FINAL

RECORD OF DECISION

TAYLOR LUMBER AND TREATING SUPERFUND SITE

SHERIDAN, OREGON

SEPTEMBER 30, 2005

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 10

Part 1: The Declaration for the Record of Decision

SITE NAME AND LOCATION

The Taylor Lumber and Treating Superfund Site is located in Sheridan, Oregon. The Taylor Lumber and Treating Site was listed on the National Priorities List on June 14, 2001, and the U.S. Environmental Protection Agency (EPA) identification number for the site is ORD009042532. The site is not divided into operable units.

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected final remedial action for the Taylor Lumber and Treating Site, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record file for this site.

The Oregon Department of Environmental Quality (DEQ) concurs with the Selected Remedy to the extent it addresses the portion of the site referred to as the West Facility. DEQ is not able at this time to concur with EPA's decision to not address the East Facility and one nearby residence under CERCLA.

ASSESSMENT OF THE SITE

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Such a release or threat of release may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This ROD selects the final remedy for the site. The entire site is included in one operable unit (OU1). The remedy documented in this ROD was designed to protect human health and the environment by containing and preventing contact with the wastes from the former wood-treating facility. Major elements of the selected remedy include:

- Continued operation and maintenance of the underground barrier wall system at the site, including continuing extraction and treatment of groundwater from within the slurry wall, to prevent migration of contaminated groundwater and dense non-aqueous phase liquid (DNAPL) to the outside of the wall.
- Replacement of the existing 4.6-acre asphalt cap, which is above the area within the existing slurry wall, with a more durable low permeability cap to protect human exposure through direct contact with contaminated soils.
- Excavation or capping and consolidation of contaminated soils located within the West Facility and in ditches that abut the West Facility, in coordination with applicable state and federal regulations. If cost-effective, excess soil that is not consolidated onsite may be sent offsite to an acceptable disposal facility.

- Operation and maintenance of the caps to ensure protection of human health and the environment.
- Long-term monitoring of groundwater for pentachlorophenol to ensure that contaminated groundwater does not pose an unacceptable risk to human health or the environment. The focus of this effort will be to protect ecological receptors in adjacent surface water (Rock Creek, South Yamhill River), and will include installation of a new monitoring well near a former Geoprobe sample (GP-03) to fill a data gap on the eastern side of the site.
- Periodic monitoring of groundwater for pentachlorophenol in two nearby residential wells (existing data have not identified a problem, but EPA believes that it is prudent to continue sampling these wells).
- Institutional controls (ICs) for the property defined as the West Facility, which is currently owned and operated by Pacific Wood Preserving of Oregon, restricting groundwater use and non-industrial land use.

A completed early action addressed remediation of source materials, which included contaminated soils and DNAPL at the site, by installation of a slurry wall and construction of an overlying asphalt cap. These source materials constitute principal threat wastes at the site. This selected remedy requires continued operation and maintenance of this system.

The selected remedy is expected to protect human health and the environment by preventing contact with contaminated soil above protective regulatory criteria and reducing the potential for contaminated soil and groundwater to migrate off-property and to adjacent water bodies.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

None of the alternatives achieve reduction of toxicity, mobility, or volume through treatment, except for extracted groundwater from inside the barrier wall, which is treated in an onsite water treatment system prior to discharge.

Because this remedial action will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, statutory five-year reviews will be conducted every five years after initiation of remedial action to ensure that the remedy continues to be protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for the site.

- Contaminants of concern and their respective concentrations (Tables 2 and 3).

- Baseline risk represented by the contaminants of concern (Section 7).
- Cleanup levels established for contaminants of concern and the basis for these levels (Section 8).
- How source materials constituting principal threats are addressed (Section 8).
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and the ROD (Section 13.5).
- Potential land and groundwater use that will be available at the site as a result of the selected remedy (Section 12.1).
- Estimated capital, annual operation and maintenance, and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (Section 12.3).
- Key factors that led to the selection of the remedy (Section 13).

AUTHORIZING SIGNATURE

for Daniel D. Opalski, Director
Office of Environmental Cleanup
United States Environmental Protection Agency, Region 10

9/30/05
Date

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ACRONYMS AND ABBREVIATIONS

AOC	area of contamination
ARARs	applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	Ambient Water Quality Criteria
BAF	bioaccumulation factor
bgs	below ground surface
BLRA	Baseline Risk Assessment
CAA	Clean Air Act
CDI	chronic daily intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm^2	square centimeters
COC	chemical of concern
COEC	contaminant of ecological concern
COPC	chemical of potential concern
COPEC	contaminant of potential environmental concern
CSM	conceptual site model
Dee	Dee Industrial
DEQ	Oregon Department of Environmental Quality
DNAPL	dense non-aqueous phase liquid
ELCR	excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ERA	ecological risk assessment
ETC	Environmental Technology Council
HDPE	high-density polyethylene
HEAST	Health Effects Assessment Summary Tables
HHRA	human health risk assessment
HI	hazard index

HQ	hazard quotient
ICs	institutional controls
ILBM	Interlink Business Management Inc.
IRIS	Integrated Risk Information System
LDR	Land Disposal Restriction
LOAEL	lowest observed adverse effect level
MCL	maximum contaminant level
ug/kg	microgram per kilogram
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NAPL	non-aqueous-phase liquid
NCP	National Contingency Plan
NOAEL	no observed adverse effect level
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
ORNHIC	Oregon Natural Heritage Information Center
OSWER	Office of Solid Waste and Emergency Response
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PEC	probable effects concentration
ppm	parts per million
PPA	Prospective Purchaser Agreement
ppb	parts per billion
PRG	Preliminary Remediation Goal
PVC	polyvinyl chloride
PWPO	Pacific Wood Preserving of Oregon
QA/QC	quality assurance/quality control
RAGS	Risk Assessment Guidance for Superfund

RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SV	screening value
SVOC	semivolatile organic compound
TCLP	toxicity characteristic leaching procedure
TEC	threshold effects concentration
TEQ	total equivalent
TLT	Taylor Lumber and Treating
TRV	toxicity reference value
UCL	upper confidence limit
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WQC	Water Quality Criteria

Part 2: The Decision Summary

1.0 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

The Taylor Lumber and Treating Superfund Site is located in Yamhill County, Sheridan, Oregon (Figure 1). The site was listed on the U.S. Environmental Protection Agency's (EPA) National Priorities List (NPL) on June 14, 2001, and the EPA identification number is ORD050955848. The entire site is included in one operable unit (OU1).

Taylor Lumber and Treating (TLT) operated a sawmill from 1946 to 2001 in an area generally referred to as the East Facility. They conducted wood-treating operations from 1966 to 2001 in an area generally referred to as the West Facility (Figure 2). The predominant activity at TLT was 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 West Facility (approximately 40 acres). They began wood-treating operations in June 2002. Other entities purchased the remaining portion of the former TLT holdings. The remedy identified in this Record of Decision (ROD) is for the West Facility. The West Facility refers to the former TLT's industrial property west of Rock Creek Road, including the Treatment Plant Area, White Pole Storage Area, Treated Pole Storage Area, and Contaminated Soil Storage Area. The designations of these areas reflect general property usage by the former TLT.

Within the West Facility, PWPO currently performs wood-treating operations using copper- and borite-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. Treated wood is handled in the eastern portion of the West Facility, and untreated wood is handled on the western portion of the West Facility. Since 2002, new structures have been constructed and certain areas have been covered with asphalt or gravel.

The TLT site is not located within or adjacent to a designated wetland, critical habitat, wilderness, wildlife refuge, wild and scenic river, coastal zone, or navigable waters of the United States or state (CH2M HILL 2004). The TLT site is located within the 100-year floodplain of the South Yamhill River.

Threatened and endangered species potentially occurring within the local area include winter-run steelhead, which is listed as threatened by the National Marine Fisheries Service; the plant Nelson's sidalcea, which is listed as threatened by the U.S. Fish and Wildlife Service (USFWS); and the Willamette Valley daisy, which is listed as endangered by the USFWS.

EPA is the lead agency for this fund-financed site. The Oregon Department of Environmental Quality (DEQ) is the support agency. The Confederated Tribes of the Grande Ronde Community of Oregon have tribal representation and government-to-government involvement in EPA's Superfund activities at this site. The South Yamhill River runs through tribal lands upstream of the site and is an important migratory river for tribal salmonid and lamprey populations.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 SITE HISTORY

In 1946, John Taylor purchased the sawmill on the east side of Rock Creek Road (East Facility). In 1966, he purchased the land on the west side of Rock Creek Road for the wood-treating facility. TLT operated the sawmill and wood-treating operations until 2001. 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 Treatment Plant Area resulting from past drips, spills, and leaks of wood-treating chemicals from aboveground chemical storage tanks, drip pads, and tank farms
- Surface soil contamination in the vicinity of the Treatment Plant Area and areas of former treated lumber storage
- Surface soil contamination in roadside ditches that abut the West Facility (contamination resulted from surface water runoff from the West Facility; spills associated with wood-treating operations; and deposition of contaminated dust from the West Facility).

Also, contaminated soils from interim and early measures conducted at the site are consolidated in the Contaminated Soil Storage Cells.

2.2 ACTIONS TO DATE

Beginning with the first groundwater assessment in 1988, TLT has been the subject of over a dozen inspections, investigations, and actions through state and federal Resource Conservation and Recovery Act (RCRA), National Pollutant Discharge Elimination System (NPDES), and Superfund programs. Relevant studies are summarized in Table 1.

EPA completed a removal action at the site in 2000. In addition to soil and groundwater sampling efforts, the following actions were implemented: a 2-acre section of contaminated soils in the Treated Pole Storage Area was paved with asphalt; and a soil-bentonite slurry barrier wall was constructed beneath the Treatment Plant Area to contain dense-non-aqueous-phase liquid (DNAPL). The wall was keyed into the underlying siltstone, the area above and inside of the barrier wall was paved, and a groundwater extraction system was constructed within the contained area to maintain hydraulic control. In addition, at EPA's request, TLT removed high concentrations of arsenic from certain sections of ditches that abut the West Facility. All excavated soils were consolidated onsite in the Contaminated Soil Storage Area.

In November 2004, EPA conducted a second removal action at the residence (22150 Rock Creek Road) located directly east of the former TLT facility. Soil contamination by dioxins/furans was found to present unacceptable risk to residents at this location. Approximately six inches of surface soil, gravel, and grass were excavated from the front and side yards and replaced with clean topsoil and grass. Approximately 510 tons of materials were removed and disposed of at an offsite landfill. In summer 2005, EPA continued this removal action by excavating soils from an adjacent ditch. Excavated soils (approximately 138 cubic yards) were consolidated onsite at the West Facility.

DEQ issued a NPDES Waste Discharge Permit to PWPO, the current operator of the wood-treating facility, on December 29, 2004. The types of sources covered by the permit include treated stormwater runoff, treated extracted groundwater, and boiler blowdown.

2.3 REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

EPA initiated the Remedial Investigation and Feasibility Study (RI/FS) in April 2001. The Phase 1 RI Report (evaluation of nature and extent based on existing data) was completed in January 2002, and the Phase 2 RI (field investigation needed to fill data gaps for the RI/FS) was conducted in 2002 and 2003. The RI Report summarizes the site investigation activities and presents data on the nature and extent of contamination at the site. RI data were used to conduct a baseline human health risk assessment (HHRA) and ecological risk assessment (ERA).

The FS was conducted in 2003 and 2004. The FS Report describes the development and evaluation of remedial action alternatives for affected soil and groundwater. The complete RI/FS was provided to stakeholders for comment in December 2004. An errata sheet was produced in May 2005, and the RI/FS was finalized in May 2005.

3.0 COMMUNITY PARTICIPATION

The Community Relations Plan for the TLT site was released in January 2002. The plan was based on community interviews conducted in December 1999 and October 2001. A variety of community involvement activities have taken place at the TLT site since 1999, including distribution of seven fact sheets, maintenance of information repositories, updates to the site web page, and newspaper advertisements announcing the release of significant documents. A public meeting was held in October 2001 to present early findings from the cleanup investigation and to respond to public concerns.

A mailing list (approximately 80 addressees) keeps interested community members and others informed of activities and significant issues at the site.

For the TLT site, EPA funded a Cooperative Agreement with the Confederated Tribes of Grand Ronde to allow tribal representation and government-to-government involvement in the EPA Superfund activities that may affect the tribe.

The Proposed Plan for Taylor Lumber and Treating Site (EPA 2005) was released for formal public comment on July 28, 2005. A notice of availability of this plan and the Administrative Record was published in the *Sheridan Sun* on July 27, 2005. The public comment period closed on August 26, 2005. EPA received three comment letters. EPA's response to comments received during the public comment period is included in the Responsiveness Summary, which is included as Part 3 of this ROD.

Selection of the final remedy is based on the Administrative Record. The Administrative Record is available for review at the Sheridan Public Library (142 NW Yamhill Street, Sheridan) and at the EPA Region 10 Records Center on the 7th Floor of 1200 Sixth Avenue, Seattle, Washington. Information about the TLT site is also available at EPA's

Region 10 website (www.epa.gov/r10earth), then click on Index, and then on Taylor Lumber and Treating.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

The TLT site is not divided into operable units, and this ROD selects the final remedy for the site. This ROD explains how the selected remedy will protect human health and the environment by reducing exposure, controlling contaminant releases, and protecting potential drinking water sources near the site. Early actions completed at the site are described in Section 2.2.

Studies show that environmental impacts to the sawmill area (East Facility) are much less than to the West Facility. This ROD identifies the selected remedy for the property referred to as the West Facility. EPA has determined that remediation in the East Facility is not warranted under this CERCLA action. DEQ is continuing to evaluate the need for cleanup actions outside the West Facility.

5.0 SITE CHARACTERISTICS

5.1 OVERVIEW OF THE SITE

The TLT site is located on the relatively flat floodplain of the South Yamhill River (Figure 2) about 1 mile west of Sheridan in western Oregon. The property lies north of and adjacent to the intersection of Rock Creek Road and the West Valley Highway. Remedial action is warranted at the TLT site in the West Facility, which is approximately 39 acres of upland area. The East Facility was studied in the RI/FS but does not warrant cleanup action under this ROD. Adjacent land holdings, including residences, were also studied as part of the RI/FS.

The former TLT facility is split by Rock Creek Road into the west and east facilities. The West Facility, which is currently owned by PWPO, refers to the former TLT's industrial property west of Rock Creek Road, including the Treatment Plant Area, White Pole Storage Area, Treated Pole Storage Area, and Contaminated Soil Storage Area. TLT also operated in the Truck Shop Area, which is not included within the boundaries of the West Facility property purchased by PWPO, but is included in characterization efforts for the TLT site. The West Facility contains an active wood-treating operation, with surface and subsurface features (retorts, aboveground storage tanks, stormwater treatment and conveyance systems, storage areas, peelers) that support the facility. A railroad operates a line through the property, hauling treated and untreated wood products. The property is covered with gravel, asphalt, and structures. Current and past land use practices make this area unsuitable for most plants and wildlife because less than 5 percent of it supports vegetation. Little or no woody vegetation is present.

The East Facility refers to the former TLT property east of Rock Creek Road. Prior to the Spring of 2001, the East Facility included the main office, boiler, sawmill facility, planing mill, end-painting facility, boiler, a wood waste pile (Moe's Mountain), and fire control pond. Primary operations in this area included peeling, milling, planing and chipping of raw wood to produce lumber products.

The South Yamhill River and Rock Creek are located as close as 150 feet from the southern boundary of the facility (see Figure 2). Rock Creek flows southeasterly into the river. The South Yamhill River flows generally east past the TLT site and the City of Sheridan. During dry summer months, the City of Sheridan municipal water supply uses river water to supplement the primary drinking water source of spring water from Stoney Mountain. The City's water intake is located approximately 2.5 miles downstream from the TLT site.

No areas of archaeological or historical importance have been identified at the site.

5.1.1 Geology

At the TLT site, four distinct geologic units have been observed: fill material, fine-grained upper alluvium, coarse-grained lower alluvium, and siltstone. The fill material consists of silty to gravelly clay and road gravel, and ranges up to 5 feet thick. The unconsolidated alluvial and lower river terrace deposits of Holocene age overlie the siltstone. The upper alluvium consists of silty clay and or clayey silt, and ranges in thickness from approximately 3.5 to 10.5 feet. The lower alluvium consists of sandy silt and silty sand that grades to sand gravel with depth. The lower alluvium ranges in thickness from approximately 3 to 13 feet, averaging approximately 7 feet. The siltstone, which is classified as the Yamhill Formation, is estimated to be approximately 2,000 feet thick. Overall, the siltstone is massive in character and did not exhibit significant primary or secondary permeability.

5.1.2 Hydrogeology

The relatively thin layer of alluvium forms a modest, local-scale water-bearing zone beneath the site. The thick sequence of siltstone underlying the site is a low-yielding hydrogeologic unit viewed as the basement confining unit for the western Willamette Valley. Water levels measured in monitor wells at the site indicate depth to groundwater at between approximately 2 and 10 feet below ground surface (bgs). The lower alluvium has a greater hydraulic conductivity and is the primary water-bearing zone at the site, where groundwater occurs under semi-confined conditions.

5.1.3 Surface Water

During TLT operations, surface water from the site flowed to off-property ditches and eventually to the South Yamhill River. Currently, surface water from the contaminated portions of the site (i.e., the Treatment Plant and Treated Pole Storage areas) is collected and treated in an onsite stormwater treatment system prior to discharge to the South Yamhill River. Stormwater from other portions of the site flow through ditches to the river. The roadside ditches are dry in the summer, and do not support fish populations.

5.2 SOURCES OF CONTAMINATION

At the TLT site, past sources of contamination include operations associated with the former wood-treating facility, such as treatment plant facility operations, treated lumber and contaminated equipment, treated pole storage and drip areas, and leaks and spills from tank farms. Also, contaminated soils from interim and early measures conducted at the site are consolidated in the Contaminated Soil Storage Cells.

Contaminants in soils may migrate offsite through wind-generated dust or stormwater discharges. Contaminants in groundwater may migrate through groundwater flow to off-property areas, including the South Yamhill River or Rock Creek.

5.3 CONCEPTUAL SITE MODEL

The Conceptual Site Model (CSM) identifies the means by which human or ecological receptors (i.e., potentially exposed people, flora, or fauna) on or near the TLT site may contact chemicals in environmental media. It addresses exposures that may result under current site conditions and from reasonably anticipated potential uses of the site and the surrounding areas in the future.

Elevated concentrations of hazardous substances are detected at the TLT site in surface and subsurface soil (including ditch soils) and groundwater. The primary contaminant issues at the TLT site are depicted in the CSM shown in Figures 3 and 4. As shown in Figure 3, prior to the removal action in 2000, DNAPL beneath the Treatment Plant was an uncontrolled source of groundwater contamination. Workers were exposed to contaminated soil and contaminated soils were subject to wind erosion. Surface runoff from the site flowed to offsite ditches and eventually to the South Yamhill River. By the end of 2000, these sources were contained, as shown in the revised CSM (Figure 4). The barrier wall contains the DNAPL and eliminates it as a source for future groundwater contamination. The most contaminated surface soils were paved over. With the completion of the stormwater treatment and conveyance system, surface runoff from the Treated Pole Storage Area and Treatment Plant Area is now captured and treated.

Based on an understanding of current and reasonably anticipated future land use conditions at or near the site, the most plausible exposure pathways have been identified for characterizing human health risks (Figure 5) and ecological risks (Figure 6). Media that were evaluated as potentially impacted as a result of contaminant transport processes include:

- Surface and subsurface soil at the TLT site and nearby properties
- Surface soil in roadside ditches near the TLT site
- Surface water and sediment in the South Yamhill River and Rock Creek
- Groundwater inside and outside of the barrier wall
- Groundwater near the TLT site, including nearby residential wells
- Air on the TLT site and nearby properties.

5.4 SAMPLING STRATEGY

Numerous investigations conducted at the TLT site since 1988 have documented the presence of wood-treating contaminants, such as pentachlorophenol (PCP) and polycyclic aromatic hydrocarbons (PAHs) in soil and groundwater at the site. In the Phase 1 RI, historical soil and groundwater data from the 1999 Integrated Assessment Report and the 2001 Removal Action Report were compiled and evaluated, and data gaps relevant to the human health and ecological risk assessments were identified. In the Phase 2 RI (2002-2003), the media sampled were soils, ditch soils, groundwater, DNAPL, surface water, and river/creek sediment. Based on the Phase 2 results, supplemental sampling was performed as warranted.

Environmental investigations conducted between 1999 and 2002 are outlined in Tables 2-3, 2-4, 2-5, and 2-6 of the RI (CH2M HILL 2004) and are summarized below:

- Surface soil sampling:
  - West Facility (Treatment Plant Area, Treated Pole Storage, White Pole Storage Area, Truck Shop Area) – metals, semivolatile organic compounds (SVOCs), some samples analyzed for dioxins/furans, polychlorinated biphenyls (PCBs)/pesticides, volatile organic compounds (VOCs)
  - East Facility – metals, SVOCs, some samples analyzed for dioxins/furans, PCBs/pesticides, VOCs
  - Seventeen residences along within two miles of the site – metals, SVOCs, dioxins/furans, one sample analyzed for PCBs/pesticides and VOCs
  - Roadside ditches (east and west side of Rock Creek Road, Highway 18B) – metals, SVOCs, some samples analyzed for dioxins/furans, PCBs/pesticides, and VOCs
  - Background samples – one off-site surface sample was analyzed for metals, SVOCs, dioxins/furans, PCBs/pesticides, and VOCs; 5 surface samples were collected to determine background arsenic levels
  - Study on background arsenic levels near site
- Surface and subsurface characterization of material in Contaminated Soil Storage Cells to identify disposal options:
  - Soils at surface and at depth – metals and SVOCs by toxicity characteristic leaching procedure (TCLP); metals, SVOCs, some dioxins/furans, PCBs/pesticides, and VOCs
- Subsurface soil sampling:
  - West Facility (Treatment Plant Area, Treated Pole Storage, White Pole Storage Area, Truck Shop Area) - metals, SVOCs, some samples analyzed for dioxins/furans, PCBs/pesticides, VOCs. One background location was sampled at 9 depths, samples were analyzed for metals, SVOCs, dioxins/furans, PCBs/pesticides, and VOCs
  - East Facility – metals, SVOCs, some samples analyzed for dioxins/furans, PCBs/pesticides, and VOCs
- Groundwater sampling:
  - Inside barrier wall (monitoring wells) - metals, SVOCs, dioxins/furans, PCBs/pesticides, VOCs, general chemical parameters
  - Outside barrier wall (onsite and off-property; Geoprobes, monitoring wells, piezometers) - metals, SVOCs, dioxins/furans, PCBs/pesticides, VOCs, general chemical parameters

- East Facility (downgradient and background; wells) – metals, SVOCs, some dioxins/furans
- Off-property residential wells (two) – metals, SVOCs, dioxins/furans, general chemical parameters, one sample analyzed for PCBs/pesticides and VOCs
- Implement groundwater monitoring program to evaluate how barrier wall changed hydrology and groundwater flow pattern; effectiveness of barrier wall; estimate volume of DNAPL within barrier wall; evaluate nature and extent of groundwater contamination.

- Sediment and surface water sampling:
  - South Yamhill River and Rock Creek – metals, SVOCs, dioxins/furans, PCBs/pesticides, and VOCs
- Air (1999 sampling results) – Data were presented in the RI but not carried forward into the risk assessment because data are no longer representative of exposure since large portions of the site have been paved and the current wood-treating operations no longer use chemicals that contain arsenic or PCP:
  - Onsite (three), off-property (three), and background (one) – carcinogenic PAHs, PCP, metals (arsenic, chromium, lead).

5.5 CONTAMINANT NATURE AND EXTENT

Chemical concentrations were compared to screening values (SVs). Soil and groundwater data were compared to human health SVs, including Industrial and Residential EPA Region 9 Preliminary Remediation Goals (PRGs) for soil, tapwater (applied to groundwater), and ambient air. Region 9 PRGs were used as screening values for dioxin total equivalent (TEQ) in soil. In addition, dioxin TEQs were compared to EPA's Office of Solid Waste and Emergency Response (OSWER) directive PRGs (EPA 1998a). PRGs for individual chemicals are shown in tables presented in Appendix A of the RI. For groundwater, certain chemical concentrations were also compared to federal maximum contaminant levels (MCLs).

Sediment and surface water data were compared to aquatic sediment and freshwater aquatic SVs, respectively. The SVs for sediment were benthic invertebrate benchmarks: the threshold effects concentrations (TECs) and probable effects concentrations (PECs) were the primary SVs used. The SVs for surface water included the national ambient water quality criteria (AWQC) for aquatic organisms and the Oregon DEQ surface water screening level values. An overview of sampling and screening results is provided in the following sections. For most media, the risk to human health is driven by arsenic, PAHs, PCP, and dioxins/furans, and these chemicals are considered the primary constituents of concern at the site. Detection frequencies and concentration ranges in a given sample area are presented in a subsequent section (see Tables 2 and 3).

5.5.1 Overview of Surface Soil Sample Results and Background Arsenic Results

Surface soil samples were collected from the West Facility (including the Truck Shop Area), East Facility, off-property ditches, and neighboring residences and properties.

Arsenic and dioxin/furans are the most common contaminants in surface soil that exceed SVs. Arsenic concentrations in surface soil were well above background[1] in most on-property locations, and in some segments of the off-property ditches, particularly those that abut the West Facility (see Table 2). Arsenic levels measured in the residential yards and other nearby properties were within the background concentrations.

Numerous soil samples were also analyzed for dioxins/furans. Dioxin TEQ[2] exceeded the EPA OSWER generally recommended commercial/industrial range in two samples collected from the Treated Pole Storage and Treatment Plant Areas, and in one soil sample [5.3 parts per billion (ppb) dioxin TEQ] from an off-property ditch near the West Facility. Dioxins exceeded the Region 9 Industrial PRG SV in samples from the White Pole Storage Area, but did not exceed the EPA OSWER generally recommended commercial/industrial range. Dioxins exceeded the Region 9 Residential PRG SVs in samples from the East Facility and from one residential yard; however, these concentrations did not exceed the EPA OSWER generally recommended residential range. Of the residential yards, the highest TEQ concentration was observed at the residence located directly across Rock Creek Road from the former TLT Treatment Plant, and an early action was implemented at this yard.

In surface soils in the West Facility, PCP and PAHs were not commonly detected above SVs. PCP concentrations in only 9 of 150 samples exceeded the Industrial PRG SV of 9 milligrams per kilogram (mg/kg). Of those 9 samples, 6 samples had PCP concentrations ranging from 9.1 to 23 mg/kg. For PAHs, concentrations of three PAH compounds [i.e., benzo(a)pyrene, benzo(b)fluoranthene, and benzo(a)anthracene] exceeded the Industrial PRG SVs. Benzo(a)pyrene exceeded 10 times the SV in six samples; benzo(b)fluoranthene and benzo(a)anthracene did not exceed 10 times their respective SVs. The majority of these PAH exceedances were observed in the Treatment Plant and Treated Pole Storage areas. None of the PCP and PAH concentrations detected in surface soils in the East Facility exceeded SVs.

5.5.2 Overview of Subsurface Soil Sample Results

Subsurface soils were collected from both the West and East Facilities in 1999. The only location where significant subsurface soil contamination was observed was associated with DNAPL inside the barrier wall in the West Facility. In this area, PAHs, PCP, arsenic and dioxin/furan concentrations exceeded the SVs in several soil borings at depth.

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[1] Off-property soil samples were collected to determine background arsenic concentrations. Results showed that arsenic concentrations are relatively high in native soils in the Sheridan area, and that levels at or below 12 mg/kg should be considered background concentrations; that is, not site-related. This background concentration is nearly 10 times the Industrial Soil PRG of 1.6 mg/kg for arsenic.

[2] Dioxin/furans exist as a complex mixture of congeners, which are analyzed individually in each sample. To represent the combined toxicity of this mixture, a single numerical value or total equivalent (TEQ) is calculated. EPA has established OSWER generally recommended residential and commercial/industrial ranges for dioxin TEQ in soils (EPA 1998a); the generally recommended residential range is 1 microgram per kilogram (ug/kg), and the generally recommended commercial/industrial range is 5 to 20 ug/kg. The Industrial Region 9 PRG (Screening Value) for dioxin TEQ is 0.01 ug/kg.

The Soil Storage Cell Area consists of three aboveground cells that in total contain approximately 20,000 cubic yards of contaminated soil. The cells are lined beneath with a 40-mil high-density polyethylene (HDPE) liner and covered with a 12-mil Duraskrim® liner, affording temporary containment. PCP, dioxin, metals, arsenic and PAHs were detected in the Soil Storage Cells; however, concentrations were generally sporadic and low level. Dioxin levels measured in one cell exceed the dioxin TEQ Region 9 industrial PRG screening value but not the EPA OSWER generally recommended industrial and residential ranges.

5.5.3 Contaminant Fate and Transport in Soil

Both arsenic and dioxin have a very low solubility and volatility, and therefore are very unlikely to leach into the soil or volatilize into the air. However, they are strongly bound to soil particles, and as a result are susceptible to wind and water erosion.

The presence of elevated levels of dioxin/furans in shallow surface soils off-property, particularly at the residence across from the treatment facility, indicates air transport of contaminated soil from the West Facility. Since the 2000 Removal Action at the West Facility, the most heavily contaminated soils in the West Facility are paved over and the unpaved portions of the Treatment Plant and Treated Pole Storage areas are covered with gravel. Consequently, the potential for contaminated soil to be carried off-property by the wind is greatly reduced.

Ditches that received surface runoff in the past are contaminated with arsenic and dioxin, indicating that contaminated soils were transported off-property in surface runoff. Ditches also received spills that contaminated ditch soils. Since 2000, surface runoff from the Treated Pole Storage and Treatment Plant Areas is collected and conveyed to the stormwater treatment system before discharging to the ditches, effectively eliminating this pathway. However, runoff from the White Pole Storage Area (which includes the Contaminated Soil Cells) discharges directly to Rock Creek via the permitted ditch outfall south of the area. The contaminated soil present in the ditches will continue to migrate with surface runoff until it is addressed.

5.5.4 Overview of Groundwater

Groundwater data were collected to characterize site hydrogeology, determine the effectiveness of the underground barrier wall installed in 2000, and to assess groundwater contamination outside the barrier wall.

Aquifer tests were conducted to determine whether contamination in the shallow groundwater (from the lower alluvium described in Section 5.1.1) has impacted groundwater in the underlying siltstone. Fortunately, shallow groundwater moves downward into the siltstone very slowly, on the order of 1 foot every 250 years. As a result almost no contamination has been detected in deep groundwater collected from the siltstone, and the siltstone is considered a competent barrier to downward migration of groundwater. All descriptions of groundwater contamination refer to the shallow groundwater (i.e., in groundwater in the alluvial zone).

Groundwater flow through the alluvial water-bearing zone beneath the West Facility is generally north to south/southeast toward the South Yamhill River. The barrier wall obstructs the flow beneath the Treatment Plant Area, creating a groundwater stagnation zone immediately downgradient of the wall. Groundwater flow is relatively low north of the facility and increases toward the river. Velocities range from about 20 feet per year north of the barrier wall to about 75 feet per year just before the river bank south of the facility.

Studies in and around the barrier wall indicate that the soil-bentonite slurry wall is effectively containing DNAPL and groundwater contaminants. DNAPL does not occur outside the barrier wall. As long as the barrier wall, groundwater extraction wells, and cap are functioning as designed, potential sources of contamination to groundwater (DNAPL and contaminated groundwater inside the barrier wall) are physically and hydraulically contained.

Groundwater data collected from outside the barrier wall between 1999 and 2005 show that:

1. Arsenic occurs naturally in groundwater, and concentrations in groundwater samples do not appear to be site-related.
2. Dioxins have been observed in groundwater outside the barrier wall at very low levels. Dioxins may be associated with residual contamination in wells close to the barrier wall (MW-15S and PZ-101), but in other wells the concentrations appear to be within the background or "noise" range. Because of their low solubility and high affinity to particulates, and site conditions, dioxins are essentially immobile in groundwater.
3. Installation of the barrier wall effectively cut off the DNAPL and PCP-contaminated groundwater plume. However, some dissolved PCP still exists outside the barrier wall, with the highest concentrations occurring immediately downgradient from the wall and decreasing rapidly with distance from the wall.

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

5.5.5 Overview of Surface Water and Sediment

Sediment samples were collected in 1999 and 2002 from Rock Creek and the South Yamhill River, upstream and downstream of the facility. Samples from the South Yamhill River show no significant impacts from the site; concentrations downstream are not higher than upstream. In 1999, arsenic levels that exceed background concentrations were detected in two sediment samples collected from Rock Creek. However, the 2002 data did not show elevated arsenic concentrations in Rock Creek. The reduction in site-related contaminant concentrations is consistent with recent improvements in site operations.

Twelve surface water samples were collected from Rock Creek and the South Yamhill River in 1999. No site-related contaminants exceeded the SVs in any of the samples. However, exceedances of barium (in all samples), DDT (one sample upstream of site), and mercury (three samples) were observed. The river and creek appear to be unaffected by site-related activities. Assuming that installation of the stormwater treatment and collection system has minimized impacts to surface water relative to pre-2000 conditions, additional data were not collected.

5.5.6 Overview of Air Sampling

Air samples were collected in 1999 from onsite, off-property (near the facility), and from one background location. Chromium concentrations exceeded the Ambient Air PRG in all samples, including background. Arsenic, PCP, and several PAHs were detected at concentrations above the PRG and background in at least one location.

The exceedances observed in 1999 are believed to represent a "worst case scenario" for the air in the vicinity of former TLT operations, and are no longer relevant. Since that time, large portions of the Treatment Plant and Treated Pole Storage areas have been paved, and the current wood-treating operations no longer use chemicals that contain arsenic or PCP. Thus, these data were not used in the risk assessment.

6.0 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

6.1 LAND USES

6.1.1 Current Land Use

The former TLT land holdings were approximately 234 acres. Of these land holdings, TLT used an approximately 40-acre area known as the West Facility for wood-treating operations, and an approximately 40-acre area known as the East Facility for sawmill and wood planing operations. The remainder of the TLT land holdings were used for agriculture.

PWPO now owns the West Facility property and currently operates the wood treatment facility. Dee Industrial (Dee) acquired the remainder of the former TLT property and has demolished most of the old sawmill buildings and equipment east of Rock Creek Road and north of the railroad tracks to prepare the area for Dee's industrial use. Squire Investments, Inc. purchased the portion of the East Facility south of the railroad tracks from Dee. Using the former end-painting building for equipment and construction, and the paved area east of the building for storage, cedar gazebos and patio furniture are built at this property.

Several residences are located east of the Treatment Plant, along Rock Creek Road and along Highway 18B. One of the residences on Rock Creek Road, just north of Highway 18B, runs a small sawmill operation. In addition, there is a single family home just beyond the western site boundary, south of the Soil Storage Cell Area.

No hospitals or retirement facilities are present within 0.5-mile of the site; however, Head Start recently built a children's daycare facility across Highway 18B, about 400 feet east of Rock Creek Road.

6.1.2 Zoning

The West and East Facilities of the former TLT are within the City of Sheridan's Urban Growth Boundary. The East Facility and a small portion of the West Facility are located within the limits of the City of Sheridan and are zoned light industrial. All other nearby property that is within city limits and is east of Rock Creek Road and north of

Highway 18B is also zoned light industrial. The nearby property that is within city limits and is south of the former TLT facility (i.e., south of Highway 18B) is zoned mixed residential and commercial, and the property that is north of the facility along Rock Creek Road is zoned for urban transitional, light industrial, and public facilities.

The portion of the West Facility property that is not within the city limits is within the unincorporated area of Yamhill County and is classified and zoned as a heavy industrial district.

6.1.3 Future Land Use

It is anticipated that the west and east facilities will continue to be used for industry, while the surrounding area will remain a mix of agriculture, residential, and light industry.

6.2 GROUNDWATER AND SURFACE WATER USES

6.2.1 Groundwater

A groundwater beneficial use survey was conducted for this project in 1988 and updated in 1996. The two wells located in the vicinity of the TLT site (within 500 feet of the West Facility) are both residential wells. Well RW-01 is located west and cross-gradient from the site at 31100 SW Valley Highway, and is presently used for domestic purposes. The well is apparently a hand-dug well (no boring logs are available) that is 30 feet deep, which puts the well in the siltstone (deep) aquifer. Well RW-02 is located downgradient of the site at 1523 West Main Street. The residence at this address is on City of Sheridan water, and the well was at one time used for outdoor watering.

These two residential wells have been sampled several times since 2002. Results showed occasional arsenic levels that slightly exceed the Residential PRG but are similar to arsenic concentrations measured upgradient of the site. The highest arsenic concentration observed was 30 times less than EPA's MCL for drinking water. Low level dioxin was detected in one sample from the Valley Highway well. At 8.4×10^{-10} milligrams per liter (mg/L), this concentration is 35 times lower than the federal MCL of 3×10^{-8} mg/L for dioxin. Dioxin was not detected in the West Main Street well. Few other constituents (metals or SVOCs) were detected and none exceeded Residential PRGs.

There are currently no direct users of shallow (alluvial) or deep (siltstone) groundwater downgradient of the site. However, surface water recharge (flow to the South Yamhill River and Rock Creek) from groundwater is an important beneficial use.

Possible future beneficial uses for the shallow groundwater downgradient from the site include domestic, agricultural, irrigation and industrial applications. Groundwater from the siltstone is generally of poor quality. Chloride concentrations up to 4,200 mg/L have been detected in deep onsite wells (MFA 1997), making it unsuitable for most domestic and industrial uses.

6.2.2 Surface Water

The South Yamhill River flows generally to the east past the TLT site and the City of Sheridan, joining the North Yamhill River approximately 40 river miles northeast of the TLT site, and becoming the Yamhill River near McMinnville. During dry summer months, the

City of Sheridan uses river water to supplement the primary source of spring water from Stoney Mountain. The City's water intake is located approximately 2.5 miles downstream from the TLT site.

The South Yamhill River is a migratory corridor for several anadromous fish species, the most common being Coho salmon and steelhead. The South Yamhill River sub-basin is used extensively for recreation, including fishing, hunting, boating, water recreation, and wildlife viewing.

7.0 SUMMARY OF SITE RISKS

This section summarizes the results of the human health and ecological risk assessment for TLT. The *Baseline Risk Assessment* (BLRA) (CH2M HILL 2004) estimates the potential risk posed by the TLT site under the assumption of no remedial action for current and reasonably expected future conditions. The BLRA was conducted in accordance with applicable EPA and DEQ guidance documents.

7.1 HUMAN HEALTH RISK ASSESSMENT

In conducting a human health risk assessment, EPA evaluates the potential for noncancer health effects such as immunological, reproductive, developmental, or nervous system disorders, and the potential for increased cancer risk. Different methods are used to estimate noncancer health effects and cancer risks. Human health risk was estimated using the following process:

- Step 1: Chemicals of potential concern (COPCs) were identified separately for surface soil, subsurface soil, groundwater, surface water, and surface sediment.
- Step 2: Exposure pathways for characterizing human health risk were determined for each media, and exposures to each COPC in that media were quantified.
- Step 3: Toxicity factors (cancer slope factors and reference doses [RfDs]) were compiled describing the relationship between the magnitude of exposure and the occurrence of adverse health effects.
- Step 4: A quantitative risk characterization, which integrated information from the exposure and toxicity assessments, was performed to characterize the risk to human health from potential exposure to chemicals in environmental media. Additionally, an uncertainty analysis was performed summarizing the basic assumptions and uncertainties in the risk assessment.

The potential for unacceptable human health risk was identified using the following guidance and regulations:

- Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions. OSWER Directive 9355.0-30 (EPA 1991a)
- Approach for Addressing Dioxin in Soil and CERCLA and RCRA Sites. OSWER Directive 9200.4-26 (EPA 1998a)
- OAR 340-122-0115(1)

- ORS 465.315 (1)(b) A and B

The risk assessment is based on analytical data presented in the RI Report and summarized in Section 5.5 of this report. With one exception, data were collected in 1999 and 2002 for each exposure area; however, only 1999 data are available for surface water. The data were partitioned into the following exposure areas:

- **Onsite soil** (surface and subsurface)
  - West Facility
    - Treated Pole Storage and Treatment Plant Area
    - White Pole Storage Area
    - Truck Shop Area
    - Contaminated Soil Storage Cells
  - East Facility
- **Off-property soil** (surface only)
  - Off-property Residential Area
  - Off-property Ditch Area
- **Onsite groundwater**
  - Inside Barrier Wall
  - Outside Barrier Wall
- **Off-property groundwater**
- **Surface water and sediment**
  - Rock Creek
  - South Yamhill River

See Figure 2 for general locations of these areas.

7.1.1 Identification of Chemicals of Concern

COPCs are those chemicals that should be carried through the risk quantification process. The BLRA summarizes chemicals detected in environmental media at the TLT site and identifies the 126 COPCs that are accessible for human exposure. During the course of the risk assessment, the COPCs were evaluated to identify and prioritize those chemicals that are estimated to pose an unacceptable risk and that should be addressed in the feasibility study (FS).

Both EPA and DEQ guidance were used to determine the point of departure for risk, i.e., defining chemicals of concern (COCs) from the list of COPCs. EPA's Superfund guidance (OSWER Directive 9355.0-30) states that "Where cumulative carcinogenic site risk to an individual… is less than 10^{-4}, and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts." DEQ guidance defines carcinogenic site risk as greater than 10^{-6} for a single chemical and greater than 10^{-5} for multiple chemicals. Noncarcinogenic risk is defined as a hazard quotient (HQ) greater than 1.0.

Chemicals determined to pose an unacceptable risk are identified as the COCs and are referred to as "risk drivers." Exposure point concentrations (EPCs), chemical concentrations specific to an exposure medium that a receptor may contact, were calculated for each COC. Tables 2 and 3 summarize the COCs and EPCs for specific media within the TLT site.

7.1.2 Exposure Assessment

Table 4 summarizes potential human health exposure routes identified in the CSM for the TLT site, which is discussed in detail in Section 3 of the BLRA. The exposure pathways were determined for each media on the basis of the current understanding of land use at and near the site.

Detailed explanations of individual exposure scenarios, including exposure frequency, duration, and other factors can be found in Section 4 (Table 4-1) of the BLRA, and are summarized briefly below. As described in the footnotes to Tables 4-1 and 4-2 of the BLRA, most of the exposure assumptions used for the BLRA were those recommended as standard default exposure values in EPA guidance. For some exposure parameters, such guidance was not available; therefore, the values for these exposure parameters were based on best professional judgment considering current and future uses of the site.

VOCs present a very low risk at this site. Although there are VOCs present in soil (subsurface and surface soil) and groundwater at some of the areas of concern, the concentrations are well below (more than an order of magnitude) occupational vapor intrusion risk-based concentrations provided in Oregon DEQ's *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (updated July 2005) (DEQ 2003).

Onsite Worker Scenario

Under current and reasonably anticipated future site conditions, onsite workers could be exposed to surface soils (0-2 feet bgs), and onsite trench workers could be exposed to subsurface soils (0-15 feet bgs). Potential routes of exposure include incidental soil ingestion, dermal contact with soil, and inhalation of ambient vapors or dust generated from wind or from maintenance activities.

Off-property Residential Scenario

Under current and reasonably anticipated future site conditions, off-property residents could be exposed to surface soils from residential yards and groundwater from domestic wells. Potential routes of exposure to surface soil include incidental soil ingestion, dermal contact with soil, and inhalation of ambient vapors or dust generated from wind or from yard maintenance activities. Potential routes of exposure to groundwater include ingestion, dermal contact, and inhalation of volatile compounds during showering or other household activities.

Hypothetical Onsite Residential Scenario

Onsite groundwater is currently not used as drinking water; however, groundwater beneath the site is potentially interconnected with off-property potable sources. To provide additional information for decision-making purposes, a hypothetical residential scenario was used to evaluate onsite groundwater, inside and outside the barrier wall. Potential routes of exposure for a hypothetical onsite resident to groundwater are the same as those listed for off-property residential, above.

Off-property Recreational and Tribal User Scenario

Under current and reasonably anticipated future site conditions, recreational and tribal users could be exposed to surface soil in off-property ditches, or surface sediment in the South Yamhill River or Rock Creek, through incidental ingestion, dermal contact, and inhalation of dust or vapors in ambient air. Recreational and tribal users could be exposed to surface water from the South Yamhill River or Rock Creek through incidental ingestion and dermal contact. Recreational and tribal users could also be exposed to site contaminants from consumption of edible fish from the South Yamhill River or Rock Creek.

7.1.3 Toxicity Assessment

The toxicity assessment evaluates the relationship between the magnitude of exposure to a chemical at the TLT site and the likelihood of adverse health effects to potentially exposed populations. This assessment provides, where possible, a numerical estimate of the increased likelihood of adverse effects associated with chemical exposure (EPA 1989). The toxicity assessment contains two steps: hazard characterization, and dose-response evaluation.

Hazard characterization identifies the types of toxic effects a chemical can exert. For the toxicity assessment, chemicals are assumed to potentially cause either cancer or noncancer effects. Health risks are calculated differently for carcinogenic and non-carcinogenic effects, and separate toxicity values have been developed accordingly.

Dose-response evaluation examines the level of toxic effect associated with a specific amount of a chemical. The magnitude of toxicity of a chemical depends on the dose to a receptor. Dose refers to exposure to a chemical concentration over a specified period of time. Human exposures are generally classified as acute (typically less than 2 weeks), subchronic (about 2 weeks to 7 years), or chronic (7 years to a lifetime). This HHRA specifically addresses chronic exposure.

The primary source of toxicity values (cancer slope factors and noncancer reference doses) is the EPA's Integrated Risk Information System (IRIS) database. If a toxicity value was not available from IRIS, then the latest available values from the EPA's Health Effects Assessment Summary Tables (HEAST) were used. When toxicity values were not available from either IRIS or HEAST, toxicity values were obtained from the EPA Region IX PRG toxicity factor tables.

Tables 5 and 6 summarize carcinogenic and non-carcinogenic toxicity data, respectively, for COCs.

7.1.4 Risk Characterization

Results of the exposure assessment (estimated chemical intakes) are combined with the results of the dose-response assessment (toxicity values established in the toxicity assessment) to provide numerical estimates of potential health effects. The quantification approach differs for potential cancer effects, and noncancer effects, as described below.

Carcinogens

The potential for cancer effects is evaluated by estimating the excess lifetime cancer risk (ELCR). This risk is the incremental increase in the probability of developing cancer during one's lifetime in addition to the background probability of developing cancer. Cancer slope factors developed by the EPA are considered to be a plausible upper bound estimate of the cancer potency of a chemical. By using these upper bound estimates for the cancer slope factors, there is reasonable confidence that the actual cancer risk will not exceed the estimated risks and may actually be lower [3] (EPA 1989). For the TLT site, ELCRs were estimated using the following equation when risks were less than 1 x 10^{-2}:

$$Risk = CDI \times SF$$

When risks were greater than 1 x 10^{-2}, ELCRs were estimated using:

$$Risk = 1 - \exp^{(-CDI \times SF)}$$

where: Risk = Excess lifetime cancer risk (unitless probability)
CDI = Chronic daily intake averaged over a lifetime (mg/kg-day)
SF = Cancer slope factor (mg/kg-day)-1

When multiple chemicals are present, cancer risks are treated as additive within an exposure route in this assessment. This is consistent with the EPA guidelines on chemical mixtures (EPA 1986). For estimating the cancer risks from exposure to multiple carcinogens from a single exposure route, the following equation is used:

$$Risk_T = \sum_1^N Risk_i$$

where: $Risk_T$ = Total cancer risk from route of exposure
$Risk_i$ = Cancer risk for the ith chemical
N = Number of chemicals

These risks are probabilities that are usually expressed in scientific notation (for example, 1×10^{-6}). An ELCR of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposures is 10^{-4} to 10^{-6}. DEQ's acceptable risk level is 1 x 10^{-6}.

Noncarcinogens

For noncancer effects, the likelihood that a receptor will develop an adverse effect is estimated by comparing the predicted level of exposure for a particular chemical with the highest level of exposure that is considered protective (i.e., its RfD). The ratio of the chronic daily intake (CDI) divided by RfD is termed the hazard quotient (HQ):

[3] It is important to note that EPA is currently undergoing a reevaluation of the methodology for assessing risks from exposure to dioxins/furans.

$$HQ = CDI / RfD$$

When the HQ for a chemical exceeds 1 (i.e., exposure exceeds RfD), there is a concern for potential noncancer health effects. A hazard index (HI) was used to assess the potential for noncancer effects posed by exposure to multiple chemicals (EPA 1989). This approach assumes that the noncancer, multiple-chemical hazard is additive. The HI may exceed 1 even if all the individual HQs are less than 1.

The HI is calculated as follows:

$$HI = \sum_1^N E_i / RfD_i$$

where: HI = hazard index
E_i = daily intake of the ith chemical (mg/kg-day)
RfD_i = reference dose of the ith chemical (mg/kg-day)
N = number of chemicals

7.1.5 Soil, Sediment and Surface Water Risk Estimates by Exposure Scenario

Risk estimates for the COCs in each exposure scenario are provided as total risks across all exposure routes (Tables 7 and 8). The data sheets used to calculate risk can be found in Appendix B of the BLRA.

Onsite Worker Scenario

Total ELCR based on current conditions at the West Facility exceeded 1×10^{-3} for onsite workers and 1×10^{-5} for trench workers. Most of the risk is associated with contaminated surface soil in the Treatment Plant and Treated Pole Storage areas. Future risk in the Treatment Plant and Treated Pole Storage areas assumes that all existing pavement and soil cover are removed. This risk also exceeds 1×10^{-3} for onsite workers and, because of the subsurface contamination beneath the paved areas, exceeds 1×10^{-4} for trench workers.

Risk associated with surface soil in the White Pole Storage Area is 10^{-4}, in the Soil Storage Cells is 6.5×10^{-5}, and in the East Facility is 8×10^{-5}. Risk associated with subsurface soil in the White Pole Storage Area is 6.8×10^{-6}. The primary risk drivers in these soils are total dioxin and arsenic. Risk from the Truck Shop area is 2.8×10^{-5} for surface soil and is 10^{-6} for subsurface soil. The risk from surface soil in the Truck Shop area is attributable to elevated arsenic in the ditch along the southern boundary of this area. The potential noncancer HIs for current and future conditions onsite are all less than 1.0.

The combined risk from contaminants associated with subsurface soil in the East Facility is 10^{-6}, and the risk from individual contaminants ranges between 10^{-8} and 10^{-6}. Thus, there is no unacceptable risk associated with subsurface soil in the East Facility.

Off-property Residential Scenario

ELCR associated with surface soil at 17 residences range from 1.1×10^{-5} to 1.9×10^{-4}. The only residence where cancer risk exceeds 1.0×10^{-4} was at RES-03, located directly across the street from the West Facility. Both arsenic and dioxin contributed to risk; however, arsenic concentrations at each residence were within the range of background levels. The potential HI for noncancer effects ranged from less than 1.0 to 1.58, with arsenic as the greatest contributor to noncancer risk.

In November 2004, EPA conducted an early action at the residence located at 22150 SW Rock Creek Road (RES-03). Six inches of surface soil was excavated from the front and side yards and replaced with clean topsoil. This action removed any unacceptable risk associated with residential soil in the northern portion of this property. During the review of the FS, it was determined that an adjoining section of the same property had not been characterized and this was identified as a data gap. In April 2005, samples were collected from this area (south of the residence) and analyzed for metals and dioxins. Dioxins were detected at very low concentrations, similar to concentrations found in the other residential properties where early actions were not performed, and arsenic concentrations were well within background range. EPA determined that action in this area was not necessary.

Off-property Recreational and Tribal User Scenario

The potential total ELCR estimate for the off-property ditches is 1.7×10^{-4} for the recreational user scenario. The primary contributors to risk are total dioxin and arsenic. The potential HI for noncancer is less than 1.0. Risk estimates are based on the ditch sample with the highest contaminant concentrations. Generally the highest concentrations were observed in the ditches adjacent to the former TLT facility. Risk associated with the ditches east of Rock Creek Road is much lower.

Recreational and tribal user ELCR estimates for sediment in the South Yamhill River and Rock Creek were 4.5×10^{-6} and 3.1×10^{-5}, respectively (Table 8). The primary contributor to cancer risk is arsenic; however, levels are generally attributed to background, and concentrations upstream of the site are similar to downstream. The potential noncancer HIs for the South Yamhill River and Rock Creek were 0.5 and 1.1, respectively, and again, the primary contributor to noncancer risk is arsenic.

The ELCR estimate for the South Yamhill River surface water was 1.9×10^{-7}. No carcinogenic constituents were detected in Rock Creek. The potential noncancer HIs for the South Yamhill River and Rock Creek were less than the noncancer threshold value of 1.0.

Surface water concentrations were compared to AWQC for human health protection. Although no exceedances were observed in Rock Creek, dioxin/furans and 4,4'-DDT were detected above their respective AWQC values in the South Yamhill River. DDT is not considered site-related and was observed about 0.5-mile upstream from the TLT site. A single dioxin congener was detected approximately 1.5 miles downstream.

7.1.6 Groundwater Risk Estimates by Exposure Scenario

Hypothetical Onsite Residential Scenario

Inside Barrier Wall. Ten monitoring wells were evaluated to determine potential risk to hypothetical future residents from exposure to groundwater inside the barrier wall. ELCR estimates for these wells ranged from 1.5×10^{-5} to 1.6×10^{-2}. The primary contributors to potential cancer risk are total dioxins, arsenic, PCP and PAHs. The potential HI for noncancer effects ranged from 0.52 to 118 in these wells. The primary contributors to noncancer risk include manganese, PCP, several PAHs, and several VOCs.

Outside Barrier Wall. Eighteen monitoring wells were evaluated to determine potential risk to hypothetical future residents from exposure to groundwater onsite but outside the barrier wall. ELCR estimates for these wells ranged from 1.6×10^{-5} to 5.5×10^{-4}, with the highest risk associated with one well located just south of the barrier wall. The primary contributor to potential cancer risk in this well is PCP. In many of the other onsite wells outside the barrier wall, the primary risk contributor is arsenic, and total dioxin also appears to contribute significant risk.

The potential HI for noncancer effects ranged from 0.65 to 4.7 in these wells. The primary contributor to noncancer risk is manganese.

Off-property Residential Scenario

Eight monitoring wells were evaluated to determine potential future risk to off-property residents from exposure to groundwater. Four of these wells are actually located along the most southern boundary of the West Facility, and groundwater from these wells is considered representative of groundwater that may migrate off-property. Two of these are residential wells (RW-01 and RW-02), and two wells are located across the highway from the West Facility, close to the river. ELCR estimates for these wells ranged from 7.8×10^{-6} to 1.7×10^{-4} with the highest risk associated with the wells on the West Facility property. The primary contributors to potential cancer risk are total dioxins, arsenic, PAHs, and PCP.

The potential HI for noncancer effects ranged from 0.3 to 2.1 in these wells. The primary contributor to noncancer risk is manganese.

COCs in Groundwater Outside the Barrier Wall

Of the COCs detected in groundwater outside the barrier wall, both onsite and off-property of the former TLT property, PCP is believed to be the primary risk driver. While arsenic and manganese contribute a large part of the cancer and noncancer risk, respectively, concentrations are similar upgradient and downgradient of the Treatment Plant Area, and are generally within background range. Because of their extremely low solubilities in water, neither dioxin nor PAHs tend to migrate in groundwater. Concentrations observed in groundwater samples are very low, sporadic, and non-reproducible.

In contrast, PCP is somewhat soluble and can migrate in groundwater. Concentrations are reproducible and show a clear pattern of elevated concentrations immediately south of the barrier wall, decreasing sharply toward the river.

7.1.7 Cumulative Risk Estimates by Exposure Scenario

The recreational and tribal user could be exposed to soil in off-property ditches, as well as sediment and surface water from the South Yamhill River and Rock Creek. The total potential cancer risk for the recreational and tribal user from all exposure media is 3.6×10^{-4} (Table 9). The majority of risk is associated with off-property ditches. There is no unacceptable noncancer risk to the recreational and tribal user.

7.1.8 Risk Characterization Uncertainties

Several sources of uncertainty affect the overall estimates of potential cancer and noncancer risk. The sources are generally associated with sampling and analysis, exposure assumptions, toxicity values and risk characterization.

Uncertainty Associated with Sampling and Analysis

Sampling and analysis uncertainties include the inherent variability in the analysis, representativeness of the samples, sampling errors, and heterogeneity of the sample matrix. The quality assurance/quality control (QA/QC) program was incorporated into the sampling plans to reduce sample errors.

Uncertainty Associated with Exposure Assessment

For many contaminants detected in various media, maximum concentrations observed were used instead of 95 percent upper confidence limit (UCL) as EPCs, resulting in an overestimate of risk for that chemical in a given medium. Soil EPCs were assumed to remain stable over time, not accounting for likely fate and transport processes, and may overestimate future exposure scenario risk.

Estimation of exposure requires many assumptions that tend to simplify and approximate actual site conditions and are intended to be a conservative estimate of the true risk or hazard. EPA default exposure assumptions were used to estimate onsite exposure scenarios. Variations in specific worker location resulting in less than 250 days per year over 25 years would, likely, overestimate risk. Similarly, it is unlikely that onsite groundwater would be used for drinking water purposes; therefore, the onsite residential scenario overestimates site risk.

Risk estimates for carcinogenic PAHs detected in soil were evaluated for incidental ingestion and inhalation. Dermal exposure was not evaluated for PAHs because toxicity values are not available for this route of exposure. Some PAHs are known to be toxic via dermal exposure; therefore, the use of dose-response data from oral exposures only could underestimate risk.

Uncertainty Associated with Toxicity Assessment

The toxicological database is also a source of uncertainty and potential sources are outlined in the Risk Assessment Guidance for Superfund (RAGS; EPA 1989). Uncertainties may result from high to low dose and/or animal to human extrapolation; the species, gender, age, and strain differences in a toxin's uptake, metabolism, organ distribution, and target site susceptibility; and human population variability with respect to diet, environment, activity patterns, and cultural factors.

Uncertainty Associated with Risk Characterization

The risk characterization assumed additive risk for both cancer and noncancer effects for exposure to each individual contaminant. This approach, in accordance with EPA guidance, did not account for the possibility that constituents act synergistically or antagonistically.

7.1.9 Summary of Results from the Human Health Risk Assessment

Risks from site-related activities are summarized briefly below.

Onsite Soil

The primary contributors to cancer risk from surface soil and subsurface soil are total dioxin and arsenic. Current risk to onsite workers exceeds $1x10^{-03}$. Most of the risk is associated with contaminated surface soil in the Treatment Plant and Treated Pole Storage areas. The potential noncancer HIs for current and future conditions in the West Facility are all less than 1.0.

Off-property Soil

In November 2004, EPA conducted an early-action excavation and replaced contaminated soil with clean topsoil at the one residence associated with unacceptable risk for soil exposure, effectively eliminating the risk associated with residential soil exposure in this northern yard of the property.

The primary contributors to cancer risk from exposure to ditch soil are dioxin/furans and arsenic. ELCR risk to recreational and tribal users exceeds $1x10^{-04}$, based on the highest concentrations observed in ditches adjacent to the West Facility. The potential noncancer HI is less than 1.0.

Surface Water and Sediment

No unacceptable cancer risk from exposure to surface water and sediment from the South Yamhill River and Rock Creek is attributable to TLT-related activities. Although ELCR risk exceeds $1x10^{-06}$ for recreational and tribal users, background arsenic is the primary risk driver in sediments from both Rock Creek and the South Yamhill River. ELCR risk from exposure to surface water is less than $1X10^{-06}$. The potential noncancer HIs for sediment are 0.5 and 1.1 (again, arsenic is the noncancer risk driver) for the South Yamhill River and Rock Creek, respectively, and all surface water HIs less than 1.0.

The total potential cumulative cancer risk for the recreational and tribal user exposure from all exposure media (soil, sediment, and surface water) is 3.6×10^{-4}. The majority of risk is from exposure to off-property ditches. There is no unacceptable noncancer risk to the recreational and tribal user.

Groundwater

The primary contributors to potential cancer risk from exposure to groundwater inside the barrier wall are total dioxins, arsenic, PCP, and PAHs. ELCR risk to hypothetical future groundwater users exceeds 1X10-2. The potential HI for noncancer effects ranged from 0.52 to 118.

The primary contributor to potential cancer risk from exposure to onsite groundwater outside the barrier wall is PCP. ELCR risk to hypothetical future groundwater users ranges from 1.6 x 10-5 to 5.5 x 10-4 across all wells in this exposure area. The potential HI for noncancer effects ranged from 0.65 to 4.7.

The primary contributor to potential cancer risk from exposure to groundwater considered off-property is PCP. ELCR risk to hypothetical future groundwater users ranges from 7.8 x 10-6 to 7.1 x 10-5 in all downgradient wells, off-property. The potential HI for noncancer effects ranged from 0.3 to 5.1, because of manganese.

7.2 ECOLOGICAL RISK ASSESSMENT

This section provides the methodology and results of the ERA for the former TLT site. The objective of the ERA was to estimate the potential for adverse impacts to ecological receptors from exposure to contaminants related to TLT.

The baseline ERA was conducted in accordance with applicable EPA and DEQ guidance documents for conducting ERAs. The procedures used were consistent with those described in the following guidance documents:

- *Guidelines for Ecological Risk Assessment* (EPA 1998b)
- Oregon Department of Environmental Quality *Guidance for Ecological Risk Assessment* (DEQ 1998, 2000a, b, and 2001)
  Framework for Ecological Risk Assessment (EPA 1992)
- *Wildlife Exposure Factors Handbook* (EPA 1993)
- *EPA Region 10 Supplemental Ecological Risk Assessment Guidance for Superfund* (EPA 1997a)
- *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA 1997b)
- ECO Updates, Volumes 1 through 3 (EPA 1991b-1996).

7.2.1 Identification of Chemicals of Concern

At the TLT site, the potential site-related stressors of concern consist of chemicals released to surface soil, groundwater, surface water, sediment, and air from the former wood treating facility. The BLRA identifies samples used for the ERA collected from locations where ecological receptors could be exposed, and are provided on the habitat map in the BLRA. These samples represent conditions at onsite and off-property areas where sufficient ecological habitat occurs to support at least some wildlife. On the basis of site history and onsite occurrence, the primary types of chemical stressors identified for the TLT site include metals (for example, arsenic, copper, zinc), dioxins and furans, PAHs, and PCP.

7.2.2 Ecological Exposure Assessment

This section describes the ecological setting on and near the site, key species potentially exposed to contaminants of potential environmental concern (COPECs), selection of endpoint species, and measures of exposure.

Ecological Setting

Most of the site located west of Rock Creek Road is covered with gravel, asphalt, and/or structures. Current and past land use practices make this area unsuitable for most plants and wildlife because less than 5 percent of the site supports vegetation. The portion of the site east of Rock Creek Road contains comparatively less pavement and more vegetation than the West Facility.

Onsite trenches and roadside ditches that receive surface water runoff from the site are highly disturbed but support some plant and wildlife species that are tolerant of anthropogenic disturbance. The ditches are dry in the summer and do not support fish populations.

The South Yamhill River and Rock Creek, and associated riparian habitat, are ecologically important areas and provide higher-quality habitat to support wildlife populations. The South Yamhill River generally flows to the east past the TLT site and the City of Sheridan. Substrate near the TLT site consists primarily of bedrock, silts, and little cobble, and is not adequate salmonid spawning habitat. Substrate in Rock Creek consists primarily of clay and silts. Although vegetative canopy at Rock Creek is prevalent, water flow in the creek is ephemeral, and extremely low summer flows can result in elevated water temperatures.

Wildlife Characterization

Birds found in the area of the TLT site include American robins, northern harriers, valley quail, killdeer, red-tailed hawks, osprey, and several species of wrens, swallows, and sparrows. Common mammals that could use habitats in and around the site include the black-tailed deer, common opossum, red fox, raccoon, skunk, mink, and several species of mice, voles, and shrews.

The South Yamhill River supports a variety of fish and invertebrate species including steelhead, bass, bluegill, shiners, sucker, Pacific Lamprey *(Lampetra tridentata)*, and sculpin. Both the South Yamhill River and Rock Creek provide sufficient habitat to support aquatic invertebrates.

Data on rare, threatened, or endangered species in the vicinity of TLT were obtained from the Oregon Natural Heritage Information Center (ORNHIC). Seven such species were reported as possibly occurring within a 2-mile radius of the site:

- Winter-run steelhead (*Onchorynchus mykiss*) – federal threatened; state sensitive-critical
- Willamette Valley daisy (*Erigeron decumbens var. decumbens*) – federal and state endangered
- Nelson's sidalcea (*Sidalcea nelsoniana*) – federal and state threatened
- Thin-leaved peavine (*Lathyrus holochlorus*) – federal species of concern
- Willamette Valley larkspur (*Delphinium oreganum*) – state species of concern
- Lark (*Eremophila alpestris strigata*) – federal endangered candidate; state sensitive-critical
- Yuma bat (*Myotis yumanensis*) - federal species of concern.

Selection of Ecological Assessment Endpoints

It is not always possible to obtain data on site-specific species. Surrogate species representative of their indigenous ecological functional groups at the site are selected for evaluation of exposure and risk. Selection of surrogate species is based on the following criteria (EPA 1998b):

- Ecological relevance to ecosystems in Western Oregon
- Susceptibility to chemicals occurring at the site
- Relevance to policy goals
- Societal value.

Figure 6 summarizes ecological exposure pathways of concern and assessment endpoints for the primary exposure points.

The key functional groups that use the diverse habitat types occurring in the locality of the site include herbivorous, carnivorous, and omnivorous mammals and birds. Species selected for assessment endpoints specific to occurrence, behavior, data availability and overall representation for the TLT site include American robin (*Turdus migratorius*), red-tailed hawk (*Buteo jamaicensis*), deer mouse (*Peromyscus maniculatus*), red fox (*Vulpes vulpes)*, and black-tailed deer (*Odocoileus hemionus*).

Toxicity data are unavailable for most plant species; therefore, any plant with available chemical toxicity data was selected as an endpoint species.

Specific toxicity data are unavailable for most invertebrate species; therefore, any terrestrial invertebrate with available chemical toxicity information was selected as the endpoint species for that specific chemical.

For Rock Creek and the South Yamhill River, freshwater fish and invertebrate species represent endpoint species as a group. Toxicity is based on screening values from the federal freshwater *National Recommended Water Quality Criteria: 2002* (EPA 2002b) AWQC.

Measures of Exposure to Ecological Receptors

Mammalian and Avian Wildlife **-** According to the conceptual exposure model, mammalian and avian receptors may be exposed to site COPECs by direct ingestion of surface soil and surface water, and food-chain transfer of chemicals via ingestion of food items (i.e., invertebrates and plants). Quantitative exposure estimates for mammals and birds are developed using food-web modeling procedures consistent with EPA guidance (EPA 1993). EPCs are calculated to establish a conservative estimate of potential COPEC intake. Surface soil, surface water, and sediment EPCs used for ecological risk analysis are provided in Section 2 of the BLRA.

The species-specific exposure parameters used for this ERA include body weight, food intake rate, diet composition, water intake rate, percent of diet as soil, area use factor, bioaccumulation in food items, home range, and migration patterns. Biological information was unavailable for some parameters and is approximated using allometric equations for exposure parameters (EPA 1993; Sample et al. 1997) such as food and water ingestion rate.

Terrestrial Vegetation and Invertebrates **-** For surface soil in upland habitats in the locality of the TLT site, terrestrial vegetation and invertebrates are assumed to be potential receptors for site-related COPECs. For these endpoint species, site media concentrations were directly compared with levels believed to be protective of populations of representative species.

Aquatic Organisms **-** For surface water and sediments in Rock Creek and the South Yamhill River, aquatic and benthic organisms are assumed to be potential receptors for site-related COPECs. For these endpoint species, site media concentrations were directly compared with levels believed to be nontoxic to relevant species.

7.2.3 Ecological Effects Assessment

The ecological effects assessment identifies the toxicological properties associated with the chemical stressors at the TLT site. It determines the type of effect that could result to the ecosystem if exposure is excessive, and identifies which benchmarks provide a measure of the potential for ecological effects.

Mammalian and Avian Wildlife

The toxicity of chemicals to mammalian and avian wildlife as a result of potential exposure to contaminated media at the TLT site is identified by using literature-derived critical toxicity values that represent the highest exposure level considered to be without adverse ecological impact. This exposure level is called the toxicity reference value (TRV).

For mammalian and avian receptors, the primary toxicological endpoint used for development of the TRV is the chronic no observed adverse effect level (NOAEL). This addresses population-type endpoints such as reproduction and survival. The lowest observed adverse effect levels (LOAELs) provide a perspective on the uncertainty associated with NOAEL-based HQs. NOAELs are used to protect threatened and endangered species, whereas levels somewhere between the NOAEL and LOAEL are often used to identify conditions protective of wildlife populations that are not of special status.

In accordance with Region 10 EPA guidelines (EPA 1997a), uncertainty factors were applied to the literature-derived toxic level to account for any differences in the reported effect level and exposure duration. An additional uncertainty factor is applied to account for interspecies variation.

Final TRVs derived for each COPEC are provided in Table 5-9 of the BLRA.

Sources used for ecological toxicity information for endpoint species include the following:

- DOE's Oak Ridge National Laboratory Toxicological Benchmark Technical Reports
- EPA's Terrestrial Toxicity Database (TERRETOX)
- U.S. Fish and Wildlife Service Contaminant Hazard Reviews
- Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles
- Other available primary literature.

Terrestrial Invertebrates and Vegetation

Surface soil data from off-property ditches and onsite areas identified as ecological habitat are used to evaluate the potential for adverse effects on terrestrial invertebrates and vegetation by comparing chemical concentrations with invertebrate screening benchmarks (referenced below).

- *Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil Litter Invertebrates and Heterotrophic Process: 1997 Revision* (Efroymson et al. 1997a)

- *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision* (Efroymson et al. 1997b)

Aquatic Organisms

Surface water and shallow groundwater data from off-property wells were used to evaluate the potential for adverse effects on fish by comparing chemical concentrations with surface water screening benchmarks (referenced below). The benchmark comparison with chemical concentrations in shallow groundwater also serves to evaluate the potential for adverse effects on hyporheic communities at the river.

- *National Recommended Water Quality Criteria: 2002* (EPA 2002b)
- Oregon DEQ *Level II Guidance for Ecological Risk Assessment* (DEQ 2001)

Benthic Organisms

Data from surface sediment sampling were used to evaluate the potential for adverse effects on benthic organisms in the South Yamhill River and Rock Creek by comparing chemical concentrations with benthic macroinvertebrate screening benchmarks (referenced below); specifically, TECs PECs.

- *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald et al. 2000)
- National Oceanic and Atmospheric Administration's (NOAA Fisheries) *Screening Quick Reference Tables* (Buchman 1999)

7.2.4 Ecological Risk Characterization

The ecological risk characterization evaluates the evidence linking site contaminants with potential adverse ecological effects. Potential risk to ecological receptors at the TLT site is determined on the basis of both quantitative and qualitative evaluations. The uncertainties associated with the evaluations are also discussed.

Table 10 summarizes the risk assessment process, and describes the basis for selecting contaminants of ecological concern (COECs).

Ecological Risk Quantification for Mammalian and Avian Wildlife

The primary means for quantifying ecological risk for mammalian and avian species at the TLT site is to determine the ratio of the estimated chemical exposure level for the endpoint species of concern with the chemical-specific TRV.

$$Ecological\ HQ = I/TRV$$

where:

HQ= Ecological hazard quotient (unitless)
I = chemical intake level (mg/kg body weight-day)
TRV = toxicity reference value (mg/kg body weight-day)

When the HQ exceeds 1.0, there is a potential for ecological risk. When a cumulative effect from potential exposure to more than one chemical is suspected or known, an ecological HI is calculated. An ecological HI is the sum of all HQs for chemicals with similar toxicological mechanisms and is calculated as follows:

$$HI = HQ_1 + HQ_2 + ... + HQ_i$$

where:

HI = Ecological hazard index (unitless)
HQ_i = Ecological hazard quotient for the i^{th} constituent (unitless)

A HI is calculated for two groups of COPECs at the TLT site: dioxin/furans and PAHs.

Tier 1 Screening. Tier 1 screening uses high-end conservative exposure and effect assumptions (for example, 100 percent area use, no migration, NOAEL-based TRVs, 100 percent bioavailability, etc.) to identify primary COPECs at the TLT site.

Ecological HQs for mammalian and avian endpoint species were derived for the TLT site by comparing the calculated chemical intake of constituents detected in surface soil and surface water with TRVs identified to be protective of the representative endpoint species. Exposure to COPECs was assumed to occur in surface soil, surface water, and food items collectively.

Of the 77 COPECs detected in site media that were evaluated, Tier 1 HQs slightly exceeded 1.0 for ten metals. Tier 1 HI estimates for PAHs are below 1.0 for each endpoint species at the site, whereas HI estimates for total dioxins/furans significantly exceed 1.0. The ten metals and dioxin/furans were carried forward into the Tier 2 evaluation.

Tier 2 Evaluation of Potential Ecological Significance. To identify COECs at the site, the Tier 2 evaluation determines the ecological significance of the primary COPECs that exceeded the Tier 1 screening, using more realistic exposure and effect assumptions. The following three considerations are used to refine the risk estimates:

- A consideration is made of the range between the NOAEL and LOAEL, because actual chemical-specific toxicity is expected to fall somewhere between these two.
- A consideration of naturally occurring levels of metals
- The area use by the selected receptors is considered. This includes the migratory patterns and documented home range or foraging area for each receptor

Arsenic, cobalt, lead, manganese, and zinc concentrations in ditch soil exceed both naturally occurring levels in Oregon soils and NOAEL-based HQs of 1.0. Copper and zinc are the only metals that also exceed LOAEL-based HQs for endpoint species, the deer mouse and robin, respectively. HIs for all endpoint species exceed 1.0 for total dioxins/furans, with a high LOAEL-based HI of 476 for the deer mouse.

Based on the Tier 2 evaluation, ditch soil is the only ecological habitat where COECs were identified. Copper, zinc, and total dioxins/furans are considered contaminants of concern to avian and mammalian wildlife.

Benchmark Comparison for Terrestrial Vegetation and Invertebrates

The arsenic EPC in surface soil exceeds both the range of plant benchmarks and naturally occurring levels in Oregon soils. Confidence in the arsenic benchmark value is considered moderate (Efroymson et al. 1997b). Risks to terrestrial plants exposed to constituents in surface soils are expected to be low.

Arsenic and manganese EPCs exceed both the range of naturally occurring levels in Oregon soils and the terrestrial invertebrate benchmark. However, confidence in benchmark values is reported as low and caution is advised in interpreting risks to terrestrial invertebrates. Because of the marginal exceedances of screening values and/or naturally occurring levels, the risk to terrestrial invertebrate populations from site-related releases is likely low.

Risk Characterization Results for Aquatic Resources

*South Yamhill River***.** Surface water data collected in 1999 from the South Yamhill River were compared with freshwater acute and chronic screening values (EPA 2002a; DEQ, 2001). Of the 19 COPECs detected, only mercury exceeded the acute freshwater screening value and barium, cadmium, lead, manganese, DDT, and mercury exceeded the chronic freshwater screening benchmarks. Considering the chemical processes historically used at TLT and the sample locations at which the highest COPEC concentrations occur, none of the COPECs exceeding screening values are believed to be caused by site activities.

Rock Creek. None of the 12 COPECs detected in Rock Creek surface water samples exceeded the acute screening values, and only barium concentrations exceeded the chronic freshwater screening value. Barium is not believed to be related to site activities.

Groundwater. Shallow groundwater wells located nearest to Rock Creek and the South Yamhill River were used to assess potential risk to aquatic and hyporheic organisms. COPEC levels slightly exceeded available screening levels for the protection of aquatic and hyporheic organisms for copper, lead, and PCP. Exceedances were small and occurred at few well sites. Based on COPEC levels in groundwater and distance from the river, the likelihood of toxicity to hyporheic, benthic, or aquatic organisms using Rock Creek and the South Yamhill River is believed to be marginal to low.

Sediment. Concentrations of COPECs in South Yamhill River sediments were similar in samples both upstream and downstream of the Rock Creek Road ditch outfall, indicating that concentrations are unlikely to be site-related. Similarly, in Rock Creek, COPEC concentrations are highest in samples collected upstream of the TLT site.

Surface sediment data collected from two sampling events (1999 and 2002) were compared to freshwater TECs and PECs to evaluate the potential for risk to benthic communities in the South Yamhill River and Rock Creek. The low factor of exceedance of freshwater sediment screening values, coupled with the COPEC distribution, indicate that current risks to benthic invertebrates in Rock Creek are low.

7.2.5 Ecological Risk Uncertainties and Assumptions

Uncertainties inherent in this ERA are summarized in this section. A more complete discussion can be found in Section 5.8 of the BLRA.

Uncertainty Associated with Sampling and Analysis

Uncertainty associated with sampling and analysis and fate and transport of constituents for the ERA is similar to the HHRA.

Uncertainty Associated with Exposure Assessment

Assumptions used in exposure assessments tend to simplify and approximate actual site conditions and potential exposure. These assumptions are intended to be conservative and yield an overestimate of the true risk or hazard.

For the terrestrial food chain risk estimates, this risk assessment uses mean soil concentrations to estimate site-specific bioaccumulation factors (BAFs) and 95 percent UCL soil concentrations to estimate endpoint species COPEC intake. This is conservative and likely overestimates exposure.

Sediment screening values used in the ERA are based on direct toxicity and do not consider potential bioaccumulation through the food web. Although few bioaccumulative compounds were detected in the river and creek sediments, the potential effects of this pathway were not quantitatively evaluated.

Uncertainty Associated with Toxicity Assessment

Data on toxicity to wildlife are limited and the usefulness of existing toxicity data is constrained by the use of laboratory test species. Frequently, toxicity information on a particular contaminant for a species found onsite is not available.

Toxicity of many constituents is greatly influenced by the chemical state in which they occur. Because site-specific bioavailability data for metals that occur in soil at the site were unavailable, total concentrations are used, and exposure is generally overestimated.

7.2.6 Summary of Ecological Risk

Surface Soil in Off-Property Ditches and Onsite Areas Identified as Habitat

Copper and zinc detected in off-property ditches were found to have a marginal to low risk to terrestrial wildlife endpoint species. However, dioxins/furans pose a risk that significantly exceeds the regulatory risk target, and should be addressed.

Considering the low confidence in the benchmarks and the low magnitude of exceedances, the risks to terrestrial invertebrates and vegetation is considered marginal or low.

Off-property Groundwater and Surface Water in Rock Creek and South Yamhill River

The risks to aquatic and hyporheic organisms is marginal to low, and risk to aquatic organisms using the South Yamhill River and Rock Creek are likely marginal to low.

Sediment in Rock Creek and South Yamhill River

The low factor of exceedance of freshwater sediment screening values, coupled with the COPEC distribution, indicate that current risks to benthic invertebrates in Rock Creek are low.

Table 11 presents the COECs for the TLT site. Based on the results of this baseline ERA, the constituents with the highest potential for ecological exposure are copper, zinc, dioxins and furans in surface soils. Concentrations that contribute to this risk occur in roadside ditch areas.

7.3 CONCLUSIONS

Based on results from the BLRA, the following areas will be addressed.

- Because of the risk to onsite workers from potential exposure to arsenic and dioxin in surface and subsurface soils, action is warranted in the Treatment Plant and Treated Pole Storage areas. Areas to be addressed include contaminated soil that exceeds 10^{-4} risk (Figure 7): soil within the barrier wall in the Treatment Plant Area, soil in the southeast corner of the Treatment Plant Area (approximately 0.4-acre), and soil in the Treated Pole Storage Area (approximately 4.4 acres). Total ELCRs were calculated separately for each area on the property and ranged from 1×10^{-4} to 2.8×10^{-3}. Risks associated with future workers' exposure to subsurface soils in the Treatment Plant and Treated Pole Storage areas was 2.4×10^{-4}. Incidental ingestion accounts for at least 80 percent of the risk estimate for the worker exposure scenario. The HI of 1 was not exceeded for surface or subsurface soils.

- Because of the potential for off-property migration of contaminated surface soils to pose unacceptable risk to ecological receptors in the ditch that abuts the southern portion of the White Pole Storage Area in the West Facility, action is warranted to address these soils (approximately 0.4-acre).

- Risks to onsite workers from the remainder of the White Pole Storage Area, the Truck Shop area, and the Contaminated Soil Storage Cells exceed 1x10-6 but are less than 1×10^{-4}; these areas (see Figure 7) are considered non-hot spots according to DEQ Cleanup Rules (OAR 340-122). Non-hot spot areas exceed DEQ's acceptable risk levels, however, institutional or engineering controls may be considered appropriate remedial actions for these areas. Total estimated ELCR associated with the Contaminated Soil Storage Cells Area was 6.5×10^{-5}. As a non-hot spot, treatment is not necessarily required for this soil, but because these soil cells were constructed as temporary containment, a long-term solution for this material will be considered in the remedy.

- Because of the risk to recreational and tribal users from potential exposure to arsenic and total dioxin in off-property ditch soil, action is warranted to address the ditches adjacent to the West Facility.

- Because of risk to hypothetical residential users from potential exposure to contaminants in groundwater, media inside the barrier wall will be addressed. Although this groundwater is not used for drinking water, potential risk to hypothetical future residents from exposure to groundwater inside the barrier wall found excess lifetime cancer risks ranging from 1.5 x 10-5 to 1.6 x 10-2. The potential HI for non-cancer effects ranged from 0.52 to 118.

- Because of risk to hypothetical residential users from potential exposure to PCP in groundwater, groundwater outside the barrier wall will be addressed. Although this shallow groundwater is not used currently for drinking, there was a potential risk of excess lifetime cancer to hypothetical future residents. ELCRs ranged from 1.6 x 10^{-5} to 5.5 x 10^{-4}, with the highest risk associated with one well located just south of the barrier wall. Potential risk to off-property residents from exposure to groundwater migrating off-property found ELCRs ranging from 7.8 x 10^{-6} to 1.7 x 10^{-4} with the highest risk associated with the wells on the southern boundary of the TLT site. For this scenario, the potential HI for noncancer effects ranged from 0.3 to 2.1 in these wells.

- Because of the risk to terrestrial wildlife endpoint species from exposure to copper, zinc, and total dioxin in off-property ditch soil, action is warranted to address the ditches adjacent to the West Facility. As stated in the BLRA, the ecological risk posed by copper and zinc is marginal or low, and will be addressed with actions that address dioxins/furans.

The response action in this ROD is necessary to protect the public health, welfare, or the environment from actual or threatened releases of hazardous substances in the environment. Such a release or threat of release may present an imminent and substantial endangerment to public health, welfare, or the environment. Consistent with the NCP and EPA policy, remedial action is warranted to address these potential risks.

8.0 REMEDIAL ACTION OBJECTIVES

Environmental investigations have identified contamination requiring remedial action at the TLT site. The results of the BLRA showed that in some locations, human health and ecological risks exceed the 10^{-4} risk levels considered acceptable by EPA. These areas are also considered "hotspots" under the Oregon Hazardous Substances Remedial Action Rule. DEQ's acceptable risk level is 1 x 10^{-6}.

Based on the potential risks identified, remedial action objectives (RAOs) were developed for the site to protect human health and the environment. RAOs are EPA's goals for addressing risk at the site, and they provide a general description of what the remediation will accomplish (for example, protect the environment by containing DNAPL source areas). Thus, in Superfund, RAOs are established only for those pathways for which risk has been identified as exceeding acceptable levels. RAOs are established for soils and groundwater at the site, as follows:

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

The basis and rationale for these RAOs are briefly summarized below for each media.

- Groundwater and DNAPL inside barrier wall – Inside the barrier wall, DNAPL is present and PCP concentrations in shallow groundwater exceed the federal MCL. Through completion of early actions, the migration of contaminated shallow groundwater and DNAPL was controlled by installation of the barrier wall. Thus, the RAO for groundwater and DNAPL ensures that the early action remains protective of human health and the environment. Additionally, the barrier wall ensures that the groundwater and DNAPL does not pose a future risk to ecological receptors in the South Yamhill River and Rock Creek.
- Groundwater outside barrier wall – The RAO that addresses groundwater outside the barrier wall was developed because of elevated risks to hypothetical future residents that may drink the groundwater. Although this shallow groundwater is not used currently for drinking, there was a potential risk of unacceptable excess lifetime cancer to hypothetical future residents from exposure to groundwater outside the barrier wall. The primary contributor to potential cancer risk in this well is PCP, and PCP concentrations exceed the federal MCL. Also, the RAO that addresses groundwater outside the barrier wall was developed to minimize future migration of contaminated groundwater to adjacent surface water (South Yamhill River, Rock Creek) to protect ecological receptors.
- Soil – The RAO for soils was developed because of elevated risks to workers exposed to surface and subsurface soils at the West Facility. Potential excess individual lifetime cancer risks associated with exposure (ingestion, inhalation, and dermal contact) to surface soil for current onsite workers or future industrial workers at the West Facility exceeded the acceptable range of risks as defined by the EPA.
- Ditch Soil – The RAO for ditch soils was developed because of elevated risks to ecological receptors (birds, mammals) that may be exposed to dioxins/furans in surface soils. The ecological risk posed by copper and zinc is marginal or low.

The response action selected in this ROD will achieve these RAOs.

Cleanup and action levels for COCs at the TLT site are provided below. For groundwater, CERCLA specifies that federal MCLs are also relevant and appropriate cleanup goals for groundwater. The groundwater cleanup level applies to all groundwater outside the barrier wall. The groundwater cleanup level does not apply to groundwater inside the barrier wall because this area is a waste management area per the NCP preamble.

Contaminant of Concern	Groundwater Federal MCL	Soil Risk-based
Pentachlorophenol	1 ug/L	
Arsenic		159 ppm

Surface soils with concentrations of arsenic greater than 159 parts per million (ppm) arsenic will be addressed. This concentration was established based on standard EPA risk assumption default factors for industrial use scenarios (ingestion, inhalation of particulates, dermal) at 10^{-4} risk level. The exposure assumptions include IRIS reference dose, 70 kg adult body weight, exposure frequency of 250 days/year, exposure duration of 25 years, 100 mg/day soil ingestion rate, and 3,300 square centimeters (cm^2)/day exposed surface skin area for soil/dust. Surface soils with concentrations of arsenic that exceed the established background level or 10^{-6} risk level, but are below 159 ppm will be addressed with institutional controls. Remedial actions and institutional controls will reduce onsite worker exposure to protective levels in the unpaved areas of the West Facility.

Cleanup in the Treated Pole Storage Area is driven by human health risk from arsenic and dioxins. Because of the greater number and better distribution of arsenic data, the extent of the remedial action will be guided by arsenic cleanup levels and a cleanup level for dioxins is not being set. Because dioxins are co-located with arsenic in this area, it follows that the remedy will also address dioxin contamination.

With regards to dioxins in groundwater outside the barrier wall, dioxins have not been identified as a problem outside the barrier wall and concentrations do not exceed the federal MCL. Results from the three most recent sampling events (May, August, November 2002) indicate that dioxin in groundwater outside the barrier wall is below the federal MCLs.

Likewise, dioxin cleanup levels are not being set for ditch soils. Given the relatively small volume of ditch soils, EPA is proposing that the ditches simply be remediated without spending additional time and funds to define specific cleanup areas and cleanup levels. Post-cleanup data will be collected to ensure that the ditches do not pose unacceptable risk to people or animals after the cleanup.

9.0 DESCRIPTION OF ALTERNATIVES

This section summarizes the RAOs that were developed in the RI/FS for detailed analysis, and incorporates several modifications that have been made to the alternatives since the FS report.

9.1 COMMON ELEMENTS AND DISTINGUISHING FEATURES OF EACH ALTERNATIVE

Many of these alternatives include common components. Alternatives assume that the completed early actions remain effective and in place (for example, it is assumed that the barrier wall will remain in place and groundwater extraction and treatment within the barrier wall will continue).

Contaminated Media Inside the Barrier Wall (Alternatives labeled "BW"): Through previous early actions, the contaminated soil, groundwater, and DNAPL are contained inside a barrier wall, and a temporary asphalt cap covers the area enclosed by the wall. Through extraction of groundwater from wells, hydraulic containment is used to prevent contaminants from migrating beyond the barrier wall and to lower water levels to ensure the structural integrity of the cap. Groundwater extracted from inside the barrier wall is currently treated in the onsite water treatment system and discharged under a state discharge permit to a ditch that flows to the South Yamhill River. Data indicate that the barrier wall is effectively containing DNAPL and groundwater contaminants. A natural competent confining layer exists beneath this area to protect deeper groundwater. The BW alternatives focus on upgrades to the existing cap above and within the barrier wall.

Soils (Alternatives labeled "SW"): Soil alternatives apply to soils outside the barrier wall in the West Facility that exceed 10^{-4} risk (see Figure 7). For surface soils, capping or excavation with consolidation onsite or with offsite disposal would prevent workers from coming in contact with contaminated soil in the Treatment Plant Area and Treated Pole Storage Area. For subsurface soils, ICs would restrict worker access. Capping is an easily implemented technology that will allow continued site operations, although there will be some temporary disruption to the facility operations during construction. The specific details given for each soil alternative are provided as a basis for cost comparisons, and it should be understood that the design components would be determined during remedial design of the remedy.

Groundwater Outside the Barrier Wall (Alternatives labeled "GW"): These groundwater alternatives only apply to the shallow groundwater that is outside the existing barrier wall and that exceeds the federal drinking water standard of 1 ug/L PCP. This PCP contamination occurs in the area adjacent to the barrier wall, with the highest concentrations south and east of the barrier wall. This contamination existed prior to installation of the wall, and does not indicate failure of the barrier wall. Current evidence indicates the PCP plume is not migrating off the West Facility and that the rate of groundwater migration is very slow, particularly in the area south of the barrier wall (which is closest to the river). DNAPL does not occur outside the barrier wall.

Roadside ditches: Although not all portions of each ditch are contaminated, all roadside ditches highlighted in Figure 8 will be cleaned to simplify the ditch remediation effort. Remediated ditch soils will be consolidated onsite or disposed of at an acceptable offsite facility. Given the relatively small volume of ditch soils, EPA is proposing that the ditches simply be remediated without spending additional time and funds to define specific cleanup areas and cleanup levels. Post-cleanup data will be collected to ensure that the ditches do not pose unacceptable risk to people or animals after the cleanup.

Institutional controls: ICs are administrative measures that provide a level of protection against exposure and advise current and future property users about the existing contamination. Potential ICs that may be used at the site include governmental (for example, local zoning ordinances), enforcement (for example, legal agreements requiring cap maintenance), and proprietary (for example, environmental easements to restrict land and groundwater use at the West Facility). The West Facility will continue to be used as an industrial site (the HHRA assumed an industrial use scenario for both current and future use), and ICs will protect workers from the low level risk that remains after remediation. These restrictions are discussed in each alternative as appropriate.

Long-term Monitoring and Operations and Maintenance: Most alternatives include long-term monitoring to ensure that the remedy is effective and remains protective of human health and the environment. Long-term monitoring of groundwater will be implemented. Operations and maintenance measures would be implemented to ensure that the barrier wall and asphalt caps remain in good condition and continue to function as designed.

The key applicable or relevant and appropriate requirements (ARARs) for the development of the remedial action alternatives in this ROD are the Federal Safe Drinking Water Act and the Oregon Environmental Cleanup Rules.

9.2 DESCRIPTION OF ALTERNATIVES

Remedial action alternatives were developed in the RI/FS for detailed analysis, and presented in the Proposed Plan. Alternatives for soil (SO), groundwater (GW), and contaminated media inside the barrier wall (BW) are presented separately. Cost estimates and timeframes for remedial alternatives are summarized in Table 12. The alternatives described below incorporate several modifications that have been made to the alternatives since the FS report and Proposed Plan. These changes include: 1) for the BW alternatives, extracted groundwater is currently treated in the existing stormwater system; thus, the cost estimates associated with use of the evaporator were removed; and, 2) for the GW alternatives, an additional technical evaluation was performed, as contemplated in the Proposed Plan, and results are described below. Therefore, alternative costs presented herein differ slightly from those provided in the FS.

9.2.1 No Action Alternatives

Alternative SO-1/GW-1/BW-1: No Action.

Regulations governing the Superfund program generally require that the "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, EPA would take no action at the site to prevent human or ecological exposure to soil and groundwater contamination. There are no costs associated with this alternative.

9.2.2 Soil Alternatives

Alternative SO-2: Excavation and Consolidation; Capping with Asphalt; Institutional Controls; Monitoring

This alternative includes excavating soils from approximately 0.9-acre to a depth of 1 foot in three areas of the West Facility: two northern ditches (0.1-acre, estimated); soils in the southeastern corner (0.4-acre, estimated; given changes in site conditions and use in this area, the design will evaluate whether contaminated soils will be excavated or capped); and soils in the southwestern corner (the 0.9-acre estimate from the Proposed Plan has been revised to 0.4-acre estimated because of changes in site conditions; that is, the eastern portion is paved). These soils will be addressed along with the soils removed from the ditches along the west side of Rock Creek Road and along the southern portion of the West Facility and with the approximately 19,100 cubic yards of soils that are currently in the Soil Storage Cell Area. All these soils will be strengthened with additives, as necessary, to form a strong structural base, and will be consolidated within the West Facility area, possibly in the northeast corner in the Treated Pole Storage Area. If consolidated in the northeast corner, these soils would be covered with an approximately 7.7-acre asphalt cap that would extend over the entire Treated Pole Storage Area, including the 4.4-acre hot spot in the northeast corner, and the grade would be increased a maximum of 2 feet to match the existing grade in the 2-acre paved area. This alternative, which does not modify the 6.6

acres of the site that have been previously paved, results in about 14 acres of asphalt cap. Details are provided for cost estimating purposes. The exact location of the area to be used for consolidating and capping would be determined during remedial design, and site grades will be established in consideration of existing facility operations. All excavated areas would be backfilled with clean material to grade as appropriate to ensure compatible land use. If cost-effective, excess soils that are not consolidated onsite may be sent offsite to an acceptable disposal facility. ICs would be put in place to restrict digging in the area and operation and maintenance would be performed to ensure cap integrity. The area would be monitored to verify that the cap retains integrity and that ICs remain effective.

For the unpaved soils in the remaining portion of the site, ICs would be used to limit human exposure. Possible controls include ensuring land use remains industrial, requiring special precautions when digging in the area, and ensuring proper disposal or use of soils removed from the area.

Alternative SO-3: Excavation and Consolidation; Capping with Asphalt; Capping with Gravel; Institutional Controls; Monitoring

The components and requirements of this alternative are the same as those described in Alternative SO-2, with the exception that the unpaved soils in the remaining portion of the site would be covered with a geotextile liner system and then 12 inches of gravel.

Alternative SO-4: Excavation and Offsite Disposal; Capping with Gravel; Institutional Controls; Monitoring

This alternative considers excavation and offsite disposal (with treatment as necessary) for contaminated soils, including soils from the Treated Pole Storage Area (4.4 acres); two northern ditches (0.1-acre, estimated); the southeastern corner (0.4-acre, estimated); the southwestern corner (0.4-acre, estimated); the ditches west of Rock Creek Road and south of the West Facility; the Soil Storage Cell Area (19,100 cubic yards); and, the area under the existing 2-acre asphalt cap in the Treated Pole Storage Area. After excavation, all areas including ditches will be backfilled with clean material to meet existing grade. No ICs or monitoring would be necessary for this component of SO-4.

Unpaved soils in the remaining portion of the site would be covered with a geotextile liner system and then 12 inches of gravel. ICs and monitoring in this area would be necessary as described in SO-2.

9.2.3 Groundwater Alternatives

Alternative GW-2: Institutional Controls; Monitoring

This alternative requires the use of ICs to restrict use of groundwater for drinking water. Monitoring would ensure that the ICs are effective. Long-term groundwater monitoring would ensure that the PCP-contaminated groundwater does not migrate to adjacent surface waters (Rock Creek, South Yamhill River). Although the installation of the barrier wall created a groundwater stagnation zone in the area immediately downgradient of the wall, long-term groundwater monitoring will be performed to ensure that migration of PCP-contaminated groundwater is controlled to minimize risk to ecological receptors in surface waters.

Alternative GW-3: Pump and Treat; Institutional Controls; Monitoring

This alternative is the same as GW-2, except that the groundwater outside the barrier wall with higher PCP concentrations (for example, 100 times the drinking water standard) would be extracted, treated in the existing onsite water treatment system, and discharged to the river under the existing permit. Areas of lower PCP contamination would be addressed indirectly as the contaminant plume is drawn toward the groundwater extraction wells. This alternative would also provide hydraulic containment, which would reduce the likelihood of contaminated groundwater reaching the adjacent surface waters.

In the Proposed Plan, EPA stated that further technical evaluation of this alternative would be performed. CH2M HILL (September 26, 2005) evaluated the assumptions for remedial action Alternative GW-3 presented in the FS. Based on an understanding of site conditions, and results of the evaluation, GW-3 was not identified as a practicable alternative.

Alternative GW-4: Permeable Reactive Barrier; Institutional Controls; Monitoring

This alternative is the same as GW-2, except that the groundwater outside the barrier wall would be treated in place with a permeable reactive barrier. It is assumed that the permeable reactive barrier includes a new 400-foot section of a slurry barrier wall with three treatment "gates" containing activated carbon. Groundwater would flow passively through these treatment gates and contaminants would be intercepted, preventing potential contaminant migration to the adjacent surface waters. On-property groundwater contamination would not be altered. Successful implementation would require additional studies, favorable hydrogeologic conditions, and significant groundwater modeling efforts to confirm the feasibility of this alternative.

9.2.4 Alternatives for Contaminated Media inside the Barrier Wall

Through previous early actions, the contaminated soil, groundwater, and DNAPL are contained inside a barrier wall, and a temporary asphalt cap covers the area enclosed by the wall. Some areas of the temporary cap have been damaged by the heavy equipment used onsite. Through extraction of groundwater from wells, hydraulic containment is used to prevent contaminants from migrating beyond the barrier wall and to lower water levels to ensure the structural integrity of the cap. Groundwater extracted from inside the barrier wall is currently treated in the onsite water treatment system and discharged under a state discharge permit to a ditch that flows to the South Yamhill River. The long-term protectiveness of these earlier actions was evaluated in developing alternatives for this area. Data indicate that the barrier wall and groundwater extraction system are effectively stopping groundwater and DNAPL migration. However, the present asphalt cap must be upgraded to provide protectiveness for human exposure. Thus, these alternatives focus on upgrades to the existing cap, which currently consists of 4 inches of asphalt over a 12-inch crushed rock base.

In the FS, a fifth alternative (BW-5: Dynamic Underground Stripping) was considered as an aggressive attempt to remove "principal threat" contaminants contained within the barrier wall. This alternative was dropped from consideration because of high costs and concerns over implementability, and thus is not presented here.

Alternative BW-2: Cap Removal and Replacement with 12-inch Concrete Cap/Liner; Institutional Controls; Monitoring

The existing cap and subgrade would be removed and replaced by a new cap. The new cap would consist of a new subgrade, followed by a polyvinyl chloride (PVC) liner (between layers of geotextile fabric), and then a 12-inch concrete cap with joints. The final grade would match the current grade.

ICs would protect the new cap and limit human exposure, and monitoring would verify cap integrity, ensure effectiveness of ICs, and ensure that the remedy remains protective of human health and the environment.

Alternative BW-3: Cap Repair with Asphalt and Placement of 8-inch Concrete Cap/Liner; Institutional Controls; Monitoring

Under BW-3, any damaged areas of the existing cap would be repaired with asphalt. Installed over this asphalt would be the same cap described for BW-2, except the concrete cap would be 8 inches. The final grade would be about 8 inches above current grade. ICs and monitoring are the same as BW-2.

Alternative BW-4: Cap Repair with Asphalt/Concrete Subgrade and Placement of Asphalt Cap; Institutional Controls; Monitoring

The existing cap would be replaced by breaking up the top 8 inches of asphalt and crushed base rock, removing and mixing that broken-up material with a concrete binder, replacing the resulting mixture back onto the surface, and then compacting the mixture to form a subgrade. Next, a new engineered asphalt cap would be installed. The final grade would be about 4 inches above current grade. ICs and monitoring are the same as BW-2.

10.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the NCP, EPA used the following nine criteria to evaluate and compare each remedial alternative. Although all nine criteria are important, they are weighted differently in the decisionmaking process depending on whether they are the threshold criteria (protection of human health and the environment and compliance with ARARs) or balancing criteria. Comments on the proposed plan were used to evaluate the preferred alternative regarding the criteria on community acceptance.

10.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Determines whether a remedial action eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

All of the alternatives (except “no action”) would provide adequate protection of human health and the environment by eliminating, minimizing, or controlling risk through treatment, engineering controls, and/or ICs. The “no action” alternative is not discussed further because it does not protect human health and the environment. For soils outside the barrier wall, SO-4 would be the most protective because contaminated soils would be removed from the site, thereby significantly reducing the possibility of direct contact with contaminated soil. The other alternatives are protective but would achieve RAOs by consolidating and capping contaminated soils in place and relying on ICs to reduce the potential for direct contact with contaminants.

For groundwater outside the barrier wall, GW-2 would be somewhat less protective because it relies on ICs to restrict exposure to humans, and it would be somewhat less protective for controlling groundwater migration to the river. GW-3 may be slightly more protective because on-property groundwater concentrations would be reduced through extraction and treatment, and off-property migration would be controlled; however, the extraction and treatment of groundwater would not significantly increase the overall protection to human health and the environment because the potential for future exposure is minimal, the potential reduction in PCP concentrations would not occur within a reasonable time frame, exposure can be controlled with implementation of ICs, and most importantly, existing data indicate that the groundwater is not migrating from its current location and there is no evidence of plume migration or expansion. The elevated PCP concentrations located outside the wall are located within a stagnation zone created by installation of the barrier wall. If feasible, GW-4 would be more protective because the permeable reactive barrier would intercept any contaminated groundwater migrating off-property.

For contaminated media inside the barrier wall, BW-2, BW-3, and BW-4 are equally protective.

10.2 COMPLIANCE WITH STATE AND FEDERAL REGULATIONS

Evaluates how each alternative complies with state and federal environmental laws and regulations that pertain to the site or whether a waiver is justified.

All alternatives would meet state and federal ARARs for the portions of the site that are addressed under this ROD.

10.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Considers the ability of a remedial alternative to maintain protection of human health and the environment over time and the reliability of such protection.

This criteria concerns two primary factors: the magnitude of residual risk remaining, and the adequacy and reliability of controls for risks remaining after the cleanup action. For soils outside the barrier wall, the greatest long-term effectiveness and permanence is provided by removing all contaminated soils from the site (SO-4), and less long-term effectiveness and permanence is provided by capping, because capping requires more complex monitoring requirements (SO-2, SO-3). Regular maintenance and inspections of caps would be required.

For groundwater outside the barrier wall, GW-2 and GW-3 are similarly effective and permanent for reducing off-property contaminant levels, given that data show the migration of contaminated groundwater is controlled by existing site conditions and that the time estimate for achieving the RAOs for either alternative is on the order of hundreds of years. GW-4 is considered the least effective and permanent, given the uncertainty about whether GW-4 can achieve RAOs.

10.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME OF CONTAMINANTS THROUGH TREATMENT

Evaluates a remedial alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of residual contamination remaining.

All BW alternatives include extraction of groundwater from inside the barrier wall with treatment in the onsite water treatment system. Alternative GW-3 includes the additional treatment of extracted groundwater from areas with elevated PCP concentrations in groundwater. Soil alternatives that rely on offsite disposal include treatment where required for offsite disposal.

10.5 SHORT-TERM EFFECTIVENESS

Considers the length of time needed to implement a remedial alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

All soil alternatives involve excavation, which presents short-term exposure to workers through contact with contaminated soils. Alternative SO-4 presents a higher short-term risk than other alternatives because more materials would be excavated and materials would be trucked offsite. For groundwater, GW-4 presents the highest short-term risk because of construction of the permeable reactive barrier. GW-2 (ICs) presents the least short-term risk because no active remediation activities would occur. BW-2 has the highest short-term risk (moderate worker exposure), followed by BW-3 and BW-4 (low worker exposure).

Alternatives SO-2 and GW-2 would take the least time to construct and implement. The remaining alternatives would take slightly more time (for example, 2 years).

10.6 IMPLEMENTABILITY

Considers the technical and administrative feasibility of implementing a remedial alternative, such as relative availability of goods and services. This criterion also considers whether the technology has been used successfully at other similar sites.

All soil and groundwater alternatives use technologies that are readily available and generally proven for these contaminants, except for GW-4 (permeable reactive barrier) and GW-3 (groundwater extraction and treatment). GW-4 would require additional studies and modeling, including a determination of whether the site has sufficient hydraulic gradient to maintain flow through gates. GW-3 would require additional studies and modeling, including installation of new monitoring wells, extraction tests, pump tests, bench tests, evaluations on the affect of groundwater extraction outside the wall on the effectiveness of the barrier wall to maintain hydraulic control, evaluations on the capability of the existing stormwater treatment system to handle increased volumes, and potential modification to the existing NPDES permit.

For soils, coordination with PWPO would be required to minimize disruption to the operation of the facility.

10.7 COST

Includes estimated capital and operation and maintenance costs. Costs are expected to be accurate within a range of +50 to -30 percent.

Costs are summarized in Table 12 and are presented as total present value (2004). Costs shown for the operation and maintenance category are based on 30 years, although the actual period could be much longer in some cases. Costs for the FS were calculated using a discount rate of 7 percent over a 30-year operation period. Estimated costs have a plus 50 to minus 30 percent accuracy.

For soils outside the barrier wall, alternative SO-2 is the least costly, SO-3 is in the middle, and SO-4 is the most costly. Alternative GW-2 and then GW-3 are the least costly, but the time frame required to achieve the RAOs is on the order of hundreds of years and only a very small area outside the wall would be affected. GW-4 is very costly and the time frame required to achieve RAOs is long to very long. Alternatives BW-2, BW-3, and BW-4 are generally similar in cost.

10.8 STATE/SUPPORT AGENCY ACCEPTANCE

Considers whether the State supports EPA's analyses and recommendations of the RI/FS and the Proposed Plan.

The State of Oregon Department of Environmental Quality concurs with EPA's selected remedy. DEQ is continuing to evaluate the risks outside the West Facility to determine if some type of action is required in these areas under State of Oregon law.

10.9 COMMUNITY ACCEPTANCE

Considers whether the local community agrees with the EPA's analyses and recommendations of the RI/FS and the Proposed Plan.

EPA has considered all comments submitted during the public comment period and taken them into account during the selection of the remedy. EPA received three comment letters. EPA's responses to comments are included in the attached Responsiveness Summary (Part 3). Some of the comments support EPA's preferred alternative and some comments do not support EPA's preferred alternative. For the remedy at the TLT site, the current owner and operator, PWPO, was supportive of the remedy; however, they were concerned about the impact the remedy may have on its ability to operate the facility efficiently and the financial impact the remedy may have on its operating expenses. The other comment letters were from industry sources and primarily focused on the soil alternatives, preferring excavation and offsite disposal over capping and ICs.

11.0 PRINCIPAL THREAT WASTE

A completed early action addressed remediation of the source materials, which included contaminated soil and DNAPL in former wood-treating areas, by installation of an underground barrier wall and placement of an overlying asphalt cap. These source materials constitute principal threat wastes at the site. The selected remedy will ensure that the barrier wall is maintained so that groundwater inside the wall is extracted, to maintain hydraulic containment, and treated.

In the FS, a fifth alternative (BW-5: Dynamic Underground Stripping) was considered as an aggressive attempt to remove "principal threat" contaminants contained within the barrier wall. This alternative was dropped from consideration because of high costs and concerns over implementability, and thus is not presented here.

12.0 SELECTED REMEDY

12.1 DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy for the TLT site will achieve RAOs through a combination of soil remediation, groundwater extraction from inside the barrier wall, ICs, operation and maintenance, and long-term monitoring. The remedy is a combination of Soil Alternative SO-2, Groundwater Alternative GW-2, and Barrier Wall Alternative BW-4. The Selected Remedy consists of the following elements (see Figure 8):

- A combination of excavation, consolidation, and capping with asphalt for contaminated surface soils that exceed protective risk-based levels from the Treatment Plant Area (except for soils within the barrier wall), Treated Pole Storage Area, and Contaminated Soil Storage Area of the West Facility (see Figure 7). Consolidation would likely occur in the northeast corner of the property where the highest soil contamination exists outside of the barrier wall. Excess soil that is not consolidated onsite will be sent offsite to an acceptable disposal facility. The design of the soil remedy shall consider the following:
    - Asphalt caps, excavated areas, backfill of excavated areas, and finished site grades shall be designed and constructed with due consideration given to traffic volumes, loads, and traffic patterns of the existing onsite wood-treating operations, as contemplated by the Prospective Purchaser Agreement with Pacific Wood Preserving of Oregon.
- Replacement of the existing 4.6-acre asphalt cap, which is above the area within the existing slurry wall, with a more durable low permeability cap. The engineered asphalt cap shall be designed and constructed with due consideration given to onsite wood-treating operations. The cap will minimize direct contact with underlying contaminated soils.
- Excavation of contaminated soils from ditches that abut the West Facility, with on-property consolidation under an engineered cover or offsite disposal.
- Continued operation and maintenance of the barrier wall system, including extraction and treatment of groundwater from within the barrier wall. Groundwater extraction provides hydraulic containment to prevent contaminants from migrating beyond the barrier wall and to lower water levels to ensure the structural integrity of the overlying cap. Groundwater will continue to be treated in the existing onsite stormwater treatment system and discharged pursuant to the existing Oregon DEQ NPDES permit.
- Implementation of institutional controls to reduce the potential for human exposure to contaminated soil and groundwater. The ICs are necessary to ensure that the use of the West Facility remains industrial, that the caps are maintained in place for protection of current and future use by onsite workers, and that the groundwater is not used.

  - A legal description of the real property with a corresponding map will be prepared to clearly identify the property where the ICs will be implemented.
  - A restrictive easement or covenant that runs with the land will be required to ensure that there will be no future non-industrial land use of the West Facility (for example, no residential or recreational land use). The restrictive easement or covenant will also have provisions that set forth requirements for future use of the property, such as:
    - Breeching of asphalt caps must be conducted in a manner that is protective of human health and the environment.
    - Excavation and movement of soils from within the West Facility property must be conducted in a manner that is protective of human health and the environment.
    - Limitations on the use of shallow groundwater at the West Facility property, including a prohibition on use as drinking water. Well drilling and any groundwater use must be conducted in a manner that is protective of human health and the environment.
  - Registration with a One-Call Dig System and any similar systems will be implemented to protect the physical components of the remedy and to ensure that no inappropriate contact with contaminated soil and groundwater occurs by utility companies or other authorized entities.
  - ICs will be monitored for effectiveness as part of five-year reviews.
- Long-term monitoring of groundwater quality to ensure contaminated groundwater is controlled onsite.
  - An Operation and Maintenance Plan for the Barrier Wall System shall be prepared. This plan will include a periodic evaluation of the long-term effectiveness and protectiveness of the barrier wall system.
  - A Long-term Monitoring and Reporting Plan for Groundwater at the TLT site will be developed and will include, at a minimum, the following:
    - Monitoring objectives, overview of monitoring approach, monitoring program design, data analysis and interpretation, reporting requirements, schedule, Field Sampling Plan, Quality Assurance Project Plan, Health and Safety Plan, field forms, and other relevant information.
    - The primary objective of the monitoring program is to provide data that can be evaluated to document that PCP-contaminated groundwater is not migrating to the South Yamhill River, and is not migrating across Rock Creek Road to the residences and wells.
    - The monitoring program for shallow groundwater will include, but will not be limited to, water level measurements, field measurements of water quality parameters, collection and PCP analysis of samples from wells at the site, and comparisons of results to previous data. Wells that likely will be included in the

monitoring program will be the wells located south of the barrier wall and east of the Treatment Plant Area. Additionally, a new monitoring well will be installed near the former Geoprobe location GP-03. Additional monitoring wells will be installed as needed.

- o Deep groundwater from nearby residential well RW-01 will be analyzed for PCP on a periodic basis because the residents currently get their water from this well. This hand-dug well is apparently 30 feet deep, which would put the well into the siltstone aquifer. Groundwater from nearby well RW-02 will also be analyzed for PCP because groundwater has historically been extracted for on-property watering. Although groundwater PCP concentrations have not been a problem in these wells historically, EPA believes it is prudent to continue sampling these wells at least once per year for the next five years and beyond if deemed appropriate.

- As part of operation and maintenance, an Asphalt Cap Inspection and Maintenance Plan will be developed describing the program that will be implemented to ensure the long-term structural integrity of any capped areas, including the cap above and within the barrier wall, the 2.0-acre cap in the Treated Pole Storage Area, and any newly installed caps constructed as part of this remedy. The program will include scheduled visual cap inspections and specific repair and maintenance protocols.

12.2 SUMMARY OF THE RATIONALE FOR THE SELECTED REMEDY

The Selected Remedy represents the best balance of tradeoffs under the nine Superfund evaluation criteria, and will achieve RAOs through a combination of soil remediation, groundwater extraction from inside the existing barrier wall, institutional controls, operation and maintenance, and long-term monitoring.

Early cleanup actions were completed to address threats posed by contaminated soil and groundwater and DNAPL in the Treatment Plant Area of the West Facility. Included in these actions was the installation of an underground slurry wall and placement of a temporary cap over the wall. The wall was designed to control the flow of contaminated groundwater and DNAPL off-property and to the river. Data indicate that the barrier wall is effectively containing DNAPL and groundwater contaminants. A natural competent confining layer exists beneath this area to protect deeper groundwater. Additional engineered remedial measures are not necessary for containment. What was selected as an early action is the final action, and the development and detailed evaluation of a series of other cleanup alternatives was not required for this media.

The preferred alternative for media inside the barrier wall (installation of a high-quality permanent asphalt cap and continued operation and maintenance of the slurry wall system, including groundwater extraction and treatment to provide hydraulic containment) was selected over other alternatives because this cap will have greater durability, and will require less maintenance than the standard asphalt or concrete caps proposed in the other alternatives.

The limited area of groundwater contaminated with PCP outside the barrier wall is currently controlled by site conditions (i.e., water is stagnant). As contemplated in the Proposed Plan, EPA performed a more detailed technical evaluation of Alternative GW-3. Based on that evaluation (CH2M HILL, September 26, 2005), EPA selected Alternative GW-2 rather than GW-3. Given current site conditions, and results of analytical and numerical models that estimated the timeframe for addressing groundwater contamination, EPA determined that GW-3 does not provide increased protectiveness over and above GW-2. Alternative GW-4 (i.e., permeable reactive barrier) was much more costly and is believed to be technically infeasible for the site. A new monitoring well will be installed and sampled for PCP to fill a data gap identified on the eastern side of the West Facility. Institutional controls will restrict use of groundwater for drinking water on the West Facility. Long-term monitoring will ensure that the contaminated groundwater does not pose an unacceptable risk to human health or the environment (for example, sampling will be implemented to monitor whether contaminated groundwater is migrating offsite or to the river).

The preferred soil alternative was selected over other alternatives because it is readily implementable, is expected to achieve substantial and long-term risk reduction through containment, and is cost-effective. Other alternatives are much more costly and the costs may not be proportional to the overall increase in protectiveness. The preferred alternative is also consistent with current and future reasonably anticipated use at the site. For soils in ditches that abut the West Facility, the excavation of soils from the ditches will protect ecological receptors, as well as reduce potential exposure to humans that access the ditches, and minimize contaminant migration to the South Yamhill River.

For off-property soils contaminated with dioxins/furans, an EPA removal action was implemented at the one residence where dioxins/furans were found to present unacceptable risk.

The combination of these alternatives is selected because it is protective of human health and the environment, it reduces the risk within a reasonable time frame, is practicable and cost-effective, and provides for long-term reliability of the remedy. The Preferred Alternative satisfies the preference for treatment as a principal element of the remedy because extracted groundwater from within the barrier wall system is being treated.

Removal of all contaminated soil at the TLT site is not reasonable, practicable, or cost-effective. Contaminated surface soils can be addressed through a combination of excavation, consolidation, capping, offsite disposal, and institutional controls. Contaminated subsurface soils can be addressed through implementation of institutional controls.

EPA has determined that remediation in the East Facility is not warranted under this CERCLA action. DEQ is continuing to evaluate the need for cleanup actions outside the West Facility.

This site is in productive re-use. PWPO is operating under a DEQ NPDES permit for wastewater discharge and a DEQ air permit. PWPO is also subject to and must comply with all applicable RCRA and State of Oregon Dangerous Waste requirements, including those for addressing the generation, treatment, storage and disposal of hazardous waste. These regulations and requirements are independent of any Superfund action.

12.3 SUMMARY OF THE ESTIMATED REMEDY COSTS

The accuracy of the cost estimate for the selected remedy is -30% to +50%. The total capital cost to construct the selected remedy is estimated to be $2.9 million, and the estimated average annual present worth (7% discount rate for 30 years) for operation and maintenance is $78,000. The combined capital cost and total operation and maintenance present worth for the selected remedy is $5.3 million (Table 13). Capital costs are not discounted because construction will be performed in the first year.

The information in this cost estimate summary is based on the best available information regarding the anticipated scope of the remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the design of the remedy. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

EPA actions at Superfund sites are generally funded through federal funds, state funds, and/or contributions required from responsible or other party agreements. EPA is currently evaluating funding shares and responsibilities on this project. Certain activities (for example, cap inspection and maintenance, extraction and treatment of groundwater from within the barrier wall) will be implemented by PWPO pursuant to a 2002 Prospective Purchaser Agreement with EPA.

12.4 EXPECTED OUTCOMES OF THE SELECTED REMEDY

The Selected Remedy will reduce the environmental impacts associated with the soil and groundwater at the TLT site and will ensure protection of the South Yamhill River and Rock Creek. Completion of the remedy will protect human health and the environment for the surrounding community and future employees working at the TLT site. It is not anticipated that groundwater directly under the site would ever be used for drinking water. The TLT site will continue to be available for industrial land use, and will allow for the continued operation by PWPO. The implementation period for construction of this alternative is one year.

13.0 STATUTORY DETERMINATIONS

Based on information currently available, EPA believes the Selected Remedy provides the best balance of tradeoffs among the alternatives with respect to the CERCLA evaluation criteria. The remedy is protective of human health and the environment, complies with federal and state requirements that are ARARs to the remedial action, and is cost-effective. This remedial action uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

13.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy is protective of human health and the environment for the short and long term. The remedy will permanently reduce the risks presently posed to human health and the environment through a combination of excavation and offsite disposal of soils or by preventing contact with soils using a combination of low permeability cover and institutional controls; remediation of ditch soils; continued operation and maintenance of the barrier wall system, including extraction and treatment of groundwater from within the barrier wall; implementation of institutional controls to ensure the use of the property remains industrial and forbids drinking groundwater; and implementation of a long-term groundwater monitoring program.

13.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The selected remedy is expected to comply with all federal and state action-, chemical-, and location-specific ARARs. The ARARS for the selected remedy are set forth below:

- Oregon Environmental Cleanup Rules – Oregon Environmental Cleanup Rules (OAR 340-122) are applicable for the establishment of cleanup levels and selection of remedial actions for soil at the site. OAR 340-122-0040(2) requires that hazardous substance remedial actions achieve one of four standards: 1) acceptable risk levels, 2) generic soil numeric cleanup levels, 3) remedy-specific cleanup levels provided by Oregon DEQ as part of an approved generic remedy, or 4) background levels in areas where hazardous substances occur naturally. The selected remedy will meet this ARAR by achieving acceptable risk levels (i.e., standard 1) through excavation, consolidation, and capping (excess soils that are not consolidated onsite will be sent offsite to an acceptable disposal facility) and institutional controls. The Oregon Hazardous Substance Remedial Action Rules require consideration of treatment of hot spots to the extent feasible (OAR 340-122-0040). Hot spots were identified at the TLT site, and treatment was considered to the extent feasible. Hot spots will be addressed through excavation, consolidation, and capping (excess soils that are not consolidated onsite will be sent offsite to an acceptable disposal facility) and institutional controls.

- Oregon Hazardous Waste Regulations and federal RCRA (40 CFR Parts 260 to 268; OAR 340-100 to 340-106) – Federal regulations promulgated under RCRA, and corresponding state law, provide standards for the management and disposal of solid and hazardous waste. These regulations are applicable to the remedial action because it generates waste and treatment residuals. Waste sent off-property will comply with the Oregon RCRA rules pertaining to the generation, transportation, treatment, storage, and disposal of hazardous waste.

  The State of Oregon has adopted the RCRA Land Disposal Restrictions (LDRs) (40 CFR Part 268), which are applicable requirements for off-property treatment and disposal of soils classified as a hazardous waste. Because the West Facility meets the requirements to be an Area of Contamination (AOC), LDRs are not applicable if wastes are consolidated within the AOC, capped in place, or processed within the AOC (but not in a separate unit, such as a tank) to improve its structural stability.

  The RCRA regulations establish performance standards that are relevant and appropriate for the construction and maintenance of caps to the extent that the caps are being designed to prevent direct contact with surface soil contamination and to reduce vertical contaminant migration by minimizing stormwater infiltration. The specific RCRA regulations are 40 CFR Section 265.111 (Closure Performance Standards), 40 CFR Section 265.117 (Post-Closure Care), and 40 CFR Section 265.310 (Landfill Closure).

- Oregon Solid Waste Management Rules (OAR 340-093 through -097) – These rules are applicable to any treatment and disposal of solid waste (for example, construction debris) that may be generated at the site during implementation of the selected remedy.

- Oregon Well Construction and Abandonment Standards (OAR 690-210 and 690-022) – These standards are applicable to the construction, monitoring, and abandonment of any wells at the site.
- Federal Safe Drinking Water Act (40 CFR 141) – The primary drinking water standards address toxicity and are termed MCLs. MCLs regulate the concentrations of contaminants, including PCP, in public drinking water supplies and are considered relevant and appropriate for groundwater aquifers potentially used for drinking water. Groundwater from the shallow alluvial aquifer in the vicinity of the TLT site has been, and is currently, used for domestic purposes.
- Clean Water Act (40 CFR 122) – EPA has established federal Water Quality Criteria (WQC) under the Clean Water Act. Federal WQC form the basis of Oregon water quality standards (OAR 340-041). WQC are relevant and appropriate at the TLT site for groundwater migrating off-property to adjacent surface water bodies (South Yamhill River, Rock Creek). These standards also form the basis for the NPDES permit, Permit Number 101267, expiration date 11-30-2009, which covers treatment of extracted groundwater from within the barrier wall and discharge to the South Yamhill River.
- Clean Air Act (40 CFR 50) – The Clean Air Act (CAA) regulates emissions of fugitive dust, emissions from air pollutant sources, and establishes national ambient air quality standards and national emission standards for hazardous air pollutants. The CAA is applicable to activities that might generate dust, such as excavation. In addition, the Oregon General Emission Standards for Particulate Matter (OAR 340-208-0100 through -0210) are applicable to visible emissions and nuisance conditions that may be generated by the construction of the selected remedy. Dust generated from earthwork or other disturbance of on-property soils must meet nuisance standards for fugitive emissions.
- Endangered Species Act of 1973 (16 USC 1531 et seq., 50 CFR Part 402) – The federal Endangered Species Act (ESA) requires protection for certain plant and animal species and their habitat. The ESA may be applicable to the remedial action at this site because the roadside ditches that will be remediated are connected to the South Yamhill River, which is habitat to a threatened species (winter-run steelhead) listed by the National Marine Fisheries Service.
- Floodplain Management, Executive Order No. 11988 (40 CFR Part 6 Appendix A) – This Executive Order requires that federally funded or authorized actions within the 100-year floodplain avoid, to the maximum extent possible, adverse impacts associated with the development of a floodplain. This site is located within the 100-year floodplain for the South Yamhill River. The selected remedy meets the requirements of the Executive Order.
- Protection of Wetlands, Executive Order No. 11990 (40 CFR Part 6 Appendix A) – This Executive Order requires federal agencies to minimize the destruction, loss or degradation of wetlands to the extent possible, and to preserve the value of wetlands. Wetland species are present in the seasonal ditches (less than 10 feet wide) that abut the site. The selected remedy meets the requirements of the Executive Order.
- Migratory Bird Treaty Act of 1918 (16 USC 703, et seq.) – The Migratory Bird Treaty Act makes it unlawful to "hunt, take, capture, kill" or take various other actions adversely

affecting a broad range of migratory birds, including mallards, chickadees, and robins, and is relevant and appropriate for protecting migratory bird species identified at the site. This Act is applicable to the remedy at the site. The remedy will be carried out in a manner that avoids taking or killing of protected migratory bird species.

13.3 COST-EFFECTIVENESS

The selected remedy is cost-effective because it provides overall effectiveness proportional to its costs such that it represents a reasonable value for the money to be spent.

13.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a practicable manner at the TLT site. Of those alternatives that are protective of human health and the environment and comply with ARARs, the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal, and considering state and community acceptance.

13.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site whenever practicable. Principal threat waste includes waste with high concentrations of toxic compounds or is highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health and the environment should exposure occur.

Most of the principal threat waste at the TLT site was addressed by EPA's 2000 removal when the barrier wall was installed. The principal threat waste is located under the operating treatment facility inside the barrier wall and is not practicable to remove. The material is not very mobile, and the soils contain high concentrations of PCP, PAHs, and dioxins/furans. The selected remedy satisfies the preference for treatment because groundwater from within the barrier wall system is being extracted and treated.

13.6 FIVE-YEAR REVIEW REQUIREMENTS

Because this remedial action will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, statutory five-year reviews will be conducted every five years after initiation of remedial action to ensure that the remedy remains protective of human health and the environment.

14.0 DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE OF PROPOSED PLAN

There were no significant changes to the remedy as originally identified in the Proposed Plan. There were some minor estimated cost adjustments to reflect revised estimates for the soil and groundwater alternatives. Also, as stated and described in the Proposed Plan, Alternative GW-2 was selected instead of GW-3 based on results of a more complete technical evaluation. Details on this determination are provided in Section 12.2 of this ROD.

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Part 3.0: Responsiveness Summary

This section responds to comments received on the Proposed Plan for the Taylor Lumber and Treating Superfund Site Proposed Plan. The Proposed Plan was available for a 30-day public comment period from July 28 to August 26, 2005. A fact sheet describing the Proposed Plan was mailed to interested individuals and organizations prior to the public comment period. EPA provided an opportunity for a public meeting, but a public meeting was not requested from any party.

Comment letters were received from three parties:

- Environmental Technology Council (ETC) - A trade association that represents the commercial hazardous waste management industry.
- Interlink Business Management Inc. (ILBM) – A private Canadian consulting firm. The comment letter was written by the President of ILBM, who has recently represented Bennett Engineering and submitted a quote to EPA for offsite disposal of contaminated soil at the site.
- Pacific Wood Preserving of Oregon (PWPO) - The current property owner of the West Facility and operator of the existing wood-treating facility.

1.0 STAKEHOLDER COMMENTS AND LEAD AGENCY RESPONSES

Stakeholder comments are provided below as a direct quote or a paraphrased summary of the original comment. EPA's responses to the comments are provided in italics.

1. The residual risk that remains at the site from dioxin-contaminated soils, particularly for the workers and nearby residents, has been understated. Permanent removal of dioxin and arsenic-contaminated soil would eliminate future risk to workers and the community and is the only remedy that adequately considers overall protection of human health and the environment. The only reason the permanent off-site remedies were not chosen, despite their clear superiority to the other options (see Taylor FS Table 5-1), was the upfront costs. (ETC)

Highly impacted soil should be excavated and sent off-site for thermal treatment. This approach does not require long-term monitoring or operations and maintenance, and will provide permanent and economical solutions to the environmental problems. (ILBM)

Response: EPA carefully evaluated potential risks to humans and the environment at this site. We have already completed early actions to address acute risks at the site, through the removal of soil from drainage ditches and from a contaminated residential yard. We have also contained the most contaminated soils (as well as groundwater and DNAPL) within an underground barrier wall. It would be impracticable and would not be cost-effective to remove all of the contaminated material within the barrier wall.

With regard to the less-contaminated surface soils outside of the barrier wall, the selected remedy takes into account the current and future industrial use of the site. This factor was one of the key factors in determining how to deal with contaminated soil. Capping and/or excavation/consolidation/capping will provide a high level of protection for workers and neighbors (capping will reduce airborne dust), and is cost-effective. Off-site disposal of all contaminated soils is *much more costly than the selected alternative, and EPA believes that for this site the additional cost is not proportional to the overall increase in protectiveness. However, off-site disposal of some soils will be considered as we continue to work on the detailed design for the site.*

2. The preferred remedy for the soil and groundwater inside the barrier wall in the Treatment Plant Area is to repair the existing asphalt cap and implement institutional controls. The existing cap has incurred significant damage, and future heavy equipment traffic in the Treatment Plant Area will damage the cap. Will truck traffic patterns be changed to avoid cap abuse directly over the area of the greatest environmental hazard? (ETC)

The site is an operational industrial site with heavy machineries and trucking, which may adversely affect the life of the asphalt caps. Estimated costs do not adequately reflect operation and maintenance costs for repairing asphalt. (ILBM)

Response: The selected remedy for the soil and groundwater at this site will include the placement of more durable asphalt. The existing asphalt cap in the Treatment Plant Area was designed as a temporary cap, with the understanding that a more durable cap would be proposed as part of the cleanup remedy for the site. Thus, the original temporary cap was not designed to withstand the heavy use it has received. The ROD requires that the new cap be designed to withstand the PWPO's heavy equipment and traffic.

Changes in truck traffic patterns are not being considered because construction of durable asphalt caps are a well-proven technology, and caps have been implemented at many Superfund sites with operational industrial activities. Estimated costs do reflect operation and maintenance costs for repairing asphalt (see the table in the ROD "Cost Estimates for the Selected Remedy").

3. The original cap has failed since 2000. Has there been exposure because of this deterioration, and has EPA monitored for toxic releases since the deterioration? (ETC)

Response: In 2000, the temporary asphalt cap was constructed over 4 inches of clean structural fill. To date, cap 'failures' have only consisted of small cracks in the asphalt. These small cracks have not resulted in exposure to onsite workers due to the nature of the cracks and the clean fill underneath (that is, contaminated soils have not been released through these cracks). It is conceivable that the cracks could have allowed stormwater to infiltrate below the cap, but this would not result in exposure because groundwater is contained within an underground barrier wall. Monitoring has shown that the barrier wall has been effective in containing contaminated groundwater. Finally, the current operator, PWPO, implements an EPA-approved program to inspect and maintain the asphalt cap pursuant to a Prospective Purchaser's Agreement with EPA.

With regards to 'toxic releases,' monitoring of soil around the cap has not been required because the clean fill under the temporary cap provides a barrier which protects workers from exposure, and we believe that the contaminated soils under this clean fill have not been released through the cracks in the asphalt.

4. EPA plans to continue the institutional controls that were in place since 2000. Will these institutional controls be effective and who is responsible for their upkeep? What incentives are possible for the present owner to assure the cap will be maintained? (ETC)

Response: The institutional controls that are cited in the ROD to be implemented as part of the remedy are not currently in place and represent an increase in the protectiveness over what is currently being implemented. A restrictive covenant or easement limiting the use of the property to *industrial uses, which is the relevant institutional control selected in the ROD, will be effective in limiting exposure to contaminants that remain in place. No upkeep is required to implement this institutional control. (It is noted that the West Facility property is currently zoned for industrial use). The current owner's covenant not to sue (as well as that of any successive owner) is conditioned on its compliance with the terms of the Prospective Purchaser Agreement, which require it to maintain the asphalt cap. EPA's relationship to date with PWPO has been positive and we see no reason for that to change. In any event, we believe that, should an incentive be required, the possible loss of the covenant not to sue (and subsequent incurrence of Superfund liability at the site) is sufficient to ensure their ongoing assistance at the site. EPA will evaluate the effectiveness and protectiveness of the institutional controls as part of its five-year reviews of the site.*

As a note, maintenance of caps is generally considered part of Operation and Maintenance and is not generally considered an institutional control. The ROD provides information on the development and implementation of an Asphalt Cap Inspection and Maintenance Plan.

5. Why is there a liner with BW-2 and not BW-3? (ETC)

EPA regulations require a lining for caps at sites contaminated with high levels of dioxins/furans. Further, replacement of liners in future years will negatively impact budgeting, rendering the cap less economical. (ILBM)

Response: Alternatives BW-2 and BW-3 include liners. Alternative BW-4, which is part of the selected remedy, does not include a liner but instead uses engineered asphalt. Engineered asphalt is the better choice for this site because of its high durability, strength, and low permeability. EPA included the replacement of the liners and cap into its cost estimates. The cost of replacing the engineered asphalt is lower than the cost of replacing liners and will be more economical over time. See Table 13 in the ROD for Cost Estimates of the Selected Remedy.

The use of engineered asphalt meets EPA RCRA closure regulations. The engineered asphalt permeability is designed to be at or below 1 x 10-8 cm/s, and this is lower than the permeability of 1 x 10-7 cm/s discussed in RCRA guidance. Low permeability can be achieved without a liner. We do not have the additional option of using a liner with the engineered asphalt because the asphalt must be applied at a high temperature, which would damage the liner.

As a final note, of all the surface soil samples analyzed for dioxin/furans at the West Facility, only two samples had concentrations of dioxin TEQ that were greater than the OSWER generally recommended commercial/industrial range (5 – 20 ppb).

6. Cost estimates for the soil alternatives should include costs associated with addressing problems resulting from the proposed increases in site grade elevations (for example, problems for drainage and alignment with existing structures). Without these costs, the alternatives cannot be compared. The Agency may think that these are costs to be paid by the current owner. (ETC)

Response: EPA bases its cost estimates on its experience at similar sites. Consideration of costs related to site grade elevations cannot be determined until the remedy is designed. However, EPA believes that these cost adjustments would be minimal and would be insignificant compared to differences in costs between alternatives. EPA will solicit input from PWPO during the design of the remedy to minimize this type of problem.

7. The preferred soil alternative relies on institutional controls for non-hot spot areas. This part of the remedy is not adequate to protect workers and nearby residents in the

community because EPA proposes to rely on work rules that must be in place and followed for the next 30 years. This is a severe burden on work rules and employee behavior. How will institutional controls be implemented and enforced, are they practical, and will they be overly disruptive. (ETC)

Response: Active remediation (for example, capping, excavation) will be used in areas that pose higher risk to onsite workers. A restrictive covenant or easement will ensure that the site remains in industrial use. For industrial use scenarios, the areas not subject to active remediation do not pose an unacceptable risk.

During the RI/FS, residences and other neighboring properties were investigated, and unacceptable risks were not identified (except for one residence where an early action cleanup was implemented). Thus, the remedy does not require institutional controls for any "nearby residences."

8. Institutional controls may be effective on private industrial sites, but on this site, the responsible party is bankrupt and the present occupant has signed a prospective purchaser agreement that limits its liability. The new owner, Pacific Wood Preserving Company, will apparently be saddled with much of the responsibility to assure the historic contamination, which EPA plans to leave, will not be disturbed. What can EPA give the new owner besides a free paving job to accept this burden? This purchaser will be required to operate over a Superfund site that needs constant monitoring, will limit any eventual resale value, probably limit its environmental insurance options, and require numerous, although as yet unstated, limits on how it can operate on its own property. What additional incentives can the Agency give to make the owner take responsibility for the many institutional controls that only it can adequately police? (ETC)

Response: The current owner of the site, Pacific Wood Preserving of Oregon (PWPO), did not assume any CERCLA liability for historic contamination at the Taylor Lumber and Treating Site when they purchased the property. However, the terms of their Prospective Purchaser Agreement (PPA, the agreement with the United States that granted them liability protection) requires them to perform operations and maintenance (O&M) for cleanup actions taken at the site. If PWPO fails to comply with the terms of the PPA, including those requiring O&M, their liability protection will cease. Since PWPO took control of the property in 2002, they have been performing O&M on the asphalt caps and the stockpiled soil cells, as well as maintaining gradient inside the barrier wall by pumping and treating excess water. EPA has every reason to believe that PWPO will continue to comply with the PPA by performing O&M at the site, and we believe that the possibility of losing their liability protection is sufficient to ensure their continued compliance in the future. Further, PWPO has granted EPA and the State full access to the property for any cleanup-related purpose, including monitoring the adequacy of PWPO's O&M and compliance with any institutional controls.

9. The barrier wall is unreliable and would leak before its life term. The most effective barrier wall would last no more than 15 years and will potentially leak into the soil and ground water, thus allowing for the migration of contaminants. Once the wall barrier reaches its life span and requires replacement, a 2-year construction process will pose another risk period to humans and animals. (ILBM)

Response: EPA is not aware of any studies that conclude the barrier wall is unreliable. Nationally, EPA conducted a study to evaluate subsurface engineered barriers at waste sites in 1998. Soil-bentonite slurry walls were the most widely used technology. The study concluded that, if properly designed and installed, these barriers are effective containment systems for their typical minimum 30-year design life; however, the design life theoretically extends to a very long time given the nature of slurry wall materials (for example, primarily soil and clay). Available technologies are somewhat recent in age with little available monitoring data that measures barrier performance with time (for example, beyond 30 years). Some walls have been in place since the 1970s without reported decreases in effectiveness. Although data may be inadequate to predict the actual lifespan, none of the monitoring data reviewed indicated a decrease in effectiveness as a function of time. Design must include an adequate cap to protect against erosion, desiccation, and physical disturbance, as well as protection from surface loading. Design and construction of the cap and soil-bentonite slurry wall at the TLT site fulfilled these requirements. Together with the groundwater extraction wells, these components should provide a permanent containment system. Proper maintenance and adequate monitoring will ensure this outcome.

10. In Table 3 of the Proposed Plan, the estimated cost for Alternative SO-4 does not reflect the correct amount for off-site treatment. The treatment cost for 33,000 tons of soil, including shipping, thermal treatment and disposal, would be at US$375 per ton (total of $12.4 million). An additional $30 per ton would be charged for soil that contains heavy metals for secure landfill disposal. Furthermore, the time period required for excavating and off-site shipping is only a few months, not 2 years as per the Proposed Plan. (ILBM)

Response: Our estimate is that the total mass of soil to be treated is approximately 50,000 tons, not 33,000 tons. Thus, assuming slightly less than half of the soil contains heavy metals, the total cost of transport treatment and disposal is $19.5 million. The estimated time period for cleanup is one to two years from issuance of ROD. This time frame allows for remedial design, contracting, construction, and preparation of construction completion reports.

11. Another reason for not allowing capping at the site is that EPA regulations do not allow for soil manipulation. (ILBM)

Response: Capping is allowed under EPA regulations. For example, capping is clearly part of the closure of any landfill. One variation of RCRA's landfill approach is an Area of Contamination or AOC (see, for example, Management of Remediation Waste under RCRA, EPA 530-F-98-026, February 1998). The West Facility meets the requirement to be an area of contamination or AOC. This means that soils may be consolidated within the AOC, and capping is an available option. RCRA Land Disposal Restrictions are not applicable to contaminated soils that remain within or are consolidated within the AOC. Therefore, CERCLA and RCRA regulations allow for capping at this site.

12. PWPO would like EPA's assurance that all excavated backfilled areas and asphalt caps be designed and constructed to support the traffic volumes and loads experienced in those areas. (PWPO)

Response: During design of the remedy, EPA will consider traffic volumes, loads, and traffic patterns of the onsite wood-treating operations, as contemplated by the Prospective Purchaser Agreement with Pacific Wood Preserving of Oregon.

13. In the discussion of Alternative SO-2, EPA states: "If cost-effective, excess soils that are not placed onsite may be sent off site to an acceptable disposal facility." Has EPA decided what it will do with "excess soils" if it is not cost-effective to send them off-site? (PWPO)

Response: At this time, it would be premature for EPA to make a decision about what we will do with "excess soils." During remedial design of the remedy, which will start after the Record of Decision is signed, EPA will develop a more detailed plan for this component of the remedy for the site. The plan will describe the information (for example, excavated soil volumes, degree of soil contamination, size and locations of areas available for consolidation of soils) needed by EPA to make decisions about on-property and off-site disposal of soil.

14. Based on site operating conditions, PWPO prefers Alternative BW-2 over BW-4. A new subgrade and a 12-inch concrete cap will provide a more durable operating surface than breaking up the top 8 inches with no cap thickness specified. (PWPO)

Response: EPA will consider this recommendation during design of the remedy. Both alternatives are similarly protective, and at the time of the FS the capital costs for BW-4 were less than for BW-2. However, since the FS, the costs of asphalt have increased as oil prices increase, and costs for these alternatives may be more similar. The increase in grade elevations resulting from BW-4 will also need to be more thoroughly evaluated (for example, with regards to potential concerns with onsite drainage patterns and building alignment).

15. EPA has indicated that site grades will be established in consideration of existing facility operations. Because site grades are a critical factor in the efficient operation of the facility, PWPO would like EPA's assurances that all changes in site grade will be subject to PWPO's review and concurrence. As addressed in the Agreement and Covenant Not to Sue, PWPO will work with EPA in a cooperative endeavor to implement needed changes in grade, but in a way that ensures that any changes to the existing site grades do not adversely impact the ability to efficiently operate the facility. (PWPO)

Response: EPA intends to work with PWPO to design a remedy that is protective of human health and the environment and takes into consideration concerns raised by PWPO.

16. Additional paving at the site will increase the volume of stormwater collected and processed through the stormwater treatment system. It has not been demonstrated that the existing system can handle this additional volume. As a result, EPA may need to incur capital costs in addition to those shown on Table 3. Even if the existing system can handle the increased volume, the additional administrative, maintenance, and operating costs resulting from these additional volumes need to be included in the O&M costs shown on Table 3. (PWPO)

Response: Treatment costs of additional surface water resulting from increasing the paved area is expected to be minor. It is estimated that the percentage of paved area in the Treated Pole Storage and Treatment Plant Areas will increase from about 30 percent to about 60 percent. However, under current conditions, the unpaved areas are highly compacted gravel and silt, which already have a low infiltration rate (possibly only 10 to 15 percent higher than asphalt), and thus are already contributing stormwater runoff to the system during heavy rains. Based on preliminary calculations, peak stormwater runoff from these two areas after additional paving would be expected to increase by 5 to 10 percent. Nevertheless, during remedial design, a more thorough runoff evaluation will be conducted, and the capability of the existing stormwater treatment system to handle increased volume will be evaluated.

17. Treating groundwater from outside the barrier wall through the existing onsite water treatment system will increase the volume of water collected and processed, and will increase operation and maintenance costs. (PWPO)

Response: EPA selected a remedy that does not include groundwater extraction from outside the barrier wall.

18. PWPO assumes EPA has included all costs associated with Institutional Controls and Monitoring in its O&M costs shown on Table 3, except for those costs specifically assumed by PWPO in the Agreement and Covenant Not to Sue. (PWPO)

Response: The O&M cost estimates shown in Table 3 reflect EPA's current best estimates for all O&M costs, including those that are being incurred by PWPO.

19. In the Agreement and Covenant Not to Sue, EPA has agreed, consistent with its responsibilities under applicable law, to use reasonable efforts in minimizing any interference with plant operations during the implementation of response actions. PWPO would like to work with EPA to coordinate activities in a manner which enables EPA to implement the plan and at the same time allows PWPO to meet the needs of its customers. (PWPO)

Response: EPA will continue to coordinate with PWPO, consistent with the agreement, to minimize interference with facility operations while proceeding with the cleanup in a manner that is protective of human health and the environment.