

**FIVE-YEAR REVIEW
WESTERN PROCESSING SUPERFUND SITE
KENT, WASHINGTON**

Third Five-Year Review Report

for

WESTERN PROCESSING
Superfund Site

Kent, Washington

SEPTEMBER 2003

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Prepared by:

United States Environmental Protection Agency
Region 10
Seattle, Washington

Approved by:

Date:

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September 30, 2003

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Office of Environmental Cleanup
U.S. EPA, Region 10

List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
WDOE	Washington Department of Ecology
ESD	Explanation of Significant Difference
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PAH	Polyaromatic Hydrocarbon
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SDWA	Safe Drinking Water Act
VOC	Volatile Organic Compound

Executive Summary

The remedy for this site was selected prior to passage of the Superfund Amendments and Reauthorization Act (pre-SARA) and the remedy would not allow unlimited use and unrestricted exposure, and thus this is a policy Five-Year Review. Although, a substantial amount of remediation activities were completed at the site prior to the last five-year review (9/98), numerous remedial activities have been conducted since then. The work was completed as part of the alternative cleanup strategy approved by EPA in a December 1995 Explanation of Significant Differences document. The overall strategy was to convert the site from pump and treat to groundwater containment. Most of this new work was successfully completed by the end of 1999 at a cost in excess of \$40 million. The work included abandonment of the old treatment plant and numerous wells, hot spot soil removal, construction of a new extraction system, extraction wells, automated treatment plant, isolation slurry wall, and a RCRA cap.

EPA and Washington State Department of Ecology (WDOE), referred to as the Governments in Site-related documents, have continued to conduct oversight, but now at a much reduced rate. We now hold routine quarterly meetings on-site and review of site activities is accomplished through data/ document reviews and field inspections. As a result of implementing the alternative control strategy the Trust which operates the site has reduced annual operating costs from about \$5 million per year to about \$600,000. The data indicate that the strategy as designed and implemented has operated successfully and resulted in dramatically decreasing the pumping and treatment rates needed to contain the plume onsite. In 2000 the extraction wells in the so called "Trans Plume Area" were turned off as part of a monitored natural attenuation program. The contamination in that area has steadily declined and monitoring data indicated the plume is biodegrading to levels well below the ROD action levels. The site file includes a record of the documentation of Site remedial activities and performance.

The remedy for the Western Processing site currently protects human health and the environment because the contaminated groundwater and soil in the source area are contained by the slurry wall, the RCRA cap and the containment pumping and treatment system. The groundwater concentrations off the WP property are decreasing and there are no exposures to site contaminants. However, for the remedy to be protective in the long term, institutional controls that will run with the land need to be placed on the property.

Five-year Review Summary Form

Site Identification

Site Name: Western Processing
EPA ID Number: WAD0009487513
Region: 10
State: Washington
City/County: Kent, King

Site Status

NPL Status: Final
Remediation Status: Operating under LTRA
Number of OUs: One
Construction Completion Date: December 1995

Review Status

Lead Agency: US EPA

Author Name: Lee Marshall
Author Title: Project Manager
Author Affiliation: EPA, Region 10

Review Period: August 2003 through September 2003
Date of Site Inspection: September 23, 2003
Type of Review: Policy
Five-Year Review Number: 3

Triggering Action: Previous Five-Year Review Report
Triggering Action Date (WasteLAN): September, 1998
Due Date: September, 2003

Issues

Since hazardous substances remain onsite under the ROD and ESD cleanup plans, permanent Institutional Controls that will run with the property need to be developed for protection future property users from accessing the subsurface soil and the groundwater and to protect the remedy. The current land owner is quite elderly and may not be capable of implementing the IC's.

Recommendations and Follow-up Actions

It is recommended that permanent Institutional Control be implemented for inclusion on the deed, as required by the ROD and ESD. Even though the site is zoned industrial/commercial it should have proper documentation to alert future property owners about potential soil and groundwater contamination.

Protectiveness Statement

The remedy for the Western Processing site is currently protects human health and the environment because the contaminated groundwater and soil in the source area are contained by the slurry wall, the RCRA cap and the containment pumping and treatment system. The groundwater concentrations off the WP property are decreasing and there are no exposures to site contaminants. However, for the remedy to be protective in the long term, institutional controls that will run with the land need to be placed on the property.

Other Comments

None

Third Five-Year Review Report

Western Processing SUPERFUND SITE Kent, Washington

I. INTRODUCTION

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR § 300.430(f)(4)(ii) which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The US Environmental Protection Agency (EPA), Region 10 conducted the Five-Year Review of the remedy implemented at the Western Processing Site, located in Kent, Washington. This third Five-Year Review for Western Processing site was conducted by the EPA Remedial Project Manager (RPM) from August 2003 through September 2003. This report documents the results of the review.

This is the third five-year review for the Western Processing site. The triggering action for this review is the completion of the second Five-Year Review Report, dated September, 1998. The five-year review is required because hazardous substances, pollutants, or contaminants remain in the soil and groundwater above levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

Table 1 Chronology of Site Events
Western Processing

<u>Date</u>	<u>Event</u>
7/83	Site closed by court order
7/83	Emergency removal of site wastes
9/83	Site placed on NPL
8/84	1 ST Consent Decree entered by the Court
11/84	Surface Cleanup
3/85	RI/FS released
9/85	Record of Decision issued
9/86	Amended Record of Decision issued
4/87	Consent Decree entered by the Court
4/87	Subsurface remediation begun
10/88	Operations for both P&T systems begun
10/88	Slurry wall constructed around the site
3/90	Three-Year performance standards achieved for Mill Creek
8/93	Mill Creek restoration
12/93	First Five Year Review
11/94	East Drain extraction system installed
9/95	TI Waiver Petition submitted
12/95	ESD issued in response to TI Waiver Petition
6/96	Containment wells installed
1/97	Containment pumping phased into operation
6/97	New treatment system started
10/97	Isolation wall installed
10/97	Final on-site subsurface waste removal
09/98	Second Five Year Review
10/98	Completion for Sector 4 work
10/99	RCRA Cap completed
04/00	Trans Wells Shut off

III. BACKGROUND

Site Location and Description:

The Superfund Site was placed on the National Priorities List (NPL [Superfund List]) in September 1983.

The Western Processing Company, Inc., operated from 1961 to 1983 on a 13-acre parcel of land approximately two miles north of the city center of Kent, Washington in the Kent, Green River Valley (See Figure 1-1). The area was a former farming region developed into a light industrial/commercial area. The area to the north is undeveloped. East of the Site lies the Interurban Trail used by walkers and bicyclists and a railroad drainage ditch (East Drain). The area south of the Site has been developed for light industry. The Site is bounded on the west by Mill Creek, which flows in a northerly direction into the Black River, a tributary of the Green River, which becomes the Duwamish River before ultimately emptying into Puget Sound at Seattle. The Site is located outside the 100-year flood plain over an alluvial shallow aquifer, with the groundwater table at 5 to 10 feet below ground surface (bgs). There are no wells currently used for drinking water in the shallow aquifer within a one-mile radius of the site.

Background water quality of the shallow aquifer does not meet current drinking water standards, primarily for inorganic compounds. The city of Kent (pop. 71,610), of which the Site is a part, obtains its drinking water from a much deeper, hydraulically isolated artesian aquifer more than a mile southeast (hydraulically up gradient) of the Site.

Three major geologic units comprise the hydrogeologic system in the vicinity of the Site. These units comprise the White River Alluvium, the valley fill deposits that occur throughout the Kent Valley and beneath the Site. Alluvial fill consists primarily of sand, silt, and clay with occasional layers of sandy gravel. White River Alluvium is not considered to be a major drinking water source due to naturally occurring poor water quality. Groundwater is encountered at 5 to 10 feet bgs. Shallow groundwater (Zone A [shallow aquifer in a complex sequence of discontinuous interbedded silt, sand, and clay lenses to a depth of 40 feet bgs]) flows northwest from the site and discharges into Mill Creek. The deeper aquifer (Zone B [a fairly continuous fine to medium sand with intermittent silty zones existing below 40 feet extends to a depth of 80 feet bgs]) begins approximately 40 feet bgs. Groundwater in this unit flows northwest also, but generally passes below Mill Creek. Contaminants in Zone B were transported downgradient of the Site and Mill Creek; contaminants in Zone A migrated to Mill Creek prior to the installation of a slurry wall around the Site. A third groundwater zone, Zone C, extends from about 80 to 120 feet bgs and has not been impacted by Site activities.

Originally, Western Processing was a reprocessor of animal by-products and brewer's yeast. Subsequently, the business expanded to recycle, reclaim, treat, and dispose/bury/store many different types of industrial wastes. Over 300 businesses, including some of the Pacific Northwest's largest industries, had contracts with Western Processing to handle their wastes. Processes at the Site included the recovery of metals from sludges and liquid wastes; spent solvent recovery; reclamation of caustics, flue ash, and ferrous sulfide; reprocessing pickle liquor; electrolytic destruction of cyanides; chemical recombination to produce zinc chloride and lead chromate; and waste oil reclamation. Operations ceased in 1983 by order of the EPA.

Site History:

A) Early Investigations

Following much attention to the Western Processing facility by many local agencies in the 1970s and early 1980s, the U.S. Environmental Protection Agency (EPA) inspected the facility in March 1981 to determine compliance with the then new Resource Conservation and Recovery Act (RCRA) regulations. In August 1982, EPA issued a RCRA 3013 order requiring Site owners/operators to investigate contamination in soil, surface water, and groundwater. Due to failure of the owners/operators to comply, EPA undertook the investigation in September 1982. Analysis of over 160 soil and groundwater samples confirmed that hazardous substances had been released into the environment, had contaminated the shallow aquifer, and had caused widespread contamination of soils at the Site.

B) Early Actions

In April 1983, EPA issued a CERCLA Section 106 order requiring the owners/operators to cease operations immediately and to provide assurances that they would conduct a cleanup. When these assurances were not obtained, EPA used Superfund money to conduct an immediate removal operation to stabilize the Site. Work began in late April 1983 and was completed in July 1983. Over 1,900 cubic yards of solids/sludges and 930,000 gallons of waste liquids and hazardous substances were removed from the Site. The Western Processing facility was permanently closed by court order in July 1983 and was listed on EPA's National Priorities List in September 1983.

Using state funds, the Washington Department of Ecology (Ecology) implemented storm water control measures at the site in the fall of 1983.

C) Surface Cleanup

The Focused Feasibility Study for Surface Cleanup was published in June 1984. Under a Consent Decree, a group of over 190 Potentially Responsible Parties (PRPs), currently referred to as the Western Processing Trust Fund (Trust), undertook the surface cleanup, designated Phase I of the remediation, in July 1984, at a cost of over \$10 million. Over 2,400 truckloads of chemical waste and contaminated soil and debris were removed from the Site. Once all surface structures (buildings, tanks, impoundments, and waste piles) were cleared from the Site, the site was graded to prevent Site stormwater runoff, a plastic-lined pond was constructed to contain collected storm water, and a portable treatment plant was brought on site to treat the water.

Surface cleanup was completed in November 1984, with the exception of a dioxin-contaminated oily liquid discovered in one storage tank. No other dioxin contamination was found on site. This liquid was drummed and placed in plastic-lined trailers on the Site. Numerous attempts were made to arrange for disposal of this material, primarily through incineration at off-site locations. However, public and news-media reaction prevented this method of disposal. Finally, in 1986, after a two-year search for disposal alternatives, the Trust had the dioxin destroyed by successfully treating approximately 6,000 gallons of dioxin-contaminated liquid on site with the KPEG (potassium hydroxide, polyethylene glycol) mobile chemical dechlorination process. Residual material from the treatment process was shipped to Chemical Waste Management's SCA incinerator in Chicago.

D) Remedial Planning Activities

EPA's phased Remedial Investigation/Feasibility Study (RI/FS) work, which began during the summer of 1983 and proceeded simultaneously with the surface cleanup, added to the information obtained from the study following the RCRA 3013 order. Over 90 of EPA's 126 priority pollutants were found in soil, groundwater, and surface water, with heavy metals, polychlorinated biphenyls (PCBs), phenols, and volatile organic compounds (VOCs) being the predominant contaminants. Over 95% of the contamination was determined to be in the uppermost fifteen feet of soil. Groundwater contamination for the most part was concentrated from the water table to approximately 30 feet bgs (i.e., within Zone A). Extremely high concentrations of contaminants were found in this shallow groundwater with maximum detected concentrations of up

to 510,000 micrograms/kilogram ($\mu\text{g}/\text{kg}$; parts per billion [ppb]) of zinc, up to 5,400,000 ppb of total semivolatile organic compounds, and up to 1,346,000 ppb of total volatile organic compounds (VOCs).

In March 1985, the complete RI/FS was released to the public. A series of four public meetings/workshops was held at Kent City Hall. By the second meeting, virtually all attendees were parties with financial interests in the cleanup. Alternatives involving excavation and off-site disposal with groundwater pumping appeared to be favored.

An intensive soil and subsurface waste sampling program was conducted by the Trust in the fall of 1986 to obtain pre-design information for excavation of the most highly contaminated subsurface wastes. During that test program, concentrations of metals in soils were detected at up to approximately 141,000 milligrams/kilogram (mg/kg ; parts per million [ppm]) of lead; 10,000 ppm of PCBs; 53,000 ppm of total polycyclic aromatic hydrocarbons (PAHs); and 580 ppm of individual (e.g., trichloroethene) VOCs. Contamination had not been detected beyond a depth of about 70 feet bgs. Off-property surface soils analysis indicated the presence of metals and organic compounds, which may have been transported off the property by wind.

Site shallow (Zone A) groundwater flows to the northwest into Mill Creek. The RI/FS indicated that, conceptually, groundwater is captured to a depth of approximately 50 to 60 feet below grade, i.e., Mill Creek acts as a hydraulic barrier for the flow of shallow contaminated and deeper, less contaminated groundwater. Groundwater not subject to capture by Mill Creek (also flowing to the northwest) became known as the "regional groundwater." The "capture" effect of Mill Creek on site groundwater produced the initial belief that contaminated groundwater was unlikely to migrate beyond the creek.

Later installation of additional monitoring wells west of Mill Creek led to a Supplementary Remedial Investigation (SRI). The SRI, resulting in a July 1986 report, revealed that a plume identified at the time as trans-1,2-dichloroethene (referred to as the trans plume) had migrated under Mill Creek and was detected in wells west of the creek.

E) Record-of-Decision (ROD)

On September 28, 1985, the EPA Regional Administrator approved a ROD requiring the following remedial objectives/major cleanup elements:

1. Conduct extensive soil and subsurface waste sampling program, on and off site property;
2. Excavation and off-site disposal of the most-highly contaminated soils and non-soil material;
3. Elimination of direct contact threats in nearby off-property areas by excavation of all soils exceeding the acceptable daily intake (ADI) level or the 1×10^{-5} (1 in 100,000) excess cancer risk level and by covering remaining soils having above background concentrations of priority pollutants;
4. Construction of a shallow groundwater extraction system; and operation, for a minimum of 5 to 7 years,
5. Construction, operation, and maintenance of a groundwater treatment plant;
6. Construction, operation, and maintenance of a stormwater control system;
7. Excavation of contaminated Mill Creek and East Drain sediments which may have been affected by Western Processing;
8. Attainment of the Mill Creek performance standard, identified as the ambient water quality criteria for aquatic organisms or the upstream background, and excavation of contaminated Mill Creek sediments;
9. Extensive monitoring of Mill Creek, the East Drain, groundwater, and the groundwater extraction/treatment system performance;
10. Construction and maintenance of a RCRA consistent cap over Area I after pumping is completed;
11. Long-term surface water and groundwater monitoring;
12. Perform conditionally required actions if the performance standards are not achieved or if it appears that more than 20 years of groundwater extraction will be necessary; and

13. Apply institutional controls, such as deed restrictions, as needed.

An amended ROD was signed on September 4, 1986. Essentially, it required remediation (construction and operation of a groundwater extraction and treatment system) of the trans plume which had migrated off the facility and was detected just west of Mill Creek, during the SRI. It was later determined that what was originally identified as trans-1,2-dichloroethene was, in fact, a chemically similar compound, cis-1,2 dichloroethene.

ROD CLEAN UP GOALS

Cleanup Goals/Standards

As determined by the Consent Decree, the following cleanup goals were established:

Surface water quality goals for Mill Creek (adjacent to site) are Federal Ambient Water Quality Criteria (AWQC) or background-derived concentrations where upstream concentrations approach or exceed the AWQC. These goals are applied at designated downstream sampling points. The Consent Decree required that these goals be met within three years.

Prior to remediation, shallow groundwater from the Site discharged to Mill Creek. The surface water requirements were a means of measuring cleanup within shallow groundwater beneath the site. There were no other on-site cleanup goals set for the shallow groundwater. Trans plume groundwater performance standards established in the Consent Decree are the RMCLs for cis- and trans-1,2-dichloroethene, 70 ug/l in the B Zone. These standards only apply to the trans plume identified at the time of the Consent Decree and do not apply to all offsite areas.

Performance Goals

As determined by the Consent Decree, the following treatment performance goals have been established:

Achievement of an inward flow of shallow groundwater (<40 ft bgs) within a specified area of the site. This area is approximately defined by the property boundaries. Achievement of either: 1) a reversal of groundwater flow for Zone

B at a depth of 40 to 70 feet at the western boundary of the site; or 2) establishment of a hydraulic barrier to regional groundwater flow at the 40- to 70-foot depth at the western boundary of the site.

All air emissions must comply with a discharge permit issued from the Puget Sound Air Pollution Control Agency.

Combined wastewater effluent from the treatment systems must meet discharge criteria included in the POTW discharge permit.

F) Consent Decree

After the September 1985 signing of the original ROD, EPA had extensive negotiations with the PRPs and began actions to conduct a Fund-lead cleanup. However, in 1986 individual PRPs, precursors to the Trust, signed the Phase II Consent Decree for the subsurface cleanup described in the ROD. Following a public comment period, the decree was entered by the court in April 1987.

IV. REMEDIAL ACTIONS

A) Subsurface Cleanup

In the fall of 1986, the Trust retained HDR Infrastructures to conduct the intensive soil and soil/waste sampling program and geophysical investigation. An on-site lab was set up for fast sample turnaround. Over 1,500 soil and waste samples-were taken and analyzed over a four-month period. This data was used later to determine the limits of excavation of on-site subsurface specific wastes and off-property contaminated soils.

In January 1987, the Trust selected Chemical Waste Management (later known as OHM Remediation Services Corp and currently as OHM/IT) as prime contractor, with Canonie Environmental and HDR Infrastructures as subcontractors, to conduct the Phase II subsurface cleanup at a cost then estimated at \$40 million. The Trust submitted work plans for the remedial action, which were approved by EPA and Ecology. Activities were conducted consistent with the Consent Decree, the NCP, and other state and local requirements.

Subsurface cleanup began on a fast-track management schedule during which design and construction proceeded simultaneously. In the summer of 1987,

construction activities began which included: excavating over 20,000 cubic yards of highly contaminated soil and sludge, installing two extraction and treatment systems, and engineering a slurry wall to enclose the Site. Groundwater extraction and treatment began in October 1988. During the summer and fall of 1987, approximately 25,600 cubic yards of subsurface soils and wastes were excavated and hauled to the Arlington, Oregon, Class I RCRA landfill. This amount was substantially in excess of the 10,000 cubic yards required under the Consent Decree.

B) Groundwater Cleanup

Installation of 54 new monitoring wells to be used in the long-term groundwater monitoring program occurred in late 1987 and early 1988. Implementation of the monitoring program, including Mill Creek/East Drain monitoring, began in January 1988. The PRPs chose to construct an on-site lab, comparable to an EPA Contract Laboratory Program (CLP) lab and dedicated to analyzing Western Processing samples, rather than send samples off site. Construction of the lab started in August 1987 and was completed in January 1988. Peak load for the lab was expected to be over 9,000 samples analyzed per year from the Western Processing site. Capacity was later increased to more than 11,000 site-specific samples per year.

Construction of the shallow groundwater extraction and infiltration system and the trans plume extraction system began in January 1988 and was completed in May 1988. In addition, seven "barrier" monitoring wells were installed west of Mill Creek.

Remedial systems at the site originally included an on-site extraction and treatment system, an off-site extraction and treatment system, and a slurry wall that enclosed the 14.5-acre site. The on-site extraction system, which operated from 1988 until 1997, consisted of 210 (220 after 1992) vacuum-operated recovery well points to 30 feet bgs and 13,000 feet of infiltration trenches. The objective of the on-site extraction system was to create and sustain a net inward flow of groundwater at the perimeter of the Site and a net upward flow of water within the slurry wall. An infiltration system (soil flushing) placed in shallow on-site soils within the slurry wall was designed to flush contaminants out. During later years of extraction system operation, several well points were used as recharge wells to enable additional clean water to be infiltrated below the shallow silt layer that impeded infiltration from the site surface.

The soil-flushing system was designed to expedite leaching of contaminants from the shallow soils. The well-point system was designed to offer flexibility and lower pumped volume. Header pipes and valves at the top of each well could be used to select specific flow rates from seven cells in the system.

The original groundwater treatment plant was completed in July 1988, after approximately four months of construction. It was designed with two major components: air stripping for VOCs, followed by treatment for metals and semivolatile organic compounds. Air stripper operations began in August 1988, with thermally regenerating carbon adsorption units to capture vapor-phase contaminants. After processing by the two treatment systems, extracted groundwater was discharged to METRO (currently the KCIW [King County Industrial Waste Program]), the local POTW (publicly owned treatment works), or reinjected into the ground through the infiltration system.

The original treatment system for groundwater derived from the original well-point extraction system included stripping of VOCs, followed by oxidation of phenolic compounds with hydrogen peroxide, reduction of hexavalent chromium to the trivalent form, pH adjustment, metals precipitation, and carbon polishing.

Because of severe fouling of the on-site stripping tower by inorganic precipitates, the treatment sequence was modified in September 1989 to provide metals precipitation before stripping of VOCs. After 1989, phenol oxidation and hexavalent chromium reduction were discontinued. Liquid-phase activated carbon filters were used to remove oxazolidinone from treated water before discharge to the POTW.

The final major element of the cleanup, a field modification that supplemented the remedial action described in the ROD and the Amended ROD, was the installation of a 4,400 foot long slurry wall. The wall, which surrounds the site was started in May and completed in October 1988. The slurry wall serves to contain contaminated Site groundwater during pumping and increases efficiency of the pumping effort.

The slurry wall, which is approximately 40 feet deep and laterally confines the contaminants remaining on site to the site boundaries, enhances the groundwater extraction process. The soil-bentonite wall was installed using a backhoe and bucket excavator (See Figure 1-3).

The trans plume extraction system consists of three deep wells (trans wells) screened between 40 and 70 feet bgs. The Consent Decree required

overlapping zones of influence for these extraction wells. A capture zone analysis confirmed that the trans plume extraction wells effectively captured the plume and was adequately containing the contamination in Zone B groundwater. Water extracted from the off-site trans wells was directed to a separate treatment system consisting of a sand filter bed and an air stripper. Effluent from this system was reinjected to the infiltration gallery or discharged to the POTW.

Contaminant concentrations in groundwater and water levels are measured using a system of 51 monitoring wells and 28 piezometers located on and off site in both Zone A and Zone B.

C) Mill Creek

The Consent Decree required that Mill Creek sediments be tested to determine if leachable and/or bioavailable contaminants, which may have originated at the Site, were present and could adversely impact aquatic organisms. This investigation was completed in 1992. Specific reaches of Mill Creek were identified for remediation.

Remediation consisted of removal of contaminated creek bottom sediment with an auger head dredge and cover of the east creek bank soil with clean material after removing the surficial soil layer. Creek bed sediments were sampled after dredging was completed in 1993 and found to contain metal contaminants above acceptable levels. Additional remedial action was taken to isolate contaminants under a minimum 4-inch gravel bed placed in the creek. Gravel placement was completed in 1994.

D) East Drain

The Consent Decree required that East Drain sediments be tested to determine if leachable and/or bioavailable contaminants which may have originated at the Site were present and could adversely impact aquatic organisms. Investigation results indicated that certain areas of the East Drain contained metals exceeding cleanup levels. Metal contaminants were also found in the relatively stagnant shallow groundwater zone between the East Drain and slurry wall during the investigation which was completed in 1992.

Remediation of East Drain sediments was undertaken in 1993 and included removal of sediments with a track excavator and front-end tire loader. Over 1,140 tons of sediment were shipped to the Waste Management Columbia

Ridge Landfill, near Arlington, Oregon. Class A gravel borrow was used as backfill material in excavated areas.

Remedial action was taken to prevent contaminated groundwater from recontaminating the clean fill. An interceptor system between the Interurban trail and the East Drain was constructed which included a well point extraction system was installed in late 1993. Well points were connected to the Western Processing extraction system and extraction/treatment.

The East Drain extraction system was operated for less than 3 years beginning in November 1994.

E) Explanation of Significant Differences (ESD)

After eight years of remediation (extraction, surface water infiltration, and treatment) to restore the site to clean conditions, the Trust submitted a Technical Impracticability Waiver (TIW) request, stating that the Site could not be cleaned in a reasonable time or at a reasonable cost. The Governments reviewed the TIW, but did not grant a waiver. The EPA issued an ESD, in December 1996, as a modification to the ROD to reflect site conditions and remediation. The objective of the remedial systems was changed from an aggressive effort to restore groundwater quality to acceptable levels within 5 to 7 years to containment of the contamination remaining on site and prevent further off-site migration. The Governments agreed that the modified remedy is fundamentally consistent with the selected remedy contained in the ROD and amended ROD and would remain protective of human health and the environment.

The ESD included the following alternative strategy:

1. Institutional controls,
2. Containment pumping inside the slurry wall and the trans plume,
3. RCRA consistent cap over the site,
4. Trans plume control,
5. Long-term monitoring and five-year reviews,
6. Isolation wall,

7. Hot spot remediation on-site using bioremediation , thermal reduction and stabilization,
8. Minimum of 30 years site maintenance, and
9. Contingency plan.

POST ESD STATUS

All components of the ESD requiring construction have been completed. The following is a summary of the work.

1. Institutional Controls. Some institutional controls have been established. Passive controls include state regulations, currently in effect, limiting groundwater use in the area. Active controls include annual land use notifications, fencing and site security. The site property is leased by the Trust and they maintain an office at the site. They actively maintain the site for security, proper fencing and locked gates, the treatment Plant operations, cap maintenance and the long term monitoring program as part of their approved O&M plan.

2. Containment Pumping. A new extraction system (Figure 1-4) was installed in 1996 to provide more automated operation during the period of hydraulic containment for both on-site and off-site plumes. Fifteen new containment wells, new monitoring wells, and new piezometers were installed, completely replacing the old vacuum extraction system. Existing Sector 2 (a small area between the west slurry wall and Mill Creek) and Sector 3 (trans plume wells) were updated with new equipment. In late 1997, 2 new extraction wells were added to the system in Sector 4 (the area north of South 196th Street).

A new highly automated, computerized treatment system was constructed concurrently with the new extraction system for all groundwater extracted during containment operations and became operational in June 1997. The new system replaced the original system with a process designed to remove VOCs from Sector 1, 2, 3, and 4 groundwater. Treated water is discharged under permit to the King County sewage collection system. Off gas from the air

stripper is carbon-treated prior to atmospheric release under a Puget Sound Air Pollution Control Agency (PSAPCA) permit.

The average extraction rate for the site has been approximately 230 gpm, based on annual averages from 1988 to 1997. The annual rate was reduced to 140 gpm in 1996 and 75 gpm in 1997. The extraction rate was reduced in conjunction with the change in focus to containment from restoration and because the reinfiltration of about 100 gpm of treated water was discontinued at the end of 1996. Under the current scenario the treatment system, with the trans wells off and the RCRA cap in place pumping to maintain an inward and upward gradient in Sector 1 is at operating at a rate of approximately 10 gpm.

The system is operational 7 days per week, 24 hours per day. The system operates 99% of the time.

3. *RCRA Cap.* The Trust has completed work on the placement of a RCRA Cap over Area 1 (Figure 1-2) of the Site Plan.

Since initiation of the first site inspection, over 300 wells, piezometers, and well points were installed at Western Processing and in the surrounding area. Under the alternative strategy approved in the ESD, many old EPA wells, special purpose wells, piezometers, vacuum extraction wells, and infiltration lines were no longer required for extraction, infiltration, testing, or verification of containment. Between May and November 1997, approximately 300 of these "wells" were decommissioned by licensed drilling companies in accordance with Washington State regulations.

In addition, work was completed for the removal/disposal of buildings and equipment. Contaminated materials were disposed off site at a secure landfill in Arlington, Oregon.

4. *Trans Plume Control.* Ongoing groundwater level monitoring and analysis of groundwater samples from within and around the trans plume indicates that pumping continued to meet the ESD objective for containment of the plume.

In April 2000 the wells were shut with the governments approval, as part of an MNA program , that was implemented after detailed government review of a 1999 proposal by Exponent Inc for the Trust.

5. *Long-Term Monitoring and Five-Year Reviews.* The Trust has prepared a long-term monitoring and sampling plan for the Site.

6. Isolation Wall. The ESD retains the slurry wall concept and includes construction of a supplemental isolation wall immediately south of the South 196th Street right-of-way. This will continue to protect Mill Creek and the East Drain from remaining site contamination in Area I and further reduce the groundwater pumping necessary to maintain containment.

With the isolation wall, the area north of South 196th Street, formerly called Cell 7 and now known as Sector 4, has been segregated from the remaining areas of contamination. Because of the isolation wall and low levels of contamination currently found in Sector 4, a RCRA-type cap was not required.

The isolation wall was constructed using a soil-cement-bentonite backfill material. The mix varies from the original slurry wall mix to ensure additional structural stability required to facilitate plans by the City of Kent to construct an embankment across the Site at the South 196th Street corridor for a major east-west arterial.

7. "Hot Spot" Remediation. The ESD required treatment of an additional 5,000 cubic yards of contaminated soil. Soil samples were collected and analyzed from two depths at 39 locations. The boundaries of the "hot spot" were determined through an iterative process designed to identify the 5,000 cubic yards of the most contaminated (generally chlorinated VOCs >10 mg/kg, aromatic VOCs >20 mg/kg, total petroleum hydrocarbons [TPH] >10,000 mg/kg, and metals >25,000 mg/kg) soil using contour and risk-enhanced contour plots.

Soils were excavated from the "hot spot," and 5761 cubic yards (8983 tons) of contaminated soil were shipped to the hazardous waste disposal facility in Arlington, Oregon. This cleanup method was chosen as being the best alternative to the original concept of desorption and stabilization. The excavation was backfilled with lifts of clean gravel and crushed rock. Activities began with issuance of a work plan in March 1997 and were completed with regrading of surface soils in October 1997.

8. Bioremediation. The ESD identified bioremediation as a possible cleanup alternative for both shallow and deep groundwater VOC contamination. Field tests indicated that ongoing natural processes (intrinsic bioremediation) would not be significantly enhanced by active remediation. Since there was no technical advantage or cost effectiveness, bioremediation was removed from active consideration as a cleanup option for Area 1, but it was successfully implemented for the trans plume.

9. *Site Maintenance.* The Trust currently maintains the Site in accordance with various existing work plans. Long-term maintenance and operations is addressed in the long-term site operations and maintenance plan approved by the governments.

10. Contingency Plan. The Final Contingency Plan identifies procedures for evaluating containment and actions to be taken if those procedures indicate a loss of containment. This Plan was approved.

V. Progress Since Last Review

A. Protectiveness Statement from the [First] Five-Year Review

“The remedy selected for this site remains protective of public health and the environment. The current remedy is meeting the cleanup goals in the ROD, and ESD. Continued evaluation of the site monitoring data will be maintained to assure continued protectiveness.”

B. Status of the Recommendations and Follow-up Actions from First Five-Year Review

Recommendations from the first five year review were to continue monitoring and to consider implementation of institutional controls. Monitoring has continued on a regular basis and the results of that monitoring documented in this review. Institutional controls have been implemented by the Trust. The IC's that run with the land have not yet been implemented since legal negotiations with the current land owner broke down a few years ago. The trust has tried to purchase the land and implement the IC's but their recent efforts have not been successful. It is believed that the current owner is quite elderly and may not be able to conclude the transaction.

VI. Five-Year Review Process:

The Five Year Review was conducted according to procedures in OSWER Directive 9355.7-03B-P, Comprehensive Five-Year Review Guidance. Activities in this review consisted of:

- 1) Review of site-related documents
- 2) Review of monitoring data,

- 3) Discussions with the Trust
- 4) Site visit and inspection,
- 5) Community relations activities, and,
- 6) Preparation of the Five-Year Review report.

Documents reviewed for this report include:

Record of Decision, U.S. Environmental Protection Agency, September 1985.

Copy of Western Processing *Consent Decree*, filed April 10, 1987.

Explanation of Significant Differences, Western Processing Superfund Site, U.S. Environmental Protection Agency, December 11, 1995.

2001 Annual Evaluation Western Processing, Landau Associates June 18, 2002

2002 Annual Evaluation Western Processing, Landau Associates April 30, 2003

Evaluation Report, MNA, April 2000-January 2002, Western Processing, Landau Associates 8/23/02

Monitored Natural Attenuation Annual Summary - 2002 Western Processing, Landau Associates, March 19, 2003

The Second Five Year Report, Western Processing, EPA 9/98

Current Status

A site visit was conducted on September 23, 2003. The purpose of the on site visit was two fold, one, to conduct interviews and two, to observe site conditions as part of the five-year review. A site inspection report was completed during the visit and is attached in the Appendix with labeled photographs that support the findings from that visit.

Conditions and progress

1. The Western Processing site remains fenced with access controlled by on-site personnel;
2. The Site groundwater extraction system has operated continuously with only very brief shut-downs for routine maintenance. See figure 1-4 Containment Extraction system;
3. The treatment plant has operated continuously in compliance with the King County water discharge permit, and with only very brief shut-downs for routine maintenance. During 2002 the treatment plant processed 5.8 million gallons of water, while extracting 17 lbs. of zinc and 96 lbs of volatiles. The plant discharge is in full compliance with the King County Effluent Permit;
4. Major activities related to well/piezometer abandonment and decommissioning/demobilization of surplus buildings and equipment has been completed;
5. Work has been completed on the construction of RCRA cap at the site. The cap and drainage system are well maintained and appear to be functioning as designed;
6. New wells and piezometers have been installed to replace damaged or aging wells/piezometers required for continued Site monitoring. Piezometer readings for the year confirm that containment at the site has been continuously achieved. The monitoring network is shown in Figure 1-3 and the GW Elevation Monitoring locations in figure 2-1.
7. Portions of the site (not part of the Western Processing facility property) have been determined to be clean and have been sold or put into other use. Parts of Sector III, IV and V were sold for commercial development. Part of Sector VIII had soils excavated and the land converted into a wetland to enhance Mill Creek.
8. The 196th Street roadway and overpass were completed and are now fully operational. This new road way bisects the site and separates Sector 1, the containment area, from sector 4.
9. Water quality monitoring results have generally indicated a downward trend for the contaminants of concern for wells outside the Sector 1 containment cell. Cis-1,2-DCE concentrations in the area to the west of the site (GW flow direction) in the “trans plume” were not detected in the extraction wells (T

wells) this year. Vinyl chloride a breakdown product, showed an increase in concentration as expected. These levels have also decrease in time showing strong evidence that natural attenuation is occurring vigorously at this location. Mill Creek surface water quality monitoring data do not reflect contamination from the site.

In the containment area, Sector 1 water quality monitoring from the S wells(extraction wells) show concentrations of DCE up to 6000ug/L. These concentrations of DCE and other contaminants of concern are isolated within the area Sector 1 where active containment through pumping and treatment, slurry walls and the RCRA cap. See the following list of data summaries from the 2002 Annual Evaluation Report, which are attached in the Appendix of this review :

Table B-1 Detected Constituents In Monitoring Wells, 2002

Table B-2 Mill Creek Surface Water Quality, 2002

Table C-1 Detected Constituents In S- Wells

Community Notification:

There has been no recent community involvement from EPA nor has there been any interest expressed from the community in the last five years. On July 3, 2003, a Public Notice was placed in the *South County Journal* stating that EPA was doing this Five-Year Review and to solicit any comments. No comments were received by EPA as a result of the newspaper notice. Community interest in this site is considered low. A public notice of the this five year review will be put into the local newspaper, upon completion and acceptance of this report. A copy of the report will also be sent to the trust.

VII. Technical Assessment:

Question A: Is the remedy functioning as intended by the decision documents?

Yes. The review of documents and data, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD.

The RCRA cap is in place and fully functioning;

The extraction system and treatment plant maintain containment;

O&M is being implemented as approved;

Monitoring Data trends are showing decreases.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?

Yes. There are no changes in the physical conditions of the site that would affect the protectiveness of the remedy. This site is zoned industrial and the surface soil cleanup levels are consistent with industrial use.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. The remedial actions appear protective for the short-term. There are Institutional Controls required by the ROD and ESD. Hazardous substances remain onsite in the deeper subsurface soils and in the groundwater. As a result, Institutional Controls must be developed and implemented to keep the site classified as industrial, protect the remedy, to prevent exposure to potentially hazardous substances and prevent the installation of onsite wells.

Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is functioning as intended by the ROD. There have been no physical changes of the site that would affect the effectiveness of the implemented remedial actions.

VIII. Issues

The major issue concerning this site are presented in the table below:

Table for Listing Issues

Issues	Affects Protectiveness (Y/N)	
	Current	Future
Permanent Institutional Controls need to be developed and implemented that run with the land.	N	Y

IX Recommendations and Follow-up Actions

Table for Listing Recommendations and Follow-up Actions

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Develop and implement Institutional Controls	EPA	EPA	09//08	N	Y

X. Statement of Protectiveness:

Based on the Technical Assessment for the Western Processing, the remedy for the Western Processing site currently protects human health and the environment because the contaminated groundwater and soil in the source area are contained by the slurry wall, the RCRA cap and the containment pumping and treatment system. The groundwater concentrations off the WP property are decreasing; and there are no current exposure to site contaminants. However, for the remedy to be protective in the long term, institutional controls that will run with the land need to be placed on the property.

XI. Next Review

Based on site conditions and the fact that hazardous substances remain on site, the next Five-Year Review is required by September, 2008.

APPENDICES

Tables and Figures*
Site Inspection Check List
Interview Records
Site Photographs

*Tables and figures reproduced from *2002 Annual Evaluation, Western Processing*,
Landau Associates