0.00
9	Screen Soils TPS-1					100%	10,036.80

TABLE 3-1

Construction Cost Summary

Taylor Lumber and Treating Superfund Site

No.	Description	Qty	Unit	Unit Cost	Contract Value	% or Qty Complete	Total Value [1,2]
10	Additional Backfill Placement					100%	5,882.00
11	Screen Plant Idle					100%	0.00
12	Additional TPS-2 Soil - Outside Footprint					100%	0.00
13	Additional TPS-1 Soil Excavation					100%	6,924.00
14	TPS-1 Soil Excavation > 115%					100%	630.00
15	TPS-1 Soil Excavation - Outside Footprint					100%	9,114.00
16	Additional MatCon Placement					100%	0.00
17	Additional Air Monitoring					100%	0.00
18	Extended Site Management					100%	0.00
19	Final Contract Value Bonding and Associated G&A and Profit						0.00
	Change Order Subtotal						**953,178.41**
	Total Value						**$ 6,658,054.41**

Notes:

1. Final Construction costs are not yet available. Costs presented in this table are estimates from Contract Modification #9 dated January 12, 2009 and are provided for information only.
2. Final costs will be determined pending resolution of issues before the Civilian Board of Contract Appeals.

TABLE 4-1
Contractor Requests for Information
Taylor Lumber and Treating Superfund Site

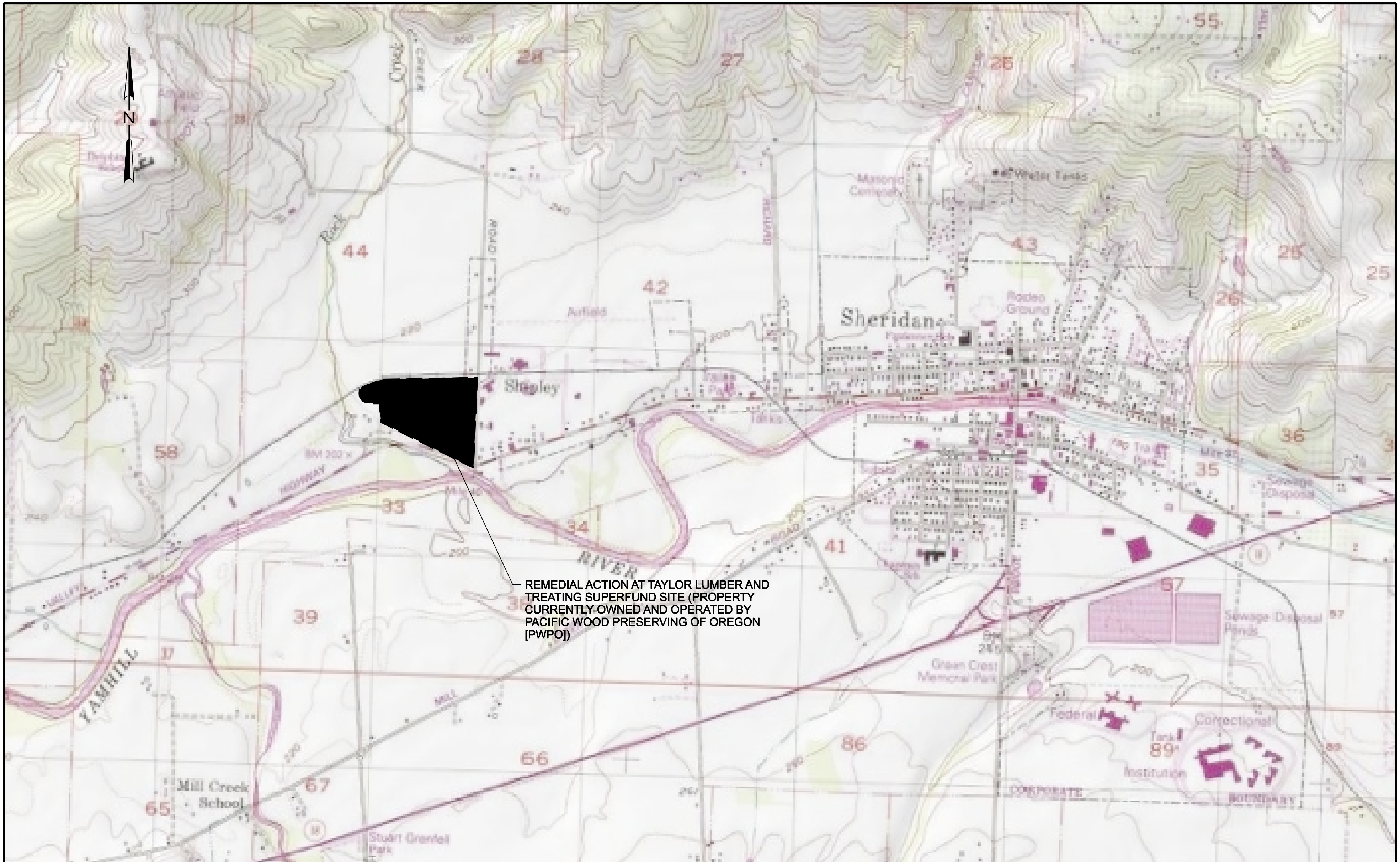
RFI #	Title	Description/Comments
1	Screening Area	Requested changes to proposed layout of screening area
2	Clarification to the preliminary air monitoring setup.	Requested clarification for 1 week requirement for meteorological data prior to start of air monitoring and excavation.
3	Screen Plant	Requested a change to the location of the screening plant for Cell 3 screening.
4	Access to RRD-W	Requested variance to proposed access route to/from RRD-W
5	Proposed Soil Screening and Handling Area	Requested changes to the layout of the soil screening and material handling area including revisions to traffic patterns and decontamination areas.
6	Placement of MatCon Asphalt Binder	Requested clarification of proposed paving at several locations based on results of site walks with PWPO.
7	Trench Drain Installation Issues	Superseded and resubmitted as RFI # 8
8	Trench Drain Installation Issues	Requested a change of approach for construction of trench drain after installation of low permeability asphalt.
9	Finish Grades	Requested additional layout information on grading in TPS-1.
10	TPS-1 Backfill	Requested clarification of subgrade preparation and backfill materials used in TPS-1.
11	Typical Road Ditch Backfill	Requested change to backfill of HWYD from Class 50 riprap to imported granular fill based on ODOT comments.
12	Train Drain Detail	Provided Contractor’s proposed sketch of concrete work at existing trench drain.
12	Train Drain Detail	Superseded and resubmitted as RFI # 12b
12b	Trench Drain Detail	Provided revised contractor sketch of concrete work at existing trench drain based on discussions between Engineer’s representatives and Contractor and subcontractor.
13	Trench Drain Detail	Provided final contractor sketch of concrete work at existing trench drain and proposed use of 4,000 psi concrete and frequency of casting concrete cylinders for compressive strength testing.
14	Finish Grade Elevation For Cell Q of TPS-1	Requested design grade elevations for portions of TPS-1 outside of design footprint of TPS-1.

Figures

Figures are provided under separate cover.

Appendix A
2008 ERRS Summary Report

Appendix A is provided under separate cover.



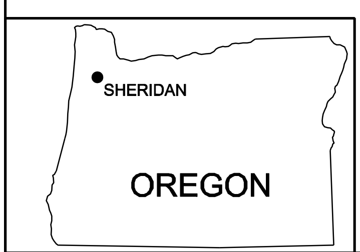


FIGURE 1-1
SITE VICINITY MAP
TAYLOR LUMBER AND TREATING SUPERFUND SITE
SHERIDAN, OREGON

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

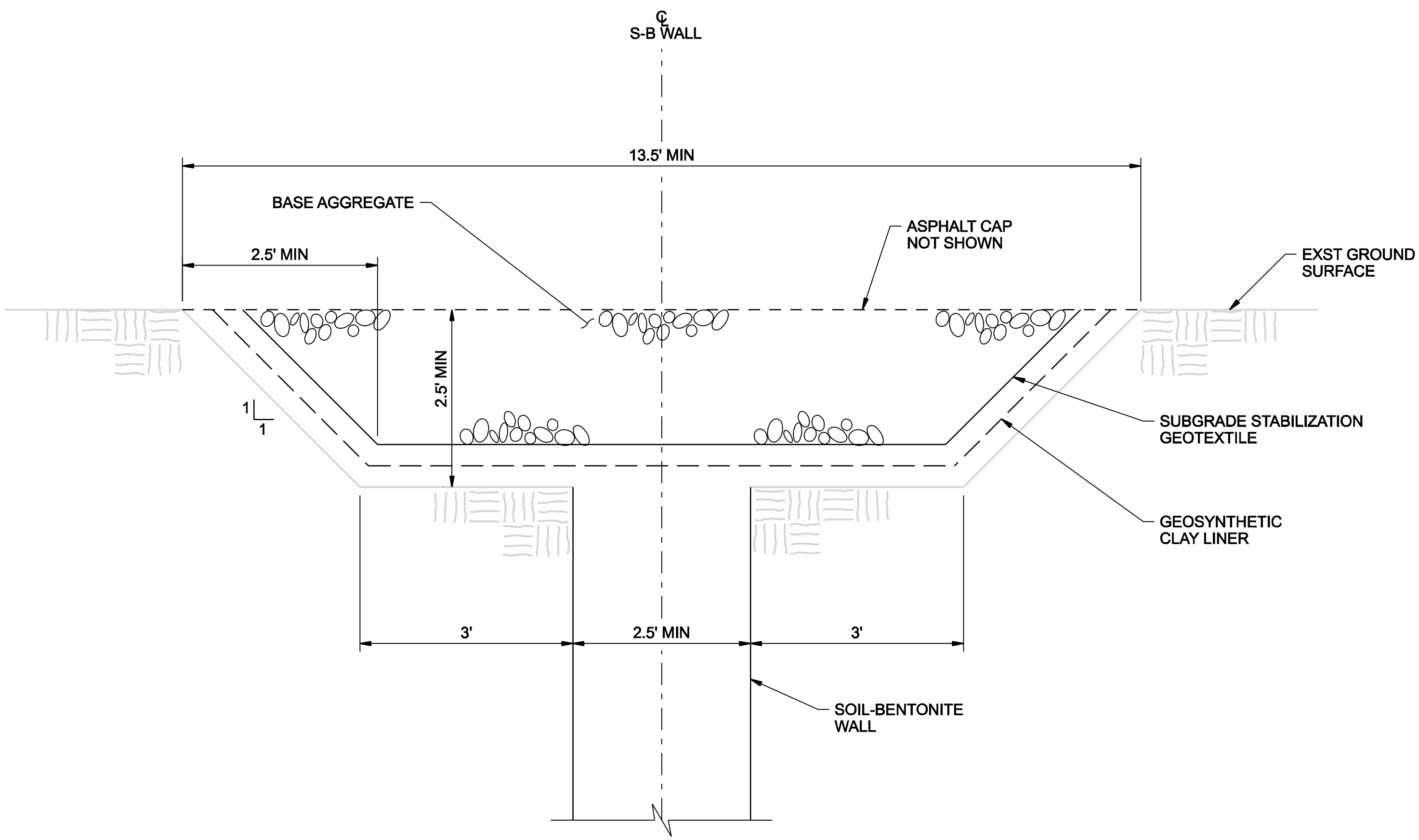


FIGURE 1-3
BARRIER WALL PROTECTIVE CAP DETAIL
TAYLOR LUMBER AND TREATING SUPERFUND SITE

24-DEC-2008 figx-x_342790.dgn

CH2MHILL

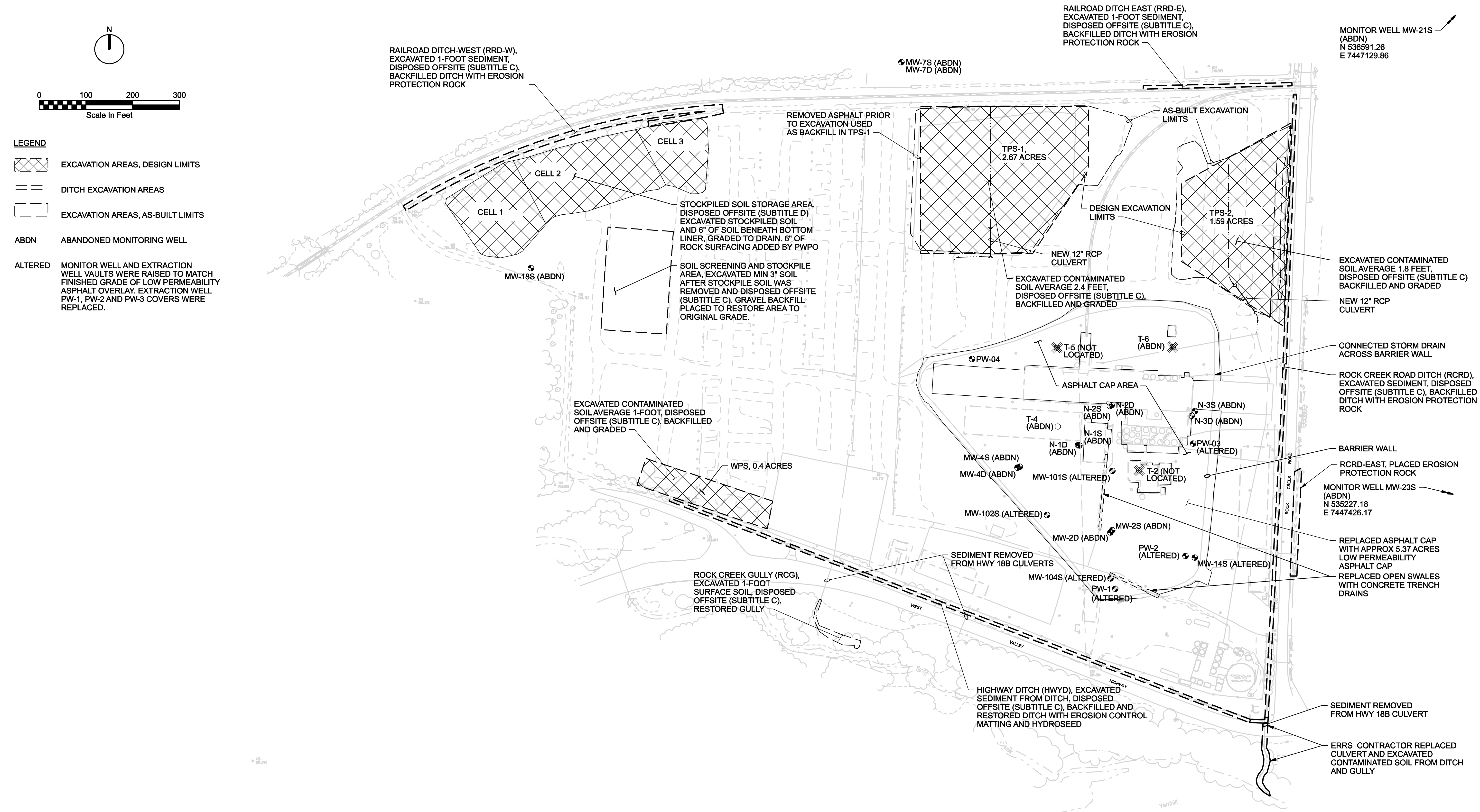


FIGURE 1-4
KEY ELEMENTS OF COMPLETED REMEDIAL ACTION

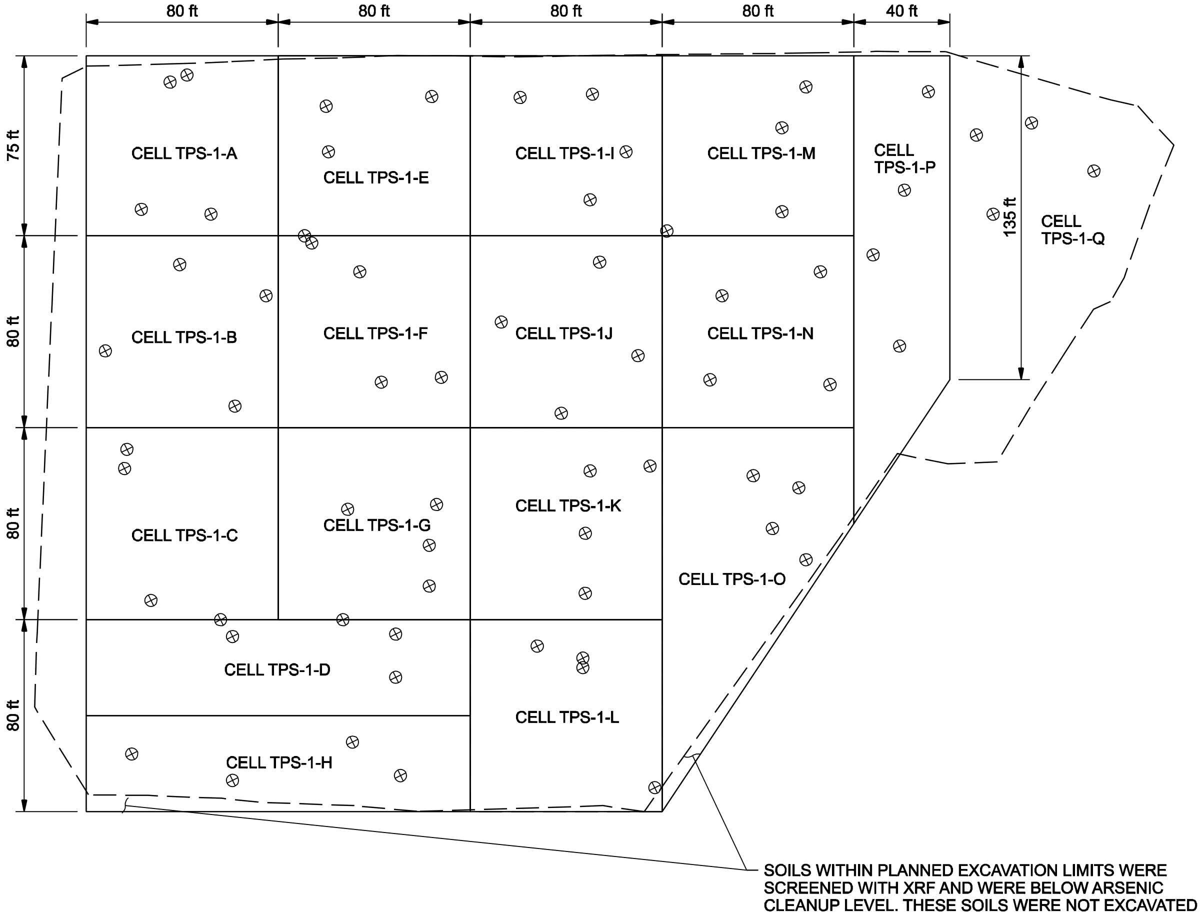
TAYLOR LUMBER AND TREATING SUPERFUND SITE

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

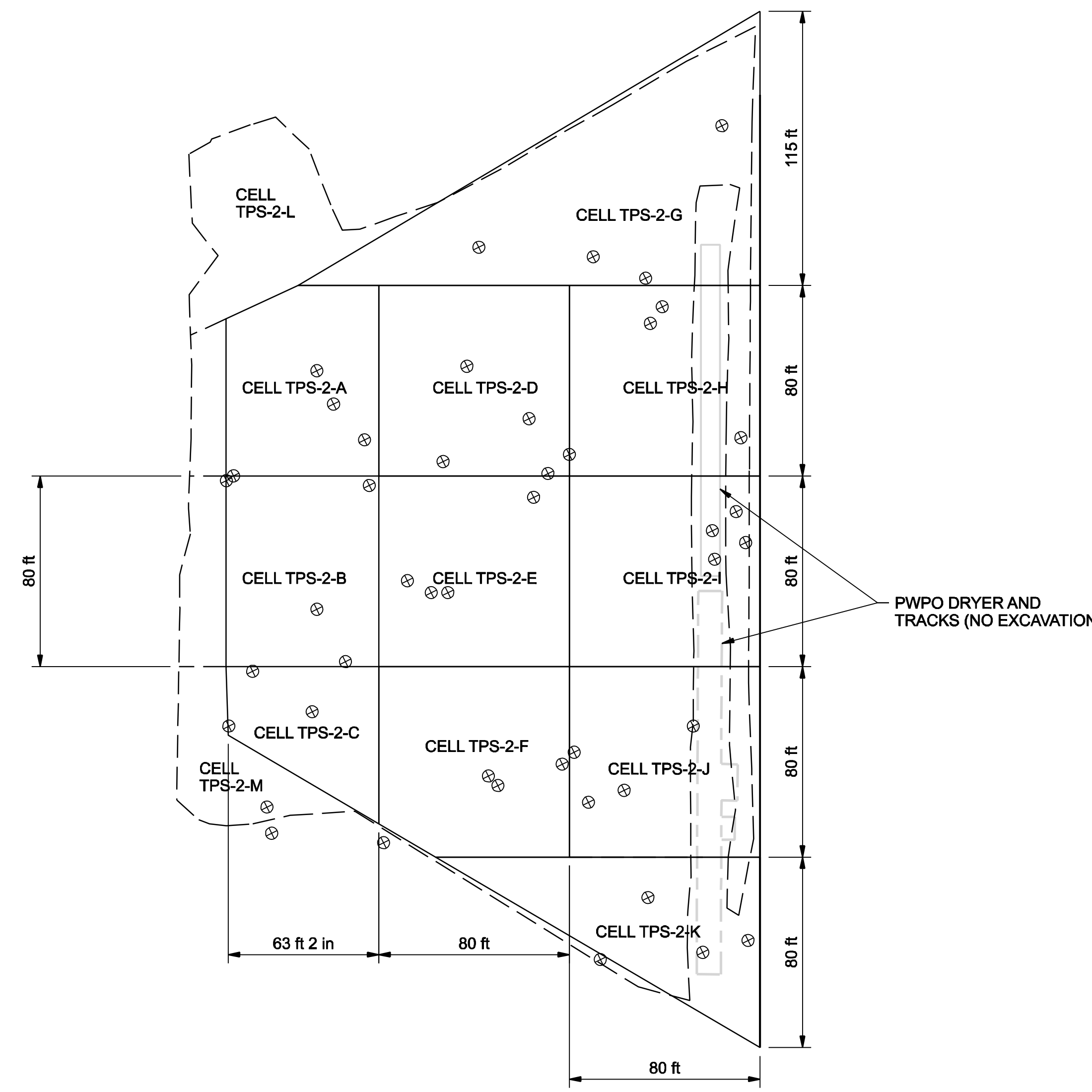
CH2MHILL

ID	Task Name	Duration	Start	Finish
1	**Contract Award**	0 days	Fri 3/30/07	Fri 3/30/07
2	**Plans and Submittals**	**126 days**	**Fri 4/6/07**	**Tue 9/25/07**
3	Preparation of Plans & Submittals (Spec. Section 1010)	61 days	Fri 4/6/07	Mon 7/2/07
4	Review of Plans & Submittals (Spec. Section 1010)	46 days	Fri 4/27/07	Mon 7/2/07
5	Preparation of Submittals (Spec. Sections 1025 - 2920)	126 days	Fri 4/6/07	Tue 9/25/07
6	Review of Submittals (Spec. Sections 1025 - 2920)	116 days	Fri 4/20/07	Tue 9/25/07
7	**Pre-Construction Meeting**	1 day	Thu 5/10/07	Thu 5/10/07
8	**Site Operations**	**112 days**	**Wed 5/16/07**	**Mon 10/15/07**
9	Site Operations	112 days	Wed 5/16/07	Mon 10/15/07
10	Stormwater Management	103 days	Wed 5/30/07	Mon 10/15/07
11	Air Quality Monitoring	85 days	Wed 5/30/07	Wed 9/19/07
12	Surveying	103 days	Wed 5/30/07	Mon 10/15/07
13	Quality Control Testing	80 days	Wed 6/27/07	Wed 10/10/07
14	**Mobilization & Site Preparation**	**19 days**	**Wed 5/16/07**	**Tue 6/12/07**
15	Personnel & Equipment Mobilization	11 days	Wed 5/16/07	Thu 5/31/07
16	Site Preparation	10 days	Wed 5/30/07	Tue 6/12/07
17	**Soil Excavation**	**65.5 days**	**Mon 6/11/07**	**Wed 9/5/07**
18	Excavate Soil in Cell 3 Non Haz	14 days	Mon 6/18/07	Fri 7/6/07
19	Excavate Soil in Cell 2 Non Haz	19 days	Mon 6/11/07	Fri 7/6/07
20	Excavate Soil in Cell 1 Non Haz	19 days	Mon 6/11/07	Fri 7/6/07
21	Excavate Soil in TPS 1 Haz	62.5 days	Thu 6/14/07	Wed 9/5/07
22	TPS-1 West 1/2	15 days	Thu 6/14/07	Thu 7/5/07
23	TPS-1 East 1/2	20 days	Wed 8/1/07	Thu 8/23/07
24	TPS-1 Cell Q South	0.5 days	Wed 9/5/07	Wed 9/5/07
25	Excavate Soil in TPS 2 Haz	38 days	Tue 7/10/07	Fri 8/24/07
26	TPS-2 North 2/3	13 days	Tue 7/10/07	Thu 7/26/07
27	TPS-2 South 1/3	8 days	Sat 8/4/07	Mon 8/13/07
28	TPS-2 (East of Dryer)	4 days	Tue 8/21/07	Fri 8/24/07
29	Excavate Soils in WPS Area Haz	16.5 days	Tue 7/24/07	Sat 8/11/07
30	WPS - Along Fenceline	1 day	Tue 7/24/07	Tue 7/24/07
31	WPS - Pole Area	0.5 days	Sat 8/11/07	Sat 8/11/07
32	Excavate Rail Road Ditch East Haz	1 day	Tue 8/14/07	Tue 8/14/07
33	Excavate Rail Road Ditch West Haz	2 days	Wed 8/15/07	Thu 8/16/07
34	Excavate Rock Creek Road Ditch Haz	5 days	Wed 8/8/07	Mon 8/13/07
35	Excavate Highway Ditch Haz	3 days	Mon 8/6/07	Wed 8/8/07
36	Excavate Rock Creek Gully Haz	5 days	Fri 8/17/07	Wed 8/22/07
37	**Screening of Soils**	**53 days**	**Tue 6/12/07**	**Sat 8/18/07**
38	Soil from Cell 3 - Non Haz	1 day	Tue 6/12/07	Tue 6/12/07
39	Soil from TPS 2 Area Haz	17 days	Thu 7/12/07	Thu 8/2/07
40	Soil from WPS Area Haz	3 days	Tue 7/24/07	Sat 8/11/07
41	Soil from Ditches & Gully	7 days	Fri 8/10/07	Fri 8/17/07
42	Soil from TPS-1 Area Haz	9 days	Thu 8/9/07	Sat 8/18/07
43	**Backfill**	**54 days**	**Fri 7/6/07**	**Wed 9/12/07**
44	Backfill TPS-1	54 days	Fri 7/6/07	Wed 9/12/07
45	West Half	19 days	Fri 7/6/07	Mon 7/30/07
46	East Half	22 days	Wed 8/15/07	Wed 9/12/07
47	Backfill TPS-2	38 days	Fri 7/27/07	Wed 9/12/07
48	North 2/3	6 days	Fri 7/27/07	Thu 8/2/07
49	South 1/3	18 days	Mon 8/20/07	Wed 9/12/07
50	Backfill WPS Area	20 days	Tue 8/14/07	Sat 9/8/07
51	Asphalt Crushing	11 days	Mon 8/13/07	Fri 8/24/07
52	**Transportation & Disposal**	**78 days**	**Mon 6/11/07**	**Thu 9/20/07**
53	Disposal at Subtitle C Facility	72 days	Tue 6/19/07	Thu 9/20/07
54	Disposal at Subtitle D Facility	19 days	Mon 6/11/07	Fri 7/6/07
55	**Monitoring Well Abandonment and Alteration**	**48 days**	**Tue 6/26/07**	**Fri 8/24/07**
56	Monitoring Well Abandonment and Alteration	6 days	Tue 6/26/07	Fri 8/24/07
57	**Paving**	**84 days**	**Mon 6/18/07**	**Fri 10/5/07**
58	Drainage Modifications (Trench Drain)	20 days	Tue 6/26/07	Mon 9/10/07
59	Pavement Patch & Repair	7 days	Mon 6/18/07	Tue 6/26/07
60	Paving Reconstruction	**17 days**	**Thu 7/5/07**	**Thu 7/26/07**
61	Phase 1	3 days	Thu 7/5/07	Sat 7/7/07
62	Phase 2	2 days	Wed 7/25/07	Thu 7/26/07
63	Low Permeability Pavement Overlay	**72 days**	**Thu 7/5/07**	**Fri 10/5/07**
64	Phase 1	4 days	Thu 7/5/07	Mon 7/9/07
65	Phase 2	3 days	Thu 7/26/07	Sat 7/28/07
66	400 SF Area	2 days	Tue 9/18/07	Fri 10/5/07
67	**Site Restoration**	**30 days**	**Mon 8/20/07**	**Fri 9/28/07**
68	Restoration of Ditches & Gully	30 days	Mon 8/20/07	Fri 9/28/07
69	Fence Installation	14 days	Tue 9/4/07	Thu 9/20/07
70	**Inspections and Punch List Completion**	**32 days**	**Fri 8/31/07**	**Mon 10/15/07**
71	EPA Preliminary Assessment of Incomplete Work	1 day	Fri 8/31/07	Fri 8/31/07
72	Prefinal Inspection	1 day	Mon 9/17/07	Mon 9/17/07
73	Punch List Items	18 days	Tue 9/18/07	Thu 10/11/07
74	Final Inspection	1 day	Mon 10/15/07	Mon 10/15/07
75	**Demobilization**	**70 days**	**Mon 9/10/07**	**Fri 12/14/07**
76	Remove Site Facilities & Equipment	70 days	Mon 9/10/07	Fri 12/14/07
77	**2008 Activities**	**185 days**	**Tue 2/5/08**	**Fri 10/17/08**
78	Alternative Dispute Resolution Meetings	2 days	Tue 2/5/08	Wed 2/6/08
79	Asphalt Bird Bath Correction	1 day	Wed 5/7/08	Wed 5/7/08
80	Contracting Officers Final Decision	0 days	Wed 10/15/08	Wed 10/15/08
81	1st Annual Low-Permeability Asphalt Inspection	1 day	Mon 8/11/08	Mon 8/11/08
82	2008 ERRS Work	61 days	Sat 7/26/08	Fri 10/17/08
83	HWY 18B Culvert Replacement	21 days	Fri 8/1/08	Fri 8/29/08
84	Trench Drain Construction	26 days	Sat 7/26/08	Fri 8/29/08
85	Trench Drain Final Inspection	1 day	Fri 9/5/08	Fri 9/5/08
86	ERRS Well Vault Riser Reconstruction	3 days	Wed 10/15/08	Fri 10/17/08

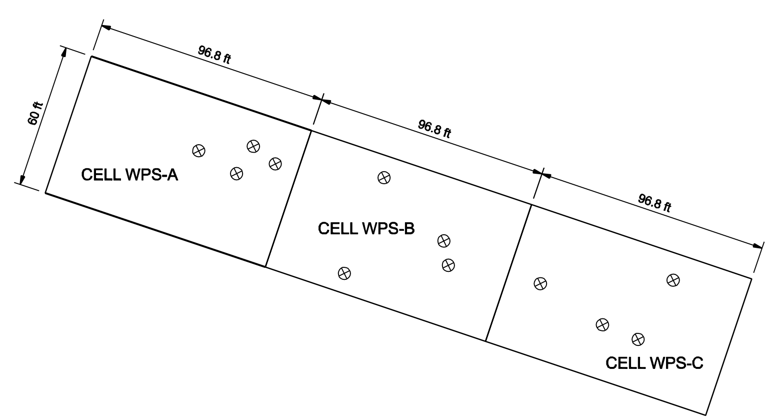
Figure 2-1
As-Built Construction Schedule
Taylor Lumber and Treating Superfund Site



TPS-1 EXCAVATION AREA (2.67 ACRES)



TPS-2 EXCAVATION AREA (1.59 ACRES)



WPS EXCAVATION AREA (0.4 ACRES)

LEGEND

AS-BUILT EXCAVATION LIMITS

CELL TPS-1-L — EXCAVATION CELL AND COMPOSITE SAMPLE AREA

CONFIRMATION SAMPLE COMPOSITE NODE LOCATIONS

FIGURE 2-2
CONFIRMATION SAMPLING LOCATIONS

TAYLOR LUMBER AND TREATING SUPERFUND SITE

ab-fig2-2_342790.dgn 24-DEC-2008

CH2MHILL

N

0 40 80 120

Scale In Feet

LEGEND:

- ASPHALT CORE LOCATIONS
- MONITOR WELL
- EXTRACTION WELL
- PAVEMENT RECONSTRUCTION AND OVERLAY
- PAVEMENT REPAIR AND OVERLAY
- 9 PATCHES TO EXISTING PAVEMENT
- 1+00 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.

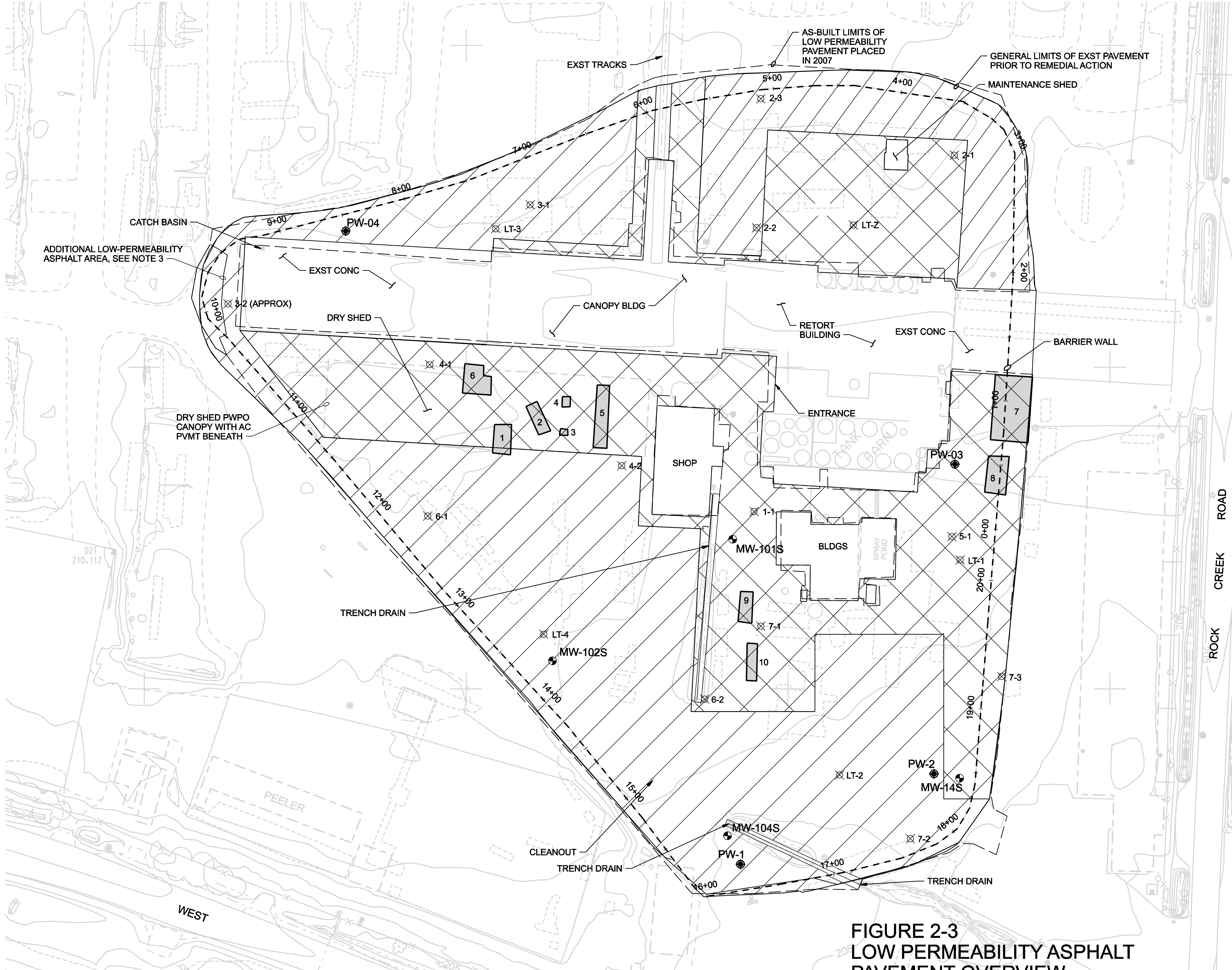


FIGURE 2-3
LOW PERMEABILITY ASPHALT PAVEMENT OVERVIEW

TAYLOR LUMBER AND TREATING SUPERFUND SITE

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