Fifth Five-Year Review Report

Western Processing Superfund Site

Kent, Washington

September 2013

PREPARED BY

U.S. Environmental Protection Agency

Region 10

Seattle, Washington

Approved by: Cami Grandinetti Date: 9/27/13

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Table of Contents

List of Figures

List of Tables

Executive Summary

The remedy for this site was originally selected prior to passage of the Superfund Amendments and Reauthorization Act (pre-SARA) and the remedy does not allow for unlimited use and unrestricted exposure, and thus this is a policy Five-Year Review.

EPA and Washington State Department of Ecology (WDOE), referred to as the Governments in Site-related documents, continue to conduct joint oversight of the Site with EPA maintaining responsibility for conducting Five-Year Reviews. Meetings are held on-site biannually to conduct field inspections and data/document reviews.

All data indicate that the remedy has been operating successfully for many years. Pumping and treatment rates have been dramatically decreased over time and continue to be effective in containing contamination within the confining slurry wall and RCRA cap constructed onsite. The monitored natural attenuation remedy applied in the off-site trans plume areas has been shown to be effective in reducing the size and contaminant concentrations of the groundwater plume. Monitoring data indicate that the trans plume has biodegraded to levels well below the ROD action levels. The site file includes a record of the documentation of Site remedial activities and performance and is summarized later within this document.

The remedy for the Western Processing site currently protects human health and the environment because the contaminated groundwater and soil within the source area are contained by the slurry wall, the RCRA cap, and the inward gradient containment pumping and associated treatment system. The trans plume groundwater contaminant concentrations outside the slurry wall have attenuated to below detection levels. However, for the remedy to be protective in the long term, institutional controls that run with the land need to be placed on the contaminated properties.

A comparison of 1996 post remedy implementation East Drain sediment monitoring results for PAHs to the Washington Department of Ecology Freshwater Sediment Quality Standards (became effective September 2013) calls into question the protectiveness of the remedy for benthic biota in the East Drain. Additional sampling and evaluation of sediments in the East Drain and Mill Creek is recommended to determine if protectiveness is still being maintained for site sediments.

Five-Year Review Summary

SITE IDENTIFICATION		
Site Name: Western Processing		
EPA ID: WAD0009487513		
Region: 10	**State:** WA	**City/County:** Kent, King

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: US EPA Region 10
Author name (Federal or State Project Manager): Joe Wallace
Author affiliation: USEPA
Review period: July 2008 – July 2013
Date of site inspection: 02/06/2013
Type of review: Policy
Review number: 5
Triggering action date: 07/24/2008
Due date *(five years after triggering action date)*: 07/24/2013

Five-Year Review Summary Form (continued)

Issues/Recommendations				
OU(s) without Issues/Recommendations Identified in the Five-Year Review:				
OU #1 and OU #3. Removal actions were completed for OU #1 and #3 and no issues remain. Monitoring of these areas is addressed in O&M of OU#2.				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 02	**Issue Category: Institutional Controls**			
	Issue: Permanent Institutional Controls need to be developed and implemented that run with the land for those parcels which constitute Sector 1 (within the boundaries of the slurry wall).			
	Recommendation: Develop and implement Institutional Controls			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	09/30/18

OU 2	**Issue Category: Remedy Performance**			
	Issue: Concentrations of PAHs in the East Drain are elevated considerably above the State of Washington's new Freshwater Sediment Standards calling into question the protectiveness of the sediment portion of the remedy.			
	Recommendation: Evaluate PAH concentrations in Mill Creek and East Drain and determine whether contamination found is related to the site. Determine whether the sediment remedy is protective.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Deferred	Deferred	Trust	EPA/WDOE	9/30/15

Sitewide Protectiveness Statement (if applicable)

Protectiveness Determination:

Protectiveness Deferred

Addendum Due Date (if applicable):
9/30/15

Protectiveness Statement:

Based on this Technical Assessment, a protectiveness determination related to the remedy for the Western Processing Site cannot be made at this time. Additional data needs to be collected for the sediment portions of the remedy (East Drain and Mill Creek) to ensure they remain protective. With the exception of these sediment areas, the remedy currently protects human health and the environment in the short term because the contaminated groundwater and soil in the source area are contained within the slurry wall, the RCRA cap and the containment pumping and treatment system. The groundwater concentrations off the Western Processing property have decreased to below detection levels. There are no current exposures to site contaminants related to these portions of the remedy. 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 properties located within the area bounded by the slurry wall.

List of Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	Federal Ambient Water Quality Criteria
bgs	below ground surface
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DCE	1, 2-dichloroethane
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Difference
gpm	gallons per minute
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated Biphenyl
POTW	Publicly Owned Treatment Works
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act 1986
SQS	Washington State Freshwater Sediment Standards
TCE	trichloroethylene
VOC	Volatile Organic Compound
WDOE	Washington Department of Ecology
WP	Western Processing

1. INTRODUCTION

The purpose of a Five-Year Review is to determine whether the remedy at a Superfund 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.

Remedial work began at Western Processing Site before the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA), therefore, this Five-Year Review is a policy review rather than a statutory review. The U.S. Environmental Protection Agency (EPA) Region 10 is preparing this Five-Year Review report consistent with 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 judgment 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.*

This is the fifth Five-Year Review for the Western Processing Site located in Kent, Washington. The triggering action for this review is the completion of the Fourth Five-Year Review Report, dated July 24, 2008. This Fifth Five-Year Review was conducted by EPA Region 10's Remedial Project Manager (RPM) for the period from July 2008 through July 2013. This Five-Year Review has been conducted because hazardous substances, pollutants, or contaminants remain in the soil and groundwater above levels that allow for unlimited use and unrestricted exposure. This report documents the results of the review.

2. SITE CHRONOLOGY *

Table 1. Chronology of Site Events

Event	Date
Western Processing begins Site operations	1961
Site closed by court order	July 1983
Emergency removal of site wastes	July 1983
Site placed on NPL	September 1983
1ST Consent Decree entered by the Court	August 1984
Surface Clean up ROD issued (Phase I)	August 1984
Surface Cleanup	November 1984
Record of Decision issued (Phase II)	September 1985
Amended Record of Decision issued	September 1986
Consent Decree entered by the Court	April 1987
Subsurface remediation begun	August 1987
Operations for both P&T systems begun	October 1988
Slurry wall constructed around the site	October 1988
Preliminary Close Out Report	December 1991
Three-Year performance standards achieved for Mill Creek	August 1993
Mill Creek restoration	September 1993
First Five-Year Review	January 1993
East Drain extraction system installed	November 1994
ESD issued	December 1995
Containment wells installed	June 1996
New treatment system started	July 1997
Final on-site subsurface waste removal	October 1997
Second Five-Year Review	September 1998
RCRA Cap completed	October 1999
Start of Trans Plume MNA	April 2000
Third Five-Year Review	September 2003
Fourth Five-Year Review	July 2008
Installation of low flow stripping tower and extraction pump size reduction	January 2009
Approval of Long Term Contingency Plan Addendum	January 2009
72nd Avenue Extension – Well Decommissioning	December 2012

* Note: The Site File contains contradictory information on some of the dates in this table. Therefore dates should be considered approximate.

3. BACKGROUND

3.1. 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 14 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 and over time has developed into a light industrial/commercial area. The area just to the north of the Site is undeveloped. East of the Site lies the Interurban Trail used by walkers and bicyclists and runs parallel to a rail line and a railroad drainage ditch (East Drain). The area south of the Site has been developed for light industry. Mill Creek lies just outside of the eastern boundary of Sector 1, the containment cell, and flows in a northerly direction into the Black River, a tributary of the Green River. The Green River flows into the Duwamish River before ultimately emptying into Puget Sound at Seattle. The trans plume area, Sectors 2 and 3, extends from the slurry wall, then under Mill Creek to the east for approximately 800 feet beneath several light industrial warehouses. The Site is located above 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 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]) begins at 40 feet bgs and extends to a depth of 80 feet bgs. Groundwater in this unit flows northwest also, but generally passes below Mill Creek. Contaminants found in Zone A at the Site migrated into Mill Creek prior to the installation of the Sector 1 slurry wall, and the contaminants in Zone B were transported beneath Mill Creek and downgradient of the Site into Sectors 2 and 3, the trans plume area. A third groundwater zone, Zone C, extends from about 80 to 120 feet bgs but has not been impacted by Site contamination.

Originally, Western Processing was a processor 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.

3.2 Site History:

3.2.1 Early Investigations

Local agencies became concerned with operations at the Western Processing in the 1970s and early 1980s. 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. After failure of the owners/operators to comply, EPA undertook the investigation in September 1982. Of the approximately 5,000 drums stored on site, many were leaking, corroded, or bulging. In several locations, drums containing incompatible materials (e.g. cyanides and ketones, acids and caustics, acids and ethyl amines) were stored together. During the sampling, battery casings were found at depths of 15’ to 24’ bgs.

Analysis of 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. Primary contaminant groups included: Halogenated volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), phenolic compounds, and metals.

Concurrent with the investigations by EPA, Washington State’s Department of Ecology (WDOE) conducted its own investigation of the Site under the authority of the laws of Washington State.

3.2.2 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.

3.2.3 Surface Cleanup

A Focused Feasibility Study for Surface Cleanup was published in June 1984 and was followed by a Record of Decision in August 1984. Under a August 1984 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 at a cost of over $10 million designated as Phase I of the remediation. 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 storm water runoff, a lined pond was constructed to contain the collected storm water, and a portable treatment plant was brought on site to treat the collected water.

The Phase 1 surface cleanup was completed in November 1984, with the exception of a storage tank containing a dioxin-contaminated oily liquid. 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 opposed this method of disposal. Ultimately, in 1986, the Trust had the dioxin-containing materials destroyed by successfully treating approximately 6,000 gallons of the 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. No other dioxin contamination was found on site.

3.2.4 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 undertaken under 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 contained within 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 milligrams/liter (mg/l; parts per million [ppb]) of zinc, up to 5,400 ppm of total semivolatile organic compounds, and up to 1,346 ppm of total volatile organic compounds (VOCs).

In March 1985, a complete RI/FS was released to the public. A series of four public meetings/workshops were held at Kent City Hall. Those alternatives involving excavation and off-site disposal combined with a groundwater pump and treat system were most favored.

An intensive soil and subsurface waste sampling program was conducted by the Trust 1986 to obtain pre-design information for excavation of the most highly contaminated subsurface wastes. During that test investigation, 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 groundwater (Zone A) flows to the northwest into Mill Creek. The RI/FS had previously indicated that groundwater was captured to a depth of approximately 50 to 60 feet below grade by Mill Creek, and therefore, Mill Creek acted as a hydraulic barrier for the flow of shallow contaminated and even the deeper, less contaminated groundwater. Because of the concept that Mill Creek acted as a hydraulic barrier to the flow of site groundwater, contaminated groundwater was not believed to migrate beyond the creek.

However, the installation of additional monitoring wells west of and hydraulically down gradient of Mill Creek led to a Supplementary Remedial Investigation report in July 1986. The report revealed that a plume identified at that time as trans-1,2-dichloroethene (trans plume) had migrated under Mill Creek and was detected in wells in groundwater Zone B 40 to 70 feet bgs, and as far as 800 feet west of Mill Creek.

4. REMEDIAL ACTIONS

4.1. Record-of-Decision (ROD)

Following the August 1984 Surface Cleanup ROD (Phase I ROD), the EPA Regional Administrator approved a ROD (Phase II ROD) in September 1985 requiring the following Remedial Action Objectives:

- Prevent direct human contact with or ingestion of contaminated soils either on or off-site;
- Prevent the further spread of and, if possible, removal of the contamination from the shallow aquifer

- Prevent further contaminant discharges (via groundwater) to Mill Creek at levels which are harmful to aquatic organisms
- Control contaminated storm water runoff from the site

Major cleanup elements were:

- Conduct an extensive soil and subsurface waste sampling program, both on- and off-site property;
- Excavation and off-site disposal of the most highly contaminated soils and non-soil material;
- 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 X 10^{-5} (1 in100,000) excess cancer risk level and by covering remaining soils having above background concentrations of priority pollutants;
- Construction and operation of a shallow groundwater extraction system for a minimum of 5 to 7 years,
- Construction, operation, and maintenance of a groundwater treatment plant;
- Construction, operation, and maintenance of a storm water control system;
- Excavation of contaminated East Drain sediments which may have been affected by Western Processing;
- 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;
- Continued monitoring of Mill Creek, the East Drain, groundwater, and the groundwater extraction/treatment system performance;
- Construction and maintenance of a RCRA consistent cap over the source area after pumping is completed;
- Long-term surface water and groundwater monitoring;
- 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
- Apply institutional controls, such as deed restrictions, as needed.

An amended ROD was signed on September 4, 1986. It required remediation (construction and operation of a groundwater extraction and treatment system) of the trans plume, which had

migrated off the facility site and was detected west of Mill Creek during the Supplemental Remedial Investigation. Although the trans plume was originally identified as trans-1,2-dichloroethene it consisted primarily a chemically similar compound, cis-1,2 dichloroethene.

4.2. Amended ROD Clean Up Goals

4.2.1. Cleanup Goals/Standards

The following cleanup goals were established in the September 1986 amended ROD:

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

- Prior to remediation, shallow contaminated groundwater from the Site discharged to Mill Creek. The goal of achieving compliance with the AWQC in Mill Creek was also considered to be a means of assessing the effectiveness of the remedy for the shallow groundwater flowing from the Site. There were no other on-site cleanup goals set for the shallow groundwater. The performance standards established in the amended ROD required a cleanup level 70 ug/l for cis-1, 2-dichloroethene in the trans plume.

4.2.2. Performance Goals

The following treatment performance goals were established in the amended ROD:

- Achievement of an inward flow of shallow groundwater (<40 ft bgs) within the area approximately defined by the Site's property boundaries. This could be accomplished by 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 were required to comply with a discharge permit issued from the Puget Sound Air Pollution Control Agency.

The collected treated wastewater effluent from the treatment systems was required to meet discharge criteria specified in the POTW (publicly owned treatment works) discharge permit.

4.2.3. *Consent Decree*

After the September 1985 signing of the Phase II ROD, EPA entered into extensive negotiations with the PRPs during which EPA began conducting 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 Phase II ROD (1985) and amended ROD (1986). Following a public comment period, a consent decree was entered by the court in April 1987.

4.3. Remedy Implementation

4.3.1. Subsurface Cleanup

In the fall of 1986, the Trust conducted the soil and soil/waste sampling program and geophysical investigation. An on-site lab was utilized to facilitate sample analysis turnaround times. Over 1,500 soil and waste samples were collected and analyzed over a four month period. This data was used to determine the limits of excavation of on-site subsurface wastes and off-property contaminated soils.

In January 1987, the Trust conducted the Phase II subsurface cleanup at an estimated cost of $40 million. The Trust submitted work plans for the remedial action, which were approved by EPA and WDOE.

Subsurface cleanup began on an aggressive schedule during which design and construction proceeded simultaneously. In the summer of 1987, construction activities began which included: excavating and Class 1 RCRA landfill disposal of over 25,000 cubic yards of highly contaminated soil and sludge, installing two groundwater extraction and treatment systems, and design of a slurry wall to enclose the Site. Groundwater extraction and treatment began in October 1988.

4.3.2. Groundwater Cleanup

Fifty four new monitoring wells were installed in late 1987 and early 1988 to be used in the long-term groundwater monitoring program. Implementation of the monitoring program, including Mill Creek and East Drain surface water monitoring, began in January 1988. The PRPs chose to construct an on-site lab, compliant with EPA's Contract Laboratory Program (CLP) dedicated to analyzing Western Processing samples. Construction of the lab was completed in January 1988. Peak load for the lab was expected to be over 9,000 sample analyses per year but was later increased to more than 11,000 samples per year.

Construction of the Sectors 1, 2 and 4 shallow groundwater extraction and infiltration system and the Sector 3 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.

The original groundwater treatment plant was completed in July 1988. It was designed with two major components: air stripping for VOCs, followed by treatment for metals and semi volatile

organic compounds. Air stripper operations began in August 1988, with thermally regenerated 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, or reinjected into the ground through the infiltration system.

The original treatment system for groundwater collected 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 contaminants 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 40 feet deep, 4,400 foot long slurry wall (see Figure 1-3 for alignment). The wall, which now surrounds Sectors 1 and 4, was completed in October 1988. The slurry wall serves to contain contaminated Site soil and groundwater and greatly increases efficiency of the extraction well pumping effort.

The Trans Plume extraction system consists of three wells (T wells) in Sector 3, and 2 wells (U wells) in Sector 2 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 were adequately containing the contamination found in the Zone B groundwater. Water extracted from the T and U wells was directed to a separate treatment system consisting of a sand filter bed and an air stripper. Effluent from this system was re-injected into the Site infiltration gallery within the slurry walls 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 Zone A and Zone B.

4.3.3. *Mill Creek*

The Phase II ROD, amended ROD, and 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.

4.3.4. East Drain

The Phase II ROD, amended ROD and 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 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 for extraction and treatment.

The East Drain interceptor system was operated for 2 years, beginning in November 1994 and was shut off in December of 1996 as part of the implementation of the containment remediation strategy and the elimination of the groundwater recharge system.

4.4. *Explanation of Significant Differences (ESD)*

After eight years of remediation (extraction, surface water infiltration, and treatment) designed to meet cleanup levels, the Trust submitted a Technical Impracticability Waiver (TIW) request, stating that the Site could not meet cleanup levels in a reasonable time or at a reasonable cost. The Governments reviewed the TIW, but did not grant a waiver. Instead, the EPA issued an ESD in December 1996 as a modification to the ROD to reflect current 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 the prevention of further off-site migration. The Governments agreed that the modified remedy was 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 remedial strategies:

- Institutional controls,
- Containment pumping inside the slurry wall and the trans plume,
- RCRA consistent cap over the site,

- Trans plume control,
- Long-term monitoring and Five-Year Reviews,
- Installation of an isolation slurry wall (separating less contaminated Sector 4 from Sector 1),
- Hot spot remediation on-site using bioremediation, thermal reduction and stabilization,
- Minimum of 30 years site maintenance, and
- Development of a contingency plan for changing conditions.

4.4.1. Post ESD

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

1. Engineering and Institutional Controls

Some institutional controls have been established. Passive controls include state regulations, currently in effect, limiting groundwater use as a drinking water source in the affected area. Active controls include annual land use notifications and engineering controls of 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, treatment plant operations, cap maintenance and the long term monitoring program as part of their approved O&M plan. However, ROD required institutional controls in the form of restrictive covenants or deed notices have not been implemented.

2. Containment Pumping

As part of the containment 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, after approvals from the Governments, approximately 300 of these "wells" were decommissioned by licensed drilling companies in accordance with Washington State regulations.

The new extraction system was installed in 1996 to provide automated operation of hydraulic containment. Fifteen new containment wells, new monitoring wells, and new piezometers were installed, completely replacing the old vacuum extraction system. Currently there are 17 extraction wells operating at Western Processing Site (see Figure 1-4).

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 treatment process designed to remove VOCs from extracted groundwater. Treated water is discharged under permit to the King County POTW. Off gas from the air stripper is carbon-treated prior to atmospheric release under a Puget Sound Air Pollution Control Agency permit.

The current extraction system, with the trans plume extraction wells off-line, the RCRA cap securely in place, and pumping to maintain a continual inward groundwater flow gradient within

the slurry walls, has averaged less than 5 gpm based on annual averages from 2008 to 2012. The annual average extraction rate has been reduced from 140 gpm in 1996 and 75 gpm in1997 to the current rate. The extraction rates have been reduced in conjunction with the change in remedy focus from restoration to containment. The system is currently operational 7 days per week, 24 hours per day. The system operates 99% of the time.

3. RCRA Cap

The Trust completed work on the placement of a RCRA Cap over Sector 1 (Figure 1-2) in 1999. As of the date of this Five-Year Review, the cap is intact, is visually monitored daily, remains effective in preventing storm water infiltration and continues to prevent human and ecological contact with the subsurface contamination.

4. Trans Plume Control

In April 2000, the extraction wells from within the trans plume were shut off as part of an MNA program that was implemented after detailed government review and approval of a 1999 proposal submitted by the Trust. The proposal and subsequent monitoring data demonstrated that geochemical conditions in the soils within and surrounding the trans plume area are very supportive of biological reductive dechlorination of target VOCs.

Monitoring of VOCs (TCE, cis 1, 2 DCE, and vinyl chloride) in the trans plume has continued through 2012. Analysis results have indicated a dramatic decrease in VOC concentrations as the result of earlier pumping and the later MNA remediation approaches. There were no VOCs detected above reporting limits in the trans plume area during 2012. The only detection of a VOC (vinyl chloride) above a laboratory detection limit since 2006 occurred in 2011, however, the concentration was well below the Contingent Action Criterion action level. The last VOC concentration in the trans plume area exceeding a Contingent Action Criteria occurred in 2002. Although the trans plume area is designated as a light industrial/commercial area, the effectiveness of MNA in treating VOCs to below detection levels eliminates concerns associated with surface structure vapor intrusion.

5. Mill Creek

The ESD did not change the remedy status of Mill Creek. The Phase II ROD, amended ROD and Consent Decree called for the remediation of Mill Creek which consisted of removal of contaminated creek bottom sediment and cover of the east creek bank soil with clean material after removing the contaminated 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. Monitoring of surface water quality continues at three stations in Mill Creek: upstream, adjacent to, and downstream of the Sector 1.

6. East Drain

Phase II investigation results indicated that certain areas of sediment in the East Drain contained metals exceeding cleanup levels. Remediation of East Drain sediments was undertaken in 1993 and included removal of over 1,140 tons of sediment. Class A gravel borrow was used as backfill material in excavated areas.

A well point extraction system was installed between the Interurban trail and the East Drain to prevent contaminated groundwater from recontaminating the clean East Drain fill. The extraction system operated from November 1994 to December of 1996 whereupon it was shut down due to the implementation of the containment remediation strategy.

7. Long-Term Monitoring and Five-Year Reviews.

The Trust has prepared a long-term monitoring and sampling plan for the Site and Five-Year Reviews are being conducted.

8. Isolation Wall

The ESD maintained the slurry wall containment remedy but added the construction of a supplemental isolation wall immediately south of the South 196th Street right-of-way. With the isolation wall, the area north of South 196th Street, called Sector 4, has been segregated from the Sector 1 source area. The isolation wall reduced the groundwater pumping necessary to maintain containment in the highly contaminated Sector 1 source area. Because of the construction of the isolation wall and the existing 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 provide the additional structural stability necessary to support the construction of an embankment across the Site for the City of Kent's South 196th Street east- west arterial extension.

9. "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] >10,000mg/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. 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.

10. Bioremediation

The ESD identified bioremediation as a possible cleanup alternative for both shallow and deeper groundwater VOC contamination. Field tests indicated that ongoing natural processes (intrinsic bioremediation) would not be significantly improved by enhanced bioremediation. 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 in the Sector 3 trans plume area.

11. 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 in 2009.

12. Contingency Plan

The Final Contingency Plan identifies procedures for evaluating containment and actions to be taken if those procedures indicate a loss of containment (Contingent Action Criteria). The Long Term Contingency Plan was approved in March, 2000. The Plan was updated 2009.

5. PROGRESS SINCE LAST REVIEW

5.1 Protectiveness Statement from the Fourth Five-Year Review:

"*The remedy at the Western Processing site currently protects human health and the environment because the slurry wall, RCRA cap, containment pumping and extraction treatment system contain the contaminated groundwater and soil within the source area. The groundwater concentrations off the Western Processing property have decreased and there are no exposure routes to the site contaminants. Current land use is consistent with Institutional Control requirements, however, institutional controls that will run with the land are not in place and still need to be placed on the parcels of property to ensure the remedy remains protective for the long term.*"

5.2 Status of the Recommendations and Follow-up Actions from Fourth Five-Year Review

The recommendation section from the Fourth Five-Year Review stated that:

"*EPA and the Western Processing Trust Fund (the Trust) will need to determine why title to the property has not passed to a new owner. This will allow discussions with the new owner for the purpose of implementing land use controls that will run with the land. The Trust will also need to*

initiate discussions with the other four properties that contain portions of the containment cell to implement land use controls that will run with the land. The ROD and the Consent Decree require the Trust to implement deed restrictions so that the remedy remains protective of human health and the environment.

The Western Processing Trust Fund should update the Contingent Action Criteria (CAC) for critical wells. After the 1995 ESD, EPA approved a containment strategy that contains procedures and potential contingent actions to be implemented if loss of containment was to occur. Part of that strategy involved the creation of Contingent Action Criteria (CAC). Since that time, contaminant concentrations have decreased and some of the current CAC no longer reflect present site conditions."

Although controls such as water use restrictions, engineering controls, and required behavior from the PRPs are in place, Institutional Controls that implement title restrictions that run with the land are not in place. The parcels of land where ICs are necessary have been identified and negotiations on the content of the deed restrictions have begun, but the process has not been completed.

The delay in implementing the deed restrictions is not affecting the current protectiveness because the current uses of land are consistent with the planned deed restrictions. The Trust is actively maintaining the site and the Governments conduct regular oversight, in order to provide the same protection in the short term that institutional controls are intended to achieve in the long term.

In 2009, the Trust updated the Contingent Action Criteria (CAC), originally developed in 2000, to better define criteria levels at which contingent actions might be necessary when contaminant concentrations exceeded certain calculated levels. The CAC were developed for each monitoring location and were updated primarily due to the addition of the intervening years of monitoring data which tended to dampen the statistical variability of expected concentrations. There have been no exceedences of the CAC since they were updated in 2009.

Other Changes:

As a contingency to the potential failure of the damaged upstream Howard Hanson Dam, several of the well vaults and their corresponding electrical panels were raised to levels above the estimated flood plain during November and December of 2009. In addition, this action also addresses foreseeable climate change impacts.

6. 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.

6.1. Notification of potentially interested parties

There has not been any interest expressed from the community in the last five years for community involvement in regards to this project, so no community involvement activities have occurred between the last Five-Year Review and the beginning of this Five-Year Review. Community interest in this site is considered low.

In Mid February, 2013, EPA mailed postcards to the contacts on the site mailing list announcing the beginning of the Five-Year Review and requesting comments. On March 1, 2013, EPA placed a Public Notice in the Kent Reporter stating that EPA was preparing this Five-Year Review and to solicit any comments. At that same time, the public notice was published on the EPA Region 10 website. No comments have been received by EPA.

This review will be publicly available on CD and as a hard copy at the Kent Regional Library, at the EPA Region 10 office, and will be available in PDF format on the EPA Region 10 Western Processing web page.

6.2. Review of site-related documents

This Five-Year Review consisted of a review of relevant, site-related documents including RODs for each OU, the Amendment to the ROD, ESD, monitoring reports, and recent monitoring data. A list of the documents reviewed can be found in the Appendix.

6.3. Site Visit, Inspection, and Interviews

A site visit was conducted on February 6, 2013. The purpose of the site visit was twofold:

1. To conduct interviews and
2. To observe site conditions as part of the Five-Year Review

A site inspection checklist was completed during the visit and is attached in the Appendix with labeled photographs that support the findings from that visit.

The remedy appeared to be operating effectively as designed. A few issues addressing weed growth and mole presence were discussed during the inspection. These issues do not appear to be substantive problems nor do they affect current or future protectiveness. Trust staff stated that they address these issues as a part of ongoing Site maintenance activities.

None of the identified issues were out of the ordinary for the type of site and setting of the site. EPA believes that the results of this inspection indicate that the onsite O&M is adequately implemented and is protective of the remedy.

The RCRA cap and drainage system are well maintained and appear to functioning as designed.

6.4. Site Conditions and Progress

The Western Processing site remains fenced with access controlled by on-site personnel. The Site groundwater extraction system has operated continuously with only very brief shut-downs for routine maintenance. See Figure 1-4 for Containment Extraction system well locations.

As a result of the City of Kent's plans to construct a 72nd Avenue S extension along the east edge of the property over Mill Creek, several well/peizometer modifications were necessary. The modifications include raising several wellheads to finish grade elevation of the proposed new roadway and decommissioning other wells. All actions were approved by the Governments in 2009. No other impacts to the Site are anticipated. The Trust moved its office building in 2010 in anticipation of the construction of the new roadway which has yet to begin as of September 2013.

6.5. Data Review

The treatment plant has operated continuously in compliance with the King County water discharge permit and a Puget Sound Air Pollution Control Agency permit and with only very brief shut-downs for routine maintenance. During 2011 the treatment plant processed 2.6 million gallons of water at an average pumping rate of 5.0 gallons per minute, while extracting 2.4 lbs. of zinc and 102 lbs of volatiles.

Groundwater quality monitoring results have indicated a strong downward trend for the contaminants of concern for wells in the trans plume area (Sector 3). Cis-1,2-DCE concentrations in the "trans plume" were not detected in the extraction wells (T wells) in 2012. Vinyl chloride, a breakdown product of cis-1,2 DCE, was detected above detection levels in 2 of 85 samples, but upon resampling, was non-detect. Otherwise, VOCs in the trans plume area have only been detected once in one location since 2006 and that result was significantly below the Contingent Action Criteria for that location. VOC concentrations have decreased over time, showing strong evidence that natural attenuation is occurring vigorously throughout the trans plume area. Mill Creek surface water quality monitoring data do not reflect contamination from the Site although occasional sampling analysis results register exceedences in AWQC originating upstream of the Site. The source of these impacts is not known.

In accordance with the 1996 Interim Period Site Monitoring Plan, sediment quality is no longer monitored at the Western Processing Site. However, sediment sampling analysis results from 1996 for PAH concentrations in the East Drain significantly exceed the WDOE Freshwater Sediment Standards adopted in September 2013. Although surface water quality sampling does not indicate exceedances of the Ambient Water Quality Criteria, the comparison of the new freshwater sediment standards to the 1996 sediment sampling results may be an indication that protectiveness for freshwater benthic biota is being compromised. However until additional evaluation of the sediment contamination in the East Drain and Mill Creek can be conducted, a determination of protectiveness cannot be made.

7. TECHNICAL ASSESSMENT:

7.1. **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 indicate that the remedy is functioning as intended by the ROD, ROD Amendment and ESD. The RCRA cap and slurry wall are in place and fully functioning; the extraction system and treatment plant maintain hydraulic containment and treatment of extracted groundwater; O&M is being implemented as approved; monitoring data trends are showing decreases from within the Sector 1 slurry walls.

Contaminant concentrations in the off-site trans plume area have decreased through natural attenuation to levels below detection limits. Except for occasional metals spikes originating upstream in Mill Creek, Mill Creek and the East Drain remain in compliance with 1986 AWQC.

However, although many institutional and engineering controls have been implemented, required deed restrictions for parcels of land in the source area have not been put in place. The purpose of the deed restrictions is to ensure that current or future property owners do not damage the containment system and to prevent contact with existing subsurface soil and groundwater contamination. The delay in implementing the deed restrictions is not affecting the current protectiveness because the current uses of land are consistent with the planned deed restrictions. The Trust is actively maintaining the site and the Governments conduct regular oversight, in order to provide the same protection in the short term that institutional controls are intended to achieve in the long term. In order to ensure protectiveness in the long-term, institutional controls in the form of restrictive covenants or deed restrictions that run with the land are required for parcels in Sectors 1 and 2.

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

Unknown. Changes in TCE toxicity values would affect protectiveness in the off-site trans plume area except that TCE is below analytical detection limits in this area. Although TCE remains a contaminant of concern in the Sector I containment area, the release of TCE or other contamination is prevented by the slurry wall, continual hydraulic containment and the RCRA cap.

The State of Washington recently promulgated freshwater sediment standards (effective September 1, 2013). Sediment analytical data collected post remedy implementation (1996) in the East Drain show PAH concentrations considerably higher than the new State standards. Although PAHs were a contaminant of concern at the site, no PAH cleanup level in sediment was established and no ARARs related to sediment were identified at the time of the ROD or ROD

Amendment. Additional evaluation is necessary to determine the current level of PAH contamination in the sediment, whether this contamination is related to the Site, and whether, considering the newly promulgated State sediment standards, this information impacts the protectiveness of the sediment portion of the remedy.

The site remains zoned industrial and the surface soil cleanup levels are consistent with industrial use. With the exception of the above concerns related to the protectiveness of the sediment portion of the remedy, the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) are still valid.

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

No. Hazardous substances remain onsite in the subsurface soils and in the groundwater within the confines of the slurry wall and RCRA cap. As a result, all required Institutional Controls must be developed and implemented to prevent exposure to potentially hazardous substances and prevent the installation of onsite wells. The Trust is actively maintaining Engineering Controls at the site and the Governments conduct regular oversight. At this time, these actions provide the same protection in the short term that institutional controls in the form of deed restrictions are intended to achieve in the long term.

In addition, as discussed above, a potential protectiveness issue related to the sediment portion of the remedy has been identified. In order to determine whether this portion of the remedy remains protective, additional evaluation is necessary.

7.3.1 Potential Climate Change Impacts

Mill Creek is located on the western side of the property, and is a rain dominated watershed with a period of peak flow between December 15 and March 1. Current climate models have a lower degree of certainty in precipitation impacts, but most models project a slight increase in precipitation during the fall and winter months. Portions of the Western Processing Superfund site are located within the 100 year flood plain and climate change related increases in winter precipitation could present an increased flood risk for the site in the future. However, in 2009, as a contingency to the potential failure of the damaged upstream Howard Hanson Dam, well vaults and their corresponding electrical panels at risk to flood impacts were raised to levels above the estimated dam failure flood plain. As the projected climate change related precipitation changes are smaller than 20th century year-to-year variability, this modification easily protects the site from foreseeable climate change impacts.

7.4 Technical Assessment Summary

With the exception of the deed restrictions, the site data and site inspection reports show that all other elements of the remedy have been properly implemented, are functioning as intended by the ROD and are effectively maintained by the approved O&M plan. The delay in implementing the deed restrictions has no effect on the current protectiveness but could affect long term protectiveness. There have been no physical changes of the site that would affect the effectiveness of the implemented remedial actions. Surface and groundwater exposure routes are under control. However, protectiveness of freshwater sediment may be in question due to elevated levels of PAHs in 1996 post remedy sampling in the East Drain and the promulgation of the new Washington Department of Ecology freshwater sediment standards (became effective September 2013). Additional sampling and evaluation is necessary to assess protectiveness in the East Drain and Mill Creek sediments.

8. ISSUES

The major issues concerning this site are presented in the table below.

Table of Issues Issues	Affects Protectiveness (Y/N)	
	Current	Future
Permanent Institutional Controls need to be developed and implemented that run with the land in Sector 1.	N	Y
Concentrations of PAHs in the East Drain are elevated above the State of Washington's new Freshwater Sediment Standards calling into question the protectiveness of the sediment portion of the remedy.	Unknown	Unknown

9. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table of 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 required Institutional Controls	Trust	EPA	9/30/18	N	Y
Evaluate PAH concentrations in Mill Creek and East Drain and determine whether the contamination found is related to the site. Determine whether the sediment remedy is protective.	Trust	EPA & WDOE	9/30/15	Unknown	Unknown

10. STATEMENT OF PROTECTIVENESS:

Based on this Technical Assessment, a protectiveness determination related to the remedy for the Western Processing Site cannot be made at this time. Additional data needs to be collected for the sediment portions of the remedy (East Drain and Mill Creek) to ensure they remain protective. With the exception of these sediment areas, the remedy currently protects human health and the environment in the short term because the contaminated groundwater and soil in the source area are contained within the slurry wall, the RCRA cap and the containment pumping and treatment system. The groundwater concentrations off the Western Processing property have decreased to below detection levels. There are no current exposures to site contaminants related to these portions of the remedy. 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 properties located within the area bounded by the slurry wall.

11. NEXT REVIEW

Based on site conditions, and the fact that hazardous substances remain on site, the next Five-Year Review is required five years; from the signature date of this Five-Year Review in 2018.

APPENDICES

Documents Reviewed
Figures*
Site Inspection Check List
Site Photographs

*Figures reproduced from 2011 Annual Report, Western Processing, Landau Associates

Appendix: List of Documents Reviewed

Record of Decision, U.S. EPA, August, 1984.

Record of Decision, U.S. EPA, September, 1985.

Amended Record of Decision, U.S. EPA, September, 1986.

Copy of Western Processing Consent Decree, filed October 16, 1986.

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

Explanation of Significant Differences, Western Processing Superfund Site, U.S. EPA, December 11, 1995.

1996 Annual Evaluation Western Processing, Landau Associates September 1, 1998

1997 Annual Evaluation Western Processing, Landau Associates December 31, 1998

1998 Annual Evaluation Western Processing, Landau Associates September 14,1999

2008 Annual Evaluation Western Processing, Landau Associates June16, 2009

2009 Annual Evaluation Western Processing, Landau Associates June 9, 2010

2010 Annual Evaluation Western Processing, Landau Associates June10, 2011

2011 Annual Evaluation Western Processing, Landau Associates June11, 2012

2012 Annual Evaluation Western Processing, Landau Associates June 3, 2013

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

Monitored Natural Attenuation Annual Summary - 2002 Western Processing

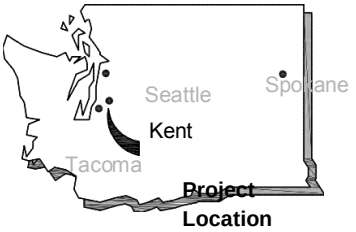
Landau Associates, March 19, 2003

The Second Five Year Review, EPA 9/98

The Third Five-Year Review Report, Western Processing, EPA 9/03

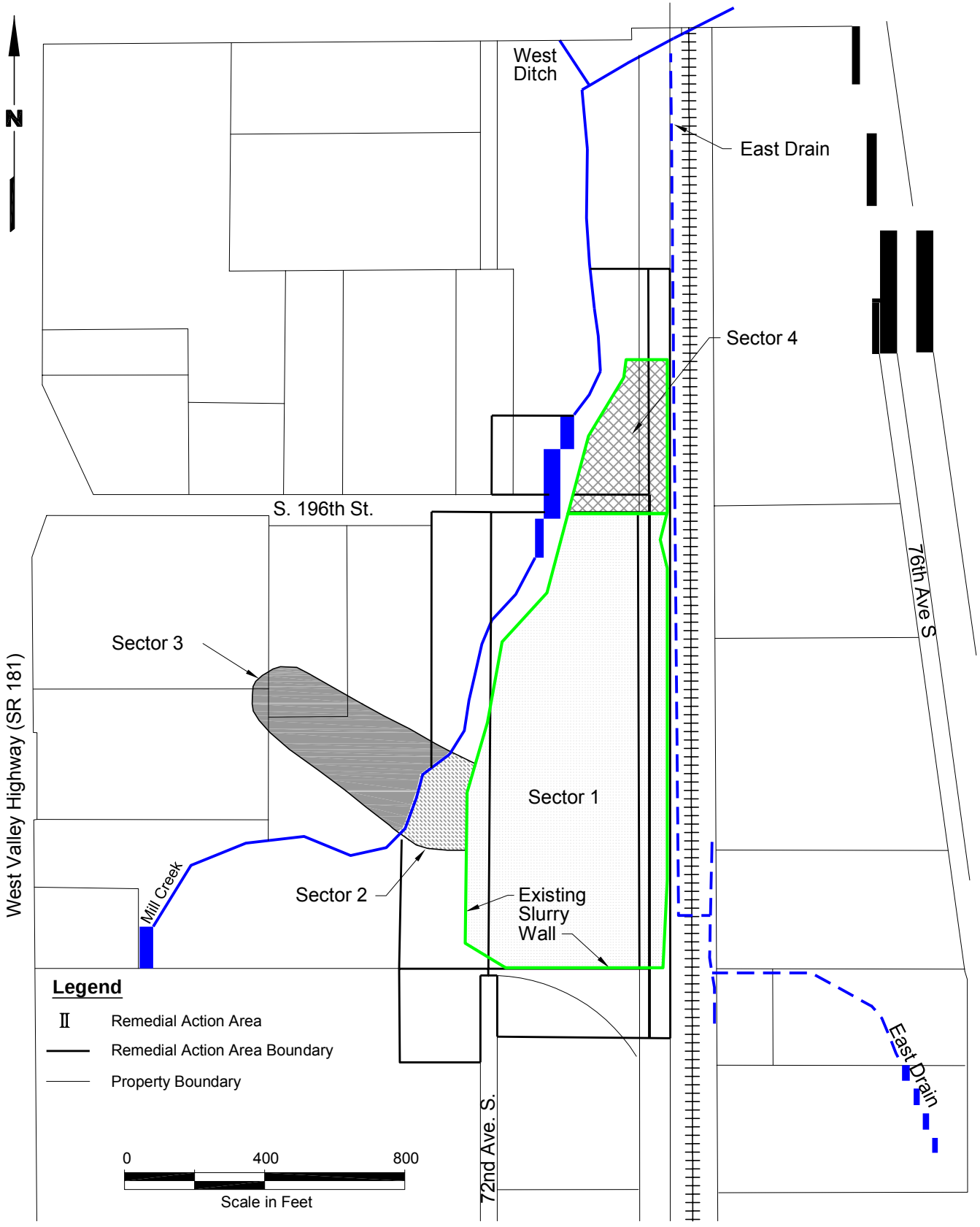
The Fourth Five-Year Review Report, Western Processing, EPA 7/2008

Map from Thomas Guide Digital Edition 2003



LANDAU ASSOCIATES

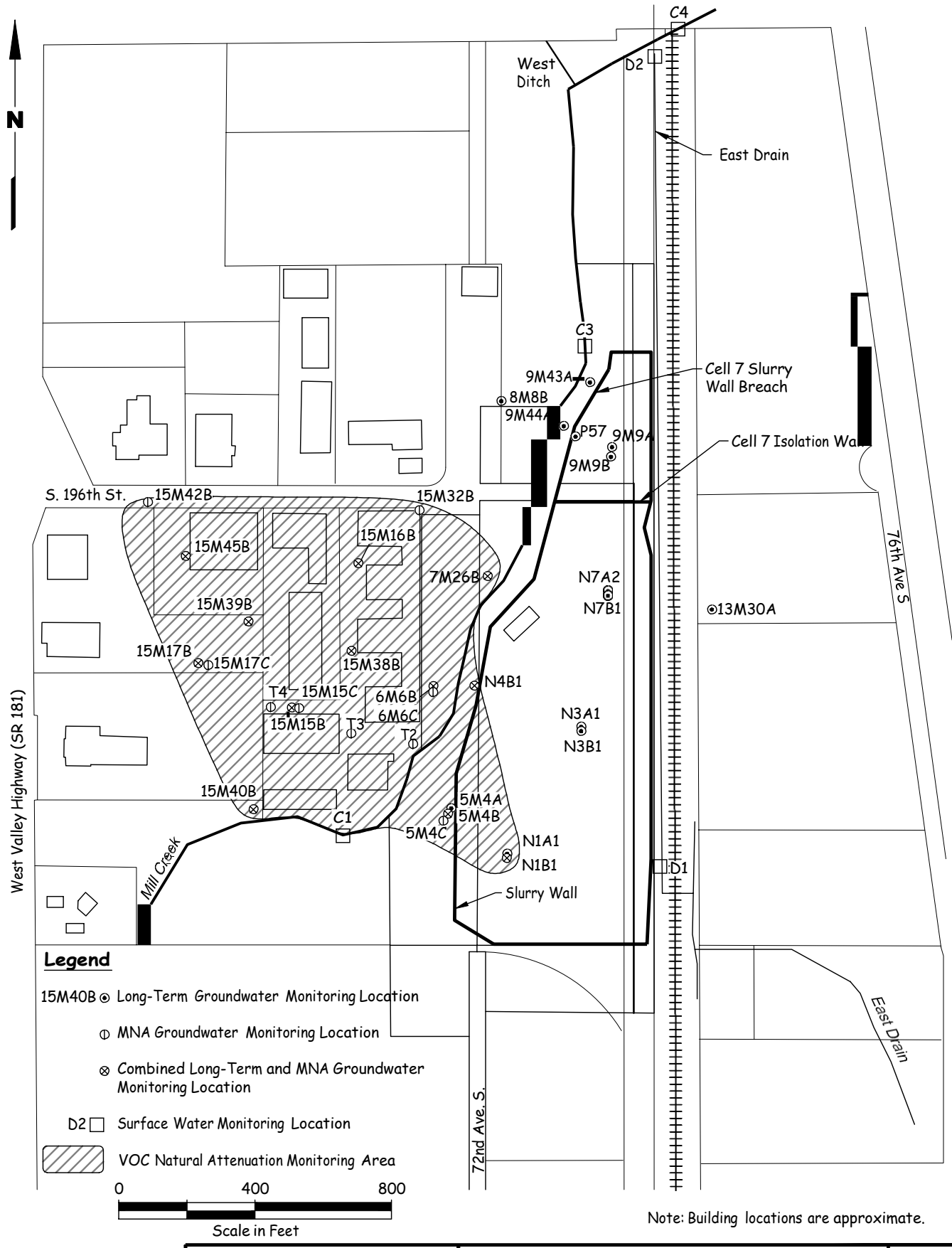
Western Processing Kent, Washington	**Vicinity Map**	1-1 Figure



Western Processing | V:\090\001\137\2010 Annual Eval\Fig1-2.dwg (A) "Figure 1-2" 5/27/2011

LANDAU ASSOCIATES

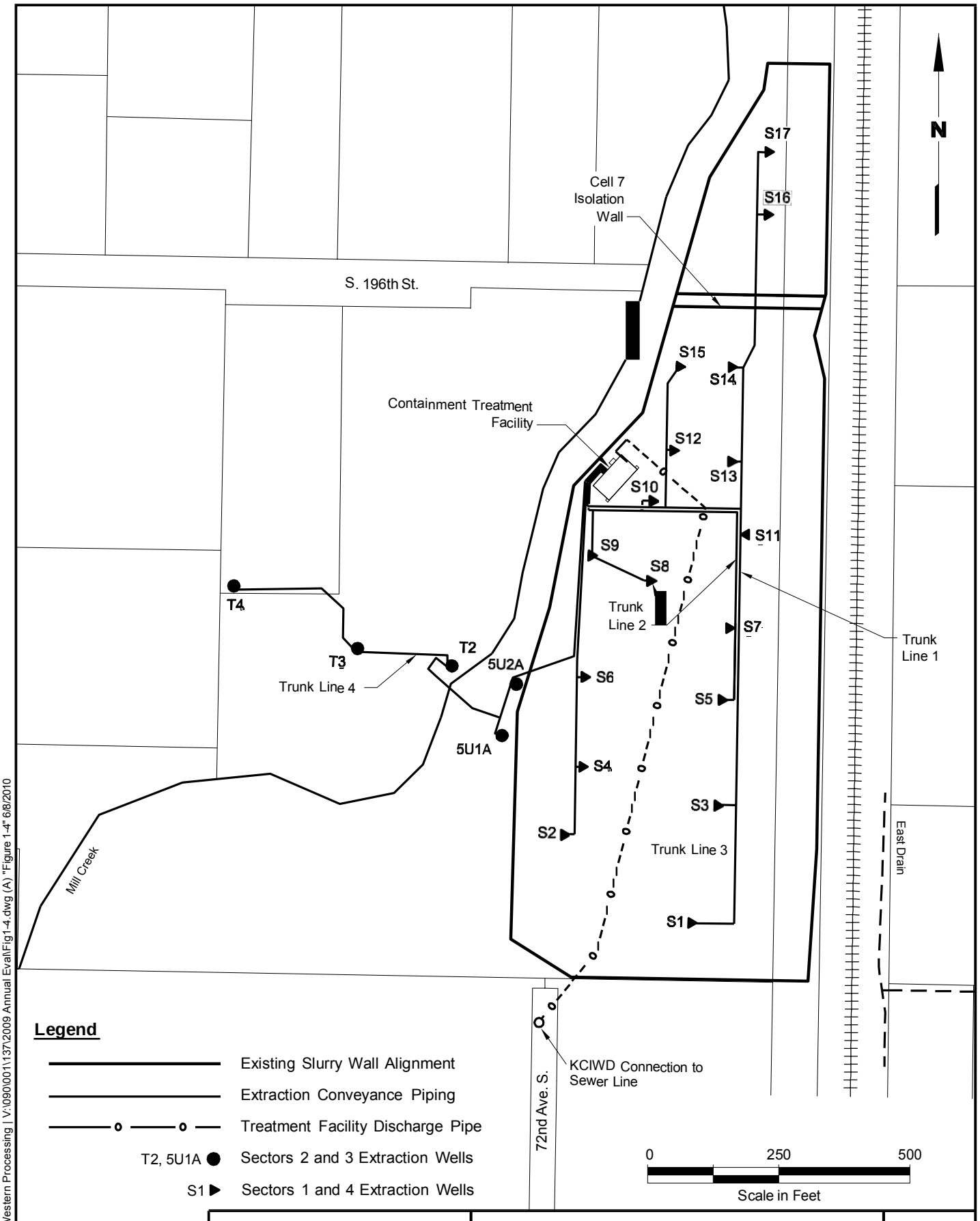
Western Processing Kent, Washington	**Site Plan**	Figure **1-2**



Western Processing | V:\090\001\410\2012 Annual Evaluation\Fig1-3.dwg (A) "Figure 1-3" 5/1/2013

LANDAU ASSOCIATES

Western Processing Kent, Washington	**Groundwater and Surface Water Quality Monitoring Locations - 2012**	Figure 1-3



Western Processing | V:\090\001\137\2009 Annual Eval\Fig1-4.dwg (A) "Figure 1-4" 6/8/2010

LANDAU ASSOCIATES

Western Processing
Kent, Washington

Containment Extraction System

Figure
1-4

A2: **Site Inspection Checklist**

I. SITE INFORMATION	
Site name: Western Processing	**Date of inspection:** February 6, 2013
Location and Region: Kent, WA; R10	**EPA ID:** WAD0009487513
Agency, office, or company leading the Five-Year Review: EPA Region 10	**Weather/temperature:** 45°F, Overcast to Partly Cloudy

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☒ Surface water collection ~~and treatment~~
- ☒ Other: Surface water monitoring for Mill Creek
- ☒ Monitored natural attenuation
- ☒ Groundwater containment
- ☒ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached
☒ Inspection team roster on bottom of page

II. INTERVIEWS (Check all that apply)

1. **O&M site manager:** Wayne Schlappi (Name) Project Manager (Title) February 6, 2013 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone no. 425-965-4177
   Problems, suggestions; ☐ Report attached _____

2. **O&M staff:** Ken Brown (Name) Senior Technician 3 (Title) February 6, 2013 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone
   Problems, suggestions; ☐ Report attached _____

Local regulatory authorities and response agencies (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

There were no other regulatory agencies present during the inspection. The Washington Department of Ecology representative opted out of attendance at the inspection.

Inspection Team:

Joe Wallace	EPA Region 10, Remedial Project Manager	206-553-4470
Bernie Zavala	EPA Region 10, Hydrogeologist	206-553-1562

III. ON SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☐ Up to date	☐ N/A	
☒ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A	
☒ Maintenance logs	☒ Readily available	☐ Up to date	☐ N/A	

Remarks: The maintenance log and inspection notebook displayed that maintenance logs are being maintained and that the inspections are being performed.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☐ Up to date ☐ N/A
   ☒ Contingency/emergency response plan ☒ Readily available ☐ Up to date ☐ N/A

Remarks: I did not verify these elements during the interview and inspection.

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: HAZW OPER certification is current.

4. **Permits and Service Agreements**

☒ Air discharge permit	☒ Readily available	☒ Up to date	☐ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☒ Waste disposal, POTW	☒ Readily available	☒ Up to date	☐ N/A
☐ Other permits_____	☐ Readily available	☐ Up to date	☐ N/A

Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

8. **Groundwater Extraction Records** ☒ Readily available ☒ Up to date ☒ N/A

Remarks_____

9. **Discharge Compliance Records**

• Air	☒ Readily available	☒ Up to date	☐ N/A
• Water (effluent)	☒ Readily available	☒ Up to date	☐ N/A

Remarks_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: The sector is fenced off with a security gate. Either a combination or an electronic pass card is necessary to open the gate. All well vaults were padlocked. None of the waste material remains on t he surface, so there is not a surface waste hazard that needs to be secured.

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house	☐ Contractor for State
☐ PRP in-house	☒ Contractor for PRP
☐ Federal Facility in-house	☐ Contractor for Federal Facility
☐ Other_____	

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☒ Funding mechanism/agreement in place

Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From 1/1/2007 (Date) To 12/31/2007 (Date) $600,000 (Total cost) ☐ Breakdown attached

Remarks: Per Wayne Schlappi, costs dropped to around $600,000 per year since the containment strategy was adopted and implemented, and have remained around $600,000 per year.

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: not applicable.

V. ACCESS AND INSTITUTIONAL CONTROLS ☑ Applicable ☐ N/A

A. Fencing

1. **Fencing** ☒ Intact ☐ Damaged ☐ Location shown on site map

Remarks:

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks: The road is blocked by a gate that requires an access key to enter. All of the other observed fence gates were locked with padlocks, as were the the observed well vaults. Ken Brown and Wayne Schlappi informed me that the water treatment building has an entry alarm system.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring: Self-reporting by the Trust; office on site.

Frequency: Varies: monthly to every other year. See table 1.

Responsible party/agency: Western Processing Trust Fund.

Contact: Wayne Schlappi (Name) Project Manager (Title) February 6, 2013 (Date) 425-965-4177 (Phone no.)

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☒ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2.	**Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A Remarks: Engineered Controls are in place and effective. However, title to the property has not passed on to any heirs or successors of the estate a this time. After that occurs, EPA will resume discussions for implementing the restrictive covenants on the title.
D. General	
1.	**Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident Remarks:
2.	**Land use changes on site** ☒ N/A
3.	**Land use changes off site** ☒ N/A Remarks: The City of Kent is planning to extend 72nd Avenue across the east edge of the Western Processing site, but at this time there have not been any land use changes.

VI. GENERAL SITE CONDITIONS	
A. Roads	☒ Applicable ☐ N/A
1. **Roads damaged**	☐ Location shown on site map ☒ Roads adequate ☐ N/A
B. Other Site Conditions	
Remarks: I inspected some of the storm grates on Site, a storm water outfall at Mill Creek, a few discharge lines from the RCRA cap into East Drain, the overflow area from the detention pond, and the discharge line from the detention pond into Mill Creek. These were all clear of obstruction. There is a lot of vegetative growth in and around the detention pond.	

VII. LANDFILL COVERS ☑ Applicable ☐ N/A	
A. Landfill Surface	
1.	**Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident Areal extent_____ Depth_____ Remarks No settlement was evident in the area covered by the RCRA Cap.
2.	**Cracks** ☐ Location shown on site map ☒ Cracking not evident Lengths_____ Widths_____ Depths_____ Remarks_____
3.	**Erosion** ☐ Location shown on site map ☒ Erosion not evident Areal extent_____ Depth_____ Remarks_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident
Areal extent_____ Depth_____
Remarks: A few small mole hole mounds were noted in the surface soils.

5. **Vegetative Cover** ☒ Grass ☒ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks: Some trees were previously starting to establish themselves at the western fence line for Sector 4, but these trees have been removed. There were several Scotch Broom plants in Sector 4 and the detection pond.

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A
Remarks_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident
Areal extent_____ Height_____
Remarks_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet areas	☐	Location shown on site map	Areal extent_
☐ Ponding	☐	Location shown on site map	Areal extent_
☐ Seeps	☐	Location shown on site map	Areal extent_
☐ Soft subgrade	☐	Location shown on site map	Areal extent_

Remarks: None

9. **Slope Instability**
☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

4. **Containment Wells**
☒Properly secured/locked ☒Functioning ☒Routinely sampled ☒Good condition
☐Evidence of leakage at penetration ☐Needs Maintenance ☐N/A
Remarks_____

5. **Settlement Monuments** ☐Located ☐Routinely surveyed ☒N/A
Remarks_____

E. Gas Collection and Treatment ☐Applicable ☒N/A

F. Cover Drainage Layer ☒Applicable ☐N/A

1. **Outlet Pipes Inspected** ☒Functioning ☐N/A
Remarks_____

2. **Outlet Rock Inspected** ☐Functioning ☒N/A
Remarks_____

G. Detention/Sedimentation Ponds ☒Applicable ☐N/A

1. **Siltation** Areal extent_____ Depth_____ ☐N/A ☒Siltation not evident
Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☒Erosion not evident
Remarks_____

3. **Outlet Works** ☒Functioning ☐N/A
Remarks_____

4. **Spillover** ☒Functioning ☐N/A
Remarks_____

H. Retaining Walls ☐Applicable ☒N/A

I. Perimeter Ditches/Off-Site Discharge ☒Applicable ☐N/A

1. **Siltation** ☐Location shown on site map ☒Siltation not evident
Areal extent_____ Depth_____
Remarks_____

2. **Vegetative Growth** ☐Location shown on site map ☐N/A
☒Vegetation does not impede flow
Areal extent_____ Type_____
Remarks: Vegetation was encroaching on some of the drainage grates, but is regularly cleared. I saw no vegetative debris either that would impede flow.

3. **Erosion** ☐Location shown on site map ☒Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Discharge Structure** ☒Functioning ☐N/A
Remarks_____

VIII. VERTICAL BARRIER WALLS ☑ Applicable ☐ N/A

1. **Settlement** ☐ Location shown on site map ☒ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring**
   Remarks: Described in detail within this Five-Year Review.

A. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☒ Air stripping ☒ Carbon adsorbers
   ☐ Filters _____
   ☒ Additive (*e.g.*, chelation agent, flocculent): metals sequestering agents.
   ☐ Others _____
   ☒ Good condition ☐ Needs Maintenance
   ☒ Sampling ports properly marked and functional
   ☒ Sampling/maintenance log displayed and up to date
   ☒ Equipment properly identified
   ☐ Quantity of groundwater treated annually _____
   ☐ Quantity of surface water treated annually: not applicable.
   Remarks: Floor is clean, instruments and flow lines are clearly labeled, walkways are kept clear. The control system, as explained by Wayne Schlappi and Ken Brown, contains redundant safety mechanisms, including generator and battery backup to send an alarm via pager in the event of a power failure.

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☒ Good condition ☐ Needs Maintenance
   Remarks: Approximately 1" of water is on the bottom of the vaults, and enters the lowermost electrical enclosures. Wayne Schlappi stated that the sump pumps need a small amount of suction head, which is why the water is present, and that they have verified that all of the connections within the lower enclosures are completely encased.

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks:

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☒ Good condition ☐ Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   ☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (containment remedy)
   ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____

B. Monitoring Data		
1.	Monitoring Data ☒ Is routinely submitted on time	☒ Is of acceptable quality
2.	Monitoring data suggests: ☒ Groundwater plume is effectively contained	☒ Contaminant concentrations are declining

C. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

X. OTHER REMEDIES

The Sector 3 groundwater (Trans-Plume) outside of the slurry wall/RCRA cap containment area is being successfully addressed through monitored natural attenuation. Monitoring and geochemical sampling results over the years indicate conditions very conducive to the natural biodegradation of TCE to cis-1,2,DCE, then to vinyl chloride. The final breakdown constituent, vinyl chloride is nearing non-detect levels, an order of magnitude below Action Criteria.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy selected for the Western Processing site involves containment of the source contaminants on site through the use of barrier walls, a RCRA cap, and sufficient extraction of groundwater to prevent outward migration. After a study showed the area to be an ideal site for monitored natural attenuation, the pump and treat system was turned off in April of 2000.
The remedy is functioning as intended and is described in detail earlier in this Five-Year Review. The Monitored Natural Attenuation of the trans plume is ongoing and effective.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

There were a few issues that were identified during the inspection, many of which were pointed out by representatives of the Trust, such as weed growth and mole presence, but none of these issue appear to be a long-term or recurring problem. Trust staff stated that they would take care of these issues as soon as they were identified.

None of the identified issues were out of the ordinary for the type of site and setting of the site. EPA believes that the results of this inspection indicate that the onsite O&M is adequately implemented and is protective of the remedy.

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. The inspection did not identify any indicators of a potential remedy problems.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The system has been in operation long enough that there is enough data for a proper statistical analysis, and prior to the start of the inspection, we discussed the possibility of using statistical methods for Long Term Monitoring Optimization. EPA used the MAROS (Monitoring and Remediation Optimization System) Software for an analysis at the Frontier Hard Chrome site, to good effect. The analysis would focus on the adequacy of the sampling frequency and locations based on the data collected over several years. It is quite possible that this may indicate that the sampling frequency at some of the wells could be reduced. This will be discussed in more detail after the Trust has had the opportunity to become familiar with these methods.

1. WWTP control panel screen showing WWTP systems.

2. WWTP control panel screen showing well network.

3. Information on well operation called up on control panel screen.

4. Monitoring well vault raised to protect well from flooding due to potential Howard Hanson Dam failure.

5. View to North over RCRA cap. S. 196th St. bridge crossing RCRA cap in background.

6. Monitoring well vault with sampling tubes.

7. Monitoring well with raised electrical panel for flood protection.

8. Piezometer

9. One of the storm drains on the RCRA cap.

10. Storm drain discharge point into Mill Creek.

11. Looking West to neighboring warehouse. Ecology blocks set to protect fence from trucks (a past problem).

12. Vegetative growth on RCRA cap. Note mole tunnel mound.

13. Mole hole on RCRA cap.

14. View to South over RCRA cap. Note mole tunnel mounding.

15. Small animal access under East side fenceline.

16. Interurban bike trail along East edge of Site.

17. East Drain parallel to and just East of Interurban Trail.

18. S. 196th St. bridge abutment (West end) built on RCRA cap.

19. Detention Pond with vegetative growth North of Site – accepts East Drain flow.

20. Piezometer in Detention Pond

21. Kity of Kent Public Notic of pending Mill Creek restoration work North of Site.

22. Dirt road running South from S. 196th St. close to planned extension alignment of 72nd Ave. S.

23. Abandoned tank near Mill Creek – will be removed.

24.Looking South from s.196 1h Stover MillCreek with Site VVINTP in background.

25. Barrels of collected cuttings from geophysical borings in preparation for 72 Ave S. extension. Collected soil disposed of through Waste Management.