Fourth Five-Year Review Report

for

Western Processing Superfund Site

City of Kent
King County, Washington

July 2008

Prepared by:

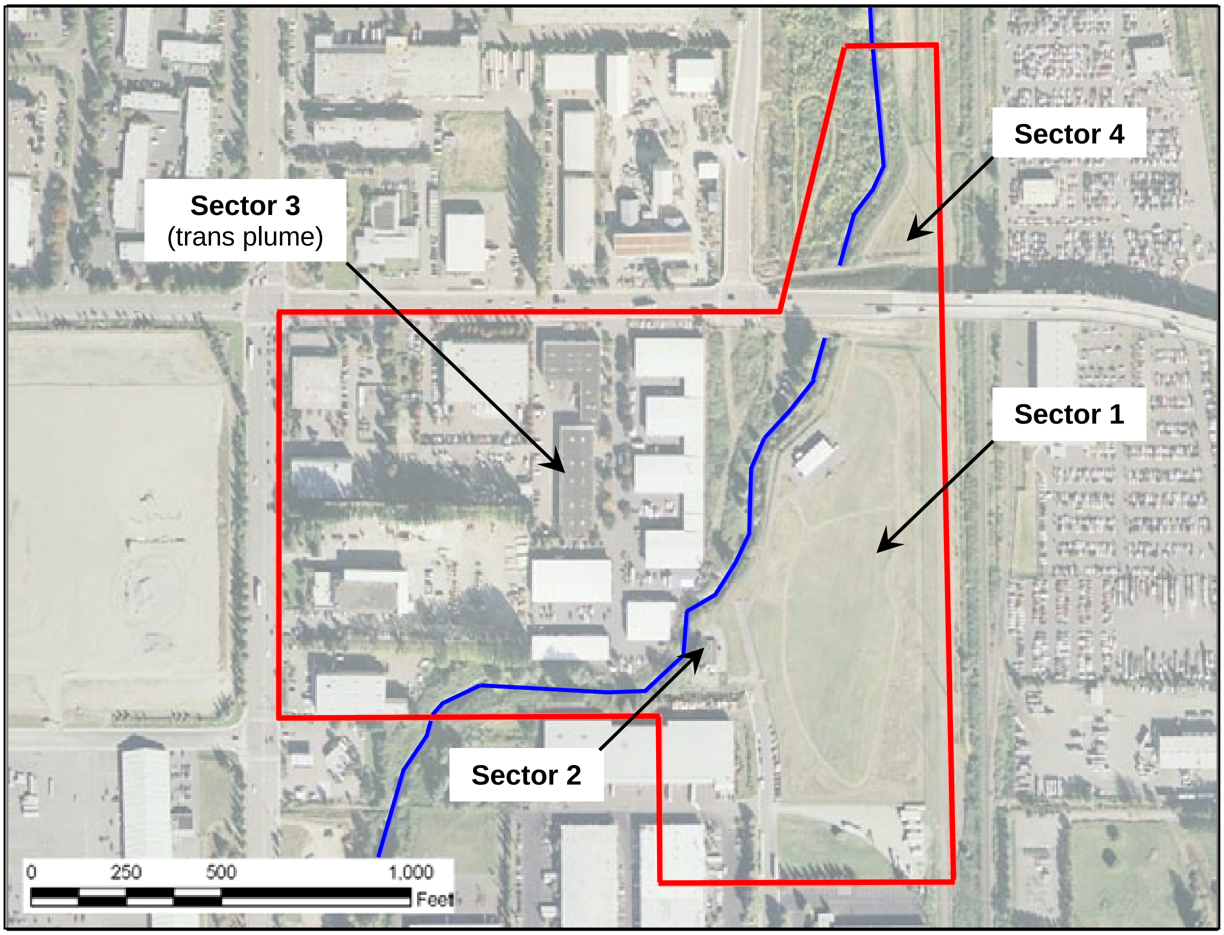
United States Environmental Protection Agency
Region 10
Seattle, Washington

Approved by: Date:

[signature] 7/24/2008

Dan Opalski, Director
Office of Environmental Cleanup
U.S. EPA, Region 10

Western Processing Superfund Site



Source: October 1, 2006; Airphoto USA

Table of Contents

List of Acronyms

AWQC	Ambient Water Quality Criteria
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
DCE	Dichloroethene
DCM	Dichloromethane (i.e. methylene dichloride)
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Difference
gpm	Gallons per minute
HRS	Hazard Ranking System
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PAH	Polyaromatic Hydrocarbon
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene (i.e. perchloroethene)
POTW	Publicly Owned Treatment Works
ppm	Parts per million
PRP	Potentially Responsible Party
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
SRI	Supplementary Remedial Investigation
TCE	Trichloroethene
TCM	Trichoromethane (i.e. chloroform, methylene trichloride)
VOC	Volatile Organic Compound
WDOE	Washington Department of Ecology

Executive Summary

The Western Processing Superfund site is located on 14.5-acres of land within the Green River Valley, three miles north of the city center of Kent, Washington. This site is in the long-term operations and maintenance phase. No construction activity has occurred on site since the last Five Year Review in 2003. As the remedy for the Western Processing site resulted in hazardous substances, pollutants or contaminants remaining on site and was selected before passage of the Superfund Amendments and Reauthorization Act (pre-SARA), this is a policy Five-Year Review.

Current site actions include regular monitoring of onsite contamination and the continuous extraction and treatment of groundwater in the area under the RCRA cap in order to maintain containment. The extracted water is treated before discharge to the local sewer system. A plume of dissolved volatile organic compounds (VOCs) extends from the southwest portion of the Western Processing site towards the northwest in groundwater approximately 50' below ground surface (bgs). This offsite plume and associated geochemical properties are regularly monitored; the plume has been contracting in size and concentration since the Third Five Year Review.

EPA and Washington State Department of Ecology (WDOE), referred to as the Governments in site-related documents, continue to conduct oversight. The Western Processing Trust Fund (the Trust) and the Governments conduct two annual on-site meetings to review site data, documents and other activities. The Trust submits monthly reports to the Governments via e-mail and prepares an Annual Report which provides a summary of system operation, remediation progress, and recommendations. EPA conducts periodic field inspections at the site.

The Trust successfully shifted to a containment strategy prior to the Third Five Year Review, which resulted in a dramatic decrease in the pumping and treatment rates needed to contain the onsite contamination. Implementation of this alternative control strategy has reduced the Trust's annual operating costs from about $5 million to roughly $600,000. In 2000, the extraction wells in the "Trans Plume Area" were turned off as part of a monitored natural attenuation program. The contamination in that area has steadily declined; monitoring data indicates 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 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. Groundwater concentrations off the Western Processing property are decreasing and there are no exposure routes from 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.

<u>Cross Program Measures</u>

Human Exposure:	Current Human Exposures are Under Control.
Groundwater Migration:	Migration of Contaminated Groundwater is Under Control.
Ready for Reuse:	The entire site is Protective for People under current conditions. Sector 3 is currently in use; Sectors 1 & 2 are Ready for Reuse. Sector 4 reuse is precluded by issues other than contaminants.

Five-Year Review Summary

SITE IDENTIFICATION		
Site name *(from WasteLAN)*:	**Western Processing Co., Inc.**	
EPA ID *(from WasteLAN)*:	**WAD0009487513**	
Region: 10	**State: WA**	**City/County: Kent / King County**
SITE STATUS		
NPL status: ■ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ■ Operating ■ Construction Complete		
Multiple OUs? ■ YES ☐ NO	**Construction completion date:** 12 / 23 / 1991	
Has site been put into reuse? ☐ YES ■ NO [1]		
REVIEW STATUS		
Lead agency: ■ EPA ☐ State ☐ Tribe ☐ Other Federal Agency ______________________		
Author name: Chris Bellovary		
Author title: RPM	**Author affiliation: EPA Region 10**	
Review period: 10 / 1 / 2003 to 7 / 25 / 2008		
Date(s) of site inspection: 04 / 03 / 2008		
Type of review: ☐ Post-SARA ■ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☐ 2 (second) ☐ 3 (third) ■ Other: Fourth Five-Year Review		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#____ ☐ Construction Completion ■ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date *(from WasteLAN)*:	9 / 30 / 2003	
Due date *(five years after triggering action date)*:	9 / 30 / 2008	

[1] Sector 3 of the Western Processing site was never removed from productive use, and remains in productive use today.

Five-Year Review Summary (continued)

Issues

Institutional Controls that will run with the property have not been implemented. The previous land owner died in 2003, which prevented this issue from proceeding. The title to the property has not yet passed on to any heirs or successors of the estate. These controls will be necessary to preclude future property users from accessing subsurface soil or groundwater.

EPA has identified the attorney for the heirs to the decedent's estate. After ownership of the property has been clarified, EPA intends to reopen discussions on implementing land use controls that run with the land.

Recommendations and Follow-up Actions

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.

Protectiveness Statement

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 are decreasing 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.

Other Comments

All other institutional controls called for in the Record of Decision are currently in place.

Western Processing Superfund Site
Kent, Washington
Fourth Five-Year Review Report

1. Introduction

1.1 Purpose of the Five-Year Review

The purpose of the five-year review is to determine whether the remedy at the Western Processing 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.

1.2 Authority for Conducting the Five-Year Review

The Superfund Amendments and Reauthorization Act of 1986 (SARA) added §121(c) to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLA §121(c) requires the U.S. Environmental Protection Agency (EPA) to review Superfund site every five years after EPA begins the remedial action if the remedy will result in hazardous substances, pollutants or contaminants remaining on site.

CERCLA § 121(c), codified at 42 U.S.C. 9621(c), 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.*

CERCLA § 121(c) is not retroactive; Superfund sites where the Record of Decision (RODs) was issued prior to the passage of SARA are not required by statute to prepare Five Year Reviews. However, as a matter of policy, EPA decided to review all remedies that result in hazardous substances, pollutants or contaminants remaining on site regardless of when the remedy was selected.

The most recent Record of Decision (ROD) for the Western Processing site was signed before the statutory requirement for Five Year Reviews came into effect[2]. As the remedy will result in hazardous substances, pollutants or contaminants remaining on site[3], this Five Year Review is required by policy.

1.3 Who Conducted the Five-Year Review

EPA Region 10 conducted the Five-Year Review of the remedy implemented at the Western Processing Site, located in Kent, Washington. The Fourth Five-Year Review for Western Processing site was conducted by the EPA Remedial Project Manager (RPM) covering the period from October 2003 through July 2008. This report documents the results of the review.

1.4 Review Status

This is the fourth Five-Year Review for the Western Processing site. The triggering action for this review was the completion of the third Five-Year Review Report, dated September 2003. 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.

1.5 Areas, Cells, Sectors, and Operating Units

This Five Year Review will only describe the site in terms of Sectors, but this explanatory note may be useful for readers who plan to review earlier site related documents.

<u>Activity</u>

- 1983 through 1984, sitewide: Operating Unit 1 (OU1)
  OU1 occurred from 1983 to 1984 and covered the removal of hazardous wastes.
- 1984 through present, sitewide: Operating Unit 2 (OU2)
  OU2 began in 1985 and covers the containment and remediation of remaining site wastes.

<u>Location</u>

- 1983: Areas I-X
  The remedial investigation divided the site into ten Remedial Action Areas, and each *Area* was separately characterized.
- 1987 through 1997: Cells 1-7
  After the remedial investigation, the original extraction system was installed using a header-lateral configuration. There were 7 main zones in which flow could be controlled, which were named as *Cells* 1-7.
- 1997: Sectors 1-4

---

2 The Superfund Amendments and Reauthorization Act of 1986 (SARA) became effective on October 17, 1986. The ROD Amendment for the Western Processing site was issued on September 4, 1986.

3 The ROD for the Western Processing site states that the site will be cleaned up to industrial use levels.

After the extraction system was replaced with a containment system in 1997, the term of Cells no longer represented site conditions, so the site was then referred to in terms of four *Sectors*:

- Sector 1: Located within the slurry wall and south of 196th Street
- Sector 2: Located between Sector 1 and Mill Creek
- Sector 3: The Trans Plume
- Sector 4: Located within the slurry wall and north of 196th Street

For additional information, please see Figures 1, 2 and 3, located in the Figures and Tables section of this document.

2. Site Chronology

Event	Sector	Date
Western Processing begins operation on site		1961
EPA issues $210,000 penalty for 28 violations of RCRA	1, 2	05/1982
Warrant for entry issued by Court	1, 2	09/1982
Order to close the site issued by EPA	1, 2	04/1983
Order to close the site issued by Court	1, 2	07/1983
Emergency removal of site wastes completed	1, 2	07/1983
Site placed on NPL		**09/1983**
WDOE implements on site stormwater control measures	1, 2	12/1983
1st Consent Decree entered by the Court[4]		07/1984
Record of Decision issued (Phase I - Removal Action)		**08/1984**
Surface cleanup completed	1, 2	11/1984
RI/FS released		03/1985
Record of Decision issued (Phase II - Remedial Action)		**09/1985**
Record of Decision Amendment issued		09/1986
Consent Decree entered by the Court[1] (Phase I)		10/1986
Consent Decree entered by the Court[1] (Phase II)		04/1987
Subsurface remediation begins		07/1987
Both pump & treat systems begin operations	1, 3	10/1988
Slurry wall constructed around the site[5]	1, 4	10/1988
Construction Complete		12/1991
First Five Year Review		**01/1993**
Mill Creek restoration complete		09/1993
East Drain interceptor system begins operation	1	11/1994
TI Waiver Petition submitted		09/1995
ESD issued in response to TI Waiver Petition		12/1995
Containment wells installed	1	06/1996
Containment pumping phased into operation	1	01/1997
New treatment system started	1, 3	07/1997
Isolation wall completed	1, 4	10/1997
Final on-site subsurface waste removal completed.		10/1997
East Drain interceptor system shut off	1	12/1997
Second Five Year Review		**09/1998**
Slurry Wall intentionally breached in Sector 4	4	09/1998
Completion of work in Sector 4	4	10/1998
RCRA Cap completed	1	10/1999
Start of Monitored Natural Attenuation for the trans plume	1, 3	04/2000
Third Five Year Review		**09/2003**

[4] Only the court documents that were significant for remedy implementation are listed in the timeline.
[5] The last 100' of the slurry wall was constructed in June of 1989, and the slurry wall was modified in September of 1989.

3. Background

3.1 Site Location and Surface Characteristics

The Western Processing Superfund site is located on the 13-acre parcel of land that was the former site of Western Processing facility, and a 1.5-acre adjoining low-lying parcel to the north, which received stormwater runoff from the Western Processing facility. These parcels of land are located approximately three miles north of the city center of Kent, Washington, and within the Green River Valley. (See Figure 1) The region was largely a farming area, but the slow transition to industry was accelerated with the completion of a flood control dam in 1963. The Western Processing site is currently surrounded by light industry. Native surface soil for the site includes Pilchuck fine sandy loam and Newberg silt loam.[6]

The northern border of the site currently contains a small parcel of undeveloped land. The eastern site boundary is the Interurban Trail used by walkers and bicyclists and a drainage ditch for the railroad line (East Drain). The western site boundary is Mill Creek, which flows in a northerly direction until it joins with Springbrook Creek. Springbrook Creek flows into the Black River, which is a tributary of the Green River, which becomes the Duwamish River before ultimately emptying into Puget Sound at Seattle. East Drain flows into Mill Creek north of the Western Processing site. The portions of the site that are immediately adjacent to Mill Creek and East Drain are within a 100-year flood plain, and the rest of the side is within a 500-year flood plain.

3.2 Subsurface Characteristics

The site is located over a shallow alluvial aquifer, with the groundwater table beginning at 5' to 20' below ground surface (bgs). Three major geologic units comprise the hydrogeologic system in the vicinity of the site. These units comprise the White River Alluvium, which are the valley fill deposits that occur throughout the Kent Valley and beneath the site. The alluvial fill consists primarily of sand, silt, and clay with occasional unconsolidated layers of sandy gravel. White River alluvium is not considered to be a major drinking water source in the Kent area because of its relatively low permeability and naturally occurring poor water quality. Many of the wells for which data are available indicate a sulfur odor, natural gas (methane), and/or high iron levels in the water.[7]

Groundwater beneath the site has been delineated into four hydrogeologic zones (A-D). The A-Zone groundwater (to a depth of 40' bgs) is comprised of a complex sequence of discontinuous interbedded silt, sand, and clay lenses. The groundwater in the A-Zone underneath the site flows to the northwest and discharges into Mill Creek. The B-Zone groundwater (depths of 40' to 80' bgs) is comprised of fairly continuous fine to medium sand with intermittent silty zones. The groundwater in the B-zone also flows northwest, but generally passes below Mill Creek. The C-Zone groundwater extends from about 80'

---

[6] Natural Resources Conservation Service, U.S. Dept. of Agriculture, Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov. Last accessed on Jan. 3, 2008.

[7] § 3.3.1 of the *Feasibility Study for Subsurface Cleanup*, referencing the Washington Dept. of Water Resources bulletin *Geology and Groundwater Resources of Southwestern King County, Washington*, J. E. Luzier, 1969.

to 120' bgs; groundwater below 120' bgs was referred to as D-Zone.[8] Zones C and D will not be discussed in this review, as the groundwater below Zones A and B have not been impacted by site activities.

Contaminants in Zone A originally discharged into Mill Creek. Installation of a slurry wall around the site has isolated the original source of contaminants from Mill Creek. Contaminants in Zone B were transported down-gradient of the site and Mill Creek. Low flow extraction of water from Zone A currently maintains a flow gradient from Zone B into Zone A across the site, to prevent further contaminants from leaving the site. Contaminants that had already been transported off site were initially addressed with a pump and treat solution, which was changed to a monitored natural attenuation program in the spring of 2000. These actions will be discussed in greater detail in Section 4.

There are no wells in this shallow aquifer within a one-mile radius of the site that are currently used for drinking water. The city of Kent (pop. 86,660)[9], of which the site is a part, obtains most of its drinking water from a much deeper, hydraulically isolated artesian aquifer, for which the closest well is slightly more than a mile to the southeast of the site. Fire Station 76 is located 0.4 miles south of the site, where the City of Kent owns a well that is screened at a depth of 85' to 95' bgs. This well was previously used to provide flow augmentation for Mill Creek in the mid-1990s, but that well is no longer used.[10]

3.3 History of Contamination

The Western Processing Company, Inc. operated from 1961 to 1983 on a 13 acre parcel of land that encompasses most of the current Superfund site. Originally, Western Processing reprocessed animal by-products and brewer's yeast. During the 1960s, the business expanded their operations, to store, reclaim, or bury waste from over 300 businesses, including some of the Pacific Northwest's largest industries.

Spills and the improper storage or disposal of wastes or reclamation byproducts caused heavy contamination of site soils, shallow groundwater beneath the site, and Mill Creek. Investigations identified more than 90 of EPA's priority pollutants at the site, most in the categories of volatile organic compounds, semivolatile organic compounds and heavy metals. Operation of the Western Processing Company ceased in 1983 by federal court order and the site was placed on the National Priorities List (NPL) in September 1983.

3.3.1 Early Investigations

Following significant attention to the Western Processing facility by many local agencies in the 1970s and early 1980s, EPA inspected the Western Processing facility

---

8 Initial investigations revealed aquitards and differences in water chemistry between the different zones of water, so these were originally believed to be discrete aquifers. Subsequent investigations showed that to be incorrect. The area underneath the site is part of a complex alluvial geology; although many discontinuous aquitards exist underneath the site, Zones A, B, C, and D are hydraulically interconnected. Nevertheless, the original terminology was maintained for purposes of describing subsurface conditions.

9 Washington State Dept. of Financial Management, *April 1 Population of Cities, Towns, and Counties* (June 27, 2008). Available online at http://www.ofm.wa.gov/pop/april1/finalpop2007.pdf, last visited on Jan. 3, 2008.

10 Conversations with the City of Kent Environmental Engineering Manager, M. Mactutis, on January 7, 2008 and February 22, 2008.

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 the owners/operators failed 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.

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.

3.3.2 Basis for Taking Action

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. Sediment and surface water samples confirmed that site contamination had impacted the creek and that Mill Creek exceeded ambient water quality criteria for aquatic organisms. The site had a Hazard Ranking System (HRS) score of 58.63 at the time it was listed on the NPL. Primary contaminants groups included: Halogenated volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), phenolic compounds, and metals.

3.3.3 Early Actions

EPA issued a CERCLA § 106 order in April 1983 which required the owners/operators to immediately cease operations and provide assurances that they would conduct a cleanup. When the company stated that it was unable to undertake the remedy, EPA used $1.5 million in CERCLA emergency funds to conduct an immediate removal operation to stabilize the site.

The EPA cleanup 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. WDOE used State funds to implement storm water control measures at the site shortly thereafter. The Western Processing facility was permanently closed by federal court order in July 1983 and was listed on the National Priorities List (NPL) in September 1983.

3.3.4 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, undertook the surface cleanup in July 1984 at a cost of over $10 million. This was Phase I of the site 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, it was graded to prevent stormwater runoff, a plastic-lined pond was constructed to contain collected storm water, and a portable treatment plant was brought on site to treat this water.

Surface cleanup was completed in November 1984, with the exception of about 3,000 gallons of a dioxin-contaminated oily liquid that was discovered in one storage tank. No other dioxin contamination was found on site. This liquid was placed into double-walled drums and moved into plastic-lined trailers on the site. The initial plan for disposal of this material was to be through off-site incineration. This plan for disposal was not well received by the public or media sources, which led to a continued search for an alternate method of disposal. In 1986, a mobile batch reactor successfully used a KPEG (potassium hydroxide, polyethene glycol) process to treat approximately 6,000 gallons of dioxin-contaminated liquid on site. Residual material from the treatment process was shipped to Chemical Waste Management's SCA incinerator in Chicago.

3.3.5 Remedial Investigation and Planning

EPA's phased Remedial Investigation/Feasibility Study (RI/FS), 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; the predominant contaminants were heavy metals, polychlorinated biphenyls (PCBs), phenols, and volatile organic compounds (VOCs). Over 95% of the contamination was determined to be in the uppermost 15' of soil. Groundwater contamination for the most part was concentrated from the top of the water table to approximately 30' bgs (Zone A). Extremely high concentrations of contaminants were found in this shallow groundwater with maximum detected concentrations of up to 510 ppm (parts per million; mg/kg) 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, 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 ppm (parts per million; mg/kg) 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' bgs. Off-property surface soils analysis indicated the presence of metals and organic compounds, which may have been transported off the property by wind.

Shallow site groundwater (Zone A) flows to the northwest into Mill Creek. The RI/FS indicated that Mill Creek captured groundwater to a depth of approximately 50' to 60' bgs, so it was believed that Mill Creek would act 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’. At the time, EPA believed the contaminated groundwater was unlikely to migrate beyond Mill Creek.

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 the trans isomer of 1,2-dichloroethene (referred to as the trans plume) had migrated under Mill Creek and was detected in wells west of the creek. This was addressed in the 1986 ROD amendment, as discussed below.

3.3.6 Record of Decision (ROD)

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

- Conduct extensive soil and subsurface waste sampling program, 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 1×10^{-5} (1 in 100,000) excess cancer risk level and by covering remaining soils having above background concentrations of priority pollutants;
- Construction of a shallow groundwater extraction system and operation of the 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 stormwater control system;
- Excavation of contaminated Mill Creek and East Drain sediments which may have been affected by Western Processing;
- Attainment of either the Mill Creek performance standard, identified as the ambient water quality criteria for aquatic organisms, or the background conditions, as measured upstream from the site;
- Meeting the Mill Creek performance standard for 30 years after ceasing groundwater extraction.
- Extensive monitoring of Mill Creek, the East Drain, groundwater, and the groundwater extraction/treatment system performance;
- Construction and maintenance of a RCRA consistent cap over Sector I 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.

On September 4, 1986, the EPA Regional Administrator approved an amendment to the ROD, which required the following additional element:

- Remediation of the plume of 1,2-dichloroethene, referred to as the trans plume, which was detected just west of Mill Creek during the SRI.

The original identification of the trans isomer of 1,2-dichloroethene within the plume was misleading; the plume was later determined to primarily contain the cis isomer of 1,2 dichloroethene.

3.3.6.1 Performance Goals

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

1. Achievement of an inward flow of shallow groundwater (<40 ft bgs) within a specified area (Sector 1) 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' at the western boundary of the site; or 2) establishment of a hydraulic barrier to regional groundwater flow at the 40' to 70' depth at the western boundary of the site.
    - Current Assessment: The inward flow of groundwater from Zone B to Zone A within the slurry wall has been consistently maintained.
2. All air emissions must comply with a discharge permit issued from the Puget Sound Air Pollution Control Agency.
    - Current Assessment: Air emission permit discharge requirements have been consistently met by the on-site treatment systems during the five year period covered by this review.
3. Combined wastewater effluent from the treatment systems must meet discharge criteria included in the POTW discharge permit.
    - Current Assessment: Due to reduced discharge levels, the discharge authorization from King County recently changed from an individual permit to a Major Discharge Authorization. Wastewater discharge permit/authorization requirements have been consistently met by the on-site treatment systems.
4. Mill Creek must be restored to meet the ambient water quality criteria for aquatic organisms, or the background conditions, as measured upstream from the site.
    - Current Assessment: Performance standards for surface water in Mill Creek were achieved in 1990 and have remained in attainment since that time.
5. Mill Creek sediments must 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.
    - Current Assessment: The remediation of Mill Creek was completed in 1994.

3.3.6.2 Cleanup Goals/Standards

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

1. 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.

   - The surface water quality goals for Mill Creek were attained in 1990.

2. 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 MCLs for cis- and trans-1,2-dichloroethene, 70 µg/l in Zone B. These standards only apply to the trans plume identified at the time of the Consent Decree and do not apply to all offsite areas.

   - Groundwater monitoring of the Sector indicates that the only VOC currently detected within the trans plume is chloroethene (i.e. vinyl chloride). Chloroethene was only detected in one of the trans plume monitoring wells (15M15B) during 2006. No VOCs were detected in the samples taken in 2007 from the trans plume monitoring wells.

3. An Explanation of Significant Difference (ESD)[11] was issued in 1995, which changed the strategy from an aggressive effort to restore groundwater quality to containment. The ESD did not waive, modify, or add any performance standards to the amended ROD; however, it did specifically identify a requirement for revisiting the issue of setting additional standards for chloroethene in the "trans" plume during future five-year reviews.

   - Geochemical sampling continues to support that conditions in the trans plume area are conducive to the natural breakdown of chloroethene; sampling results appear to verify that this breakdown is occurring as expected. EPA believes that the current approach is sufficient at this time.

4. Remedial Actions

4.1 Initial Subsurface Investigation and Cleanup

In the fall of 1986, the Trust conducted an 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

[11] The ESD is described in greater detail in section 4.6 of this review.

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[12] as prime contractor to conduct the Phase II subsurface cleanup at a cost that was initially estimated at $40 million. The Trust submitted work plans for the remedial action, which were approved by EPA and WDOE. Activities were conducted consistent with the Consent Decree, the NCP, and other state and local requirements. During the summer and fall of 1987, approximately 25,600 cubic yards of highly contaminated soil and sludge were excavated and hauled to a Class I RCRA landfill located in Arlington, Oregon.

The original on-site lab was replaced in January 1988 by a new on-site lab, and was comparable to an EPA Contract Laboratory Program (CLP) lab. Construction of the lab marked the implementation of the long-term monitoring program. The lab was dedicated to processing samples from the Western Processing site, and was designed for a peak load of over 9,000 samples analyzed per year. That capacity was later increased to more than 11,000 site-specific samples per year.

4.2 Source Control

In 1988, the Trust constructed a 4400' long soil-bentonite slurry wall (see Figure 4) around the 14.5 acre site to laterally confine the remaining site contaminants within the site boundaries. The slurry wall is 30" wide, 40' to 50' deep, and is a hanging wall that extends through the aquitard that separates Zone A and Zone B. The soil-bentonite slurry wall was installed using a backhoe and bucket excavator. This vertical barrier also increases efficiency of the groundwater extraction and treatment measures.

Vertical containment of the contaminants was achieved by groundwater extraction, described in detail below. In 1999, an impermeable RCRA style cap (see Figure 8) was placed over the main containment area (Sector 1).

4.3 Groundwater Cleanup

Remedial systems at the site originally included both an on-site and an off-site extraction and treatment system for groundwater cleanup. The original on-site extraction system consisted of 13,000' of infiltration trenches and 206 recovery wells. The main 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 was placed in shallow on-site soils within the slurry wall for the purpose of flushing contaminants from the shallow soils. 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 original groundwater treatment plant was completed in July 1988 and operated until July 1997. It was designed with two major components: air stripping for VOCs, followed

[12] Chemical Waste Management merged into OHM Remediation Services Corp. in the early to mid 1990s which in turn merged with The IT Group in 1998. All assets and liabilities of The IT Group were acquired by The Shaw Group Inc. in 2002. Chemical Waste Management's subcontractors in this phase included Canonie Environmental and HDR Infrastructures.

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 the local POTW[13] or reinjected into the ground through the infiltration system.

Due to 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 trans plume extraction system consisted of three deep wells (trans wells) screened between 40' and 70' 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.

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. Seven "barrier" monitoring wells were installed west of Mill Creek. 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 (see Figure 5).

4.4 Mill Creek

The Consent Decree required that Mill Creek be restored to meet the ambient water quality criteria for aquatic organisms, or the background conditions, as measured upstream from the site, and that these conditions be met within 3 years of the effective date of the Consent Decree (April 10, 1987). In March 1990, the Trust reported that the 3 year performance standards for surface water in Mill Creek had been achieved.

The Consent Decree also 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, which involved dredging and placing a 4" gravel bed in the creek. This remediation was completed in 1994 and sediment sampling was discontinued at the end of 1999.

Water quality in Mill Creek is monitored annually. Organic compounds are no longer monitored regularly in Mill Creek as they have not been detected since 1991. Although PCBs were originally detected in the surface soils for Western Processing, PCBs were not detected in Mill Creek sediment or water either downstream or at the site.

[13] The local POTW (publicly owned treatment works) was previously known as METRO, and is currently known as the King County Industrial Waste Program.

The only item of concern from the Mill Creek monitoring data during this five year review period did not come from the site. In 2006-2007, samples from the monitoring point upstream of the site revealed lead concentrations that exceed the Ambient Water Quality Criteria (AWQC). The downstream monitoring site detected lower concentrations of lead than the upstream monitoring site, so the Western Processing site appears not to contribute any lead to Mill Creek. The upstream source of the lead is currently unknown.

4.5 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. An investigation that was completed in 1992 also found metal contaminants in the relatively stagnant shallow groundwater zone between the East Drain and slurry wall.

Remediation of East Drain sediments was undertaken in 1993 and over 1,140 tons of sediment were removed and shipped to the Waste Management Columbia Ridge Landfill, near Arlington, Oregon. Class A gravel borrow was used as backfill material in excavated areas.

The East Drain extraction system was constructed in late 1993 between the Interurban Trail and the East Drain to intercept contaminated groundwater and prevent it from recontaminating the clean fill. The system began operation in November 1994; extracted water was treated by the Western Processing groundwater treatment plant. The system's operations ended in December of 1997, after the system's operations reached a point of diminishing returns. Results of samples taken from the East Drain in 2006 did show an unexpectedly high concentration of zinc, 597 µg/L. (See Table 4).[14]

Well 13M30A is regularly monitored for the small amount of VOCs that remain to the east of the East Drain area. TCE was last detected at this well in 2002, 1,2-DCE in 2004, and chloroethene (i.e. vinyl chloride) in 2006. Neither TCE, DCE, nor chloroethene were detected in 2007 for this location.

4.6 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. EPA and WDOE reviewed the TIW, but did not grant a waiver. Instead, EPA issued an ESD in December 1995 which modified 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 a containment strategy to keep the contamination on site and prevent further off-site migration. EPA and WDOE 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:

---

[14] East Drain Stations D1 and D2 were dry during third quarter 2007 and therefore were not sampled.

1. Containment pumping inside the slurry wall and the trans plume,
2. Hot spot remediation on-site using thermal reduction and stabilization,
3. RCRA consistent cap over the site,
4. Isolation wall,
5. Trans plume control,
6 Bioremediation,
7. Long-term monitoring and five-year reviews,
8. Institutional controls,
9. Minimum of 30 years site maintenance, and
10. Contingency plan.

4.7 Post ESD Status

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

4.7.1 Containment Pumping.

A new extraction system was installed in 1996 (see Figure 4) to provide more automated operation during the period of hydraulic containment for both on-site and off-site plumes. The former vacuum extraction system was replaced by new piezometers, monitoring wells and containment wells which used positive displacement pumps. Existing equipment in Sector 2 (a 50' wide area between the west slurry wall and Mill Creek) and Sector 3 (trans plume area) was updated. Two additional extraction wells were added to Sector 4 (the area north of South 196th Street) in late 1997.

The current control system went on line in June 1997, and expanded the control and alarm capabilities for the extraction system. The new extraction system was designed to create a constant upward gradient of groundwater in Sectors 1, 2, 3 and 4 to contain the contaminants on site. The water that is extracted to create this gradient is treated to strip VOCs and discharged under a discharge authorization to the King County sewer system. Off gas from the air stripper is treated with activated carbon prior to atmospheric release under a Puget Sound Clean Air Agency permit. Spent carbon is disposed of as hazardous waste at an approved facility.

The extraction rate for the site averaged around 230 gpm between 1988 to 1997. This rate was reduced to 140 gpm at the end of 1996, because the reinfiltration of treated water was discontinued which in turn resulted in a decreased influx of water inside the containment area. The extraction rate was further decreased to 75 gpm in 1997, in conjunction with the change in strategy from restoration to containment.

Under the current treatment operations, with the trans wells off and the RCRA cap in place, a 6.5 gpm average extraction rate is sufficient to maintain the inward and upward gradient in Sector 1. This amounts to a total rate of extraction of over 3.4 million gallons a year from Sector 1; another 0.3 million gallons a year are extracted from Sector 2.

The system is operational 7 days per week, 24 hours per day. Shutdowns occur for around three hours every eight weeks to change out air stripper trays and around six hours every four months to cycle the carbon filters.[15] The system operates approximately 99% of the time.

4.7.2 "Hot Spot" Remediation.

The ESD required treatment of a shallow area near the center of the site that contained both VOCs and heavy metals. The material was to be excavated, treated, stabilized, and then placed back into the excavated area prior to installation of the RCRA cap.

Soil samples were collected and analyzed from two depths at 39 locations, using an iterative process to identify the most contaminated area of soil using contour and risk-enhanced contour plots. It was originally believed that desorption and stabilization would be the most cost effective way of addressing the hot spots, but after determining it was one large hotspot rather than many small hotspots, offsite disposal was determined to be the most cost-effective method to address the issue.

Soils were excavated from the identified area, 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 in March 1997 and were completed with regrading of surface soils in October 1997.

4.7.3 RCRA Cap.

The RCRA cap over Sector 1 was completed in October 1999. (See Figures 2, 8) This served to dramatically reduce the amount of infiltration in the area and thereby reduce the amount of pumping necessary to achieve the containment strategy called for in the ESD.[16]

4.7.4 Isolation Wall.

The area north of South 196th Street, known as Sector 4,[17] was located within the slurry wall but had significantly less contamination than the main containment area for the site. Testing of surface soils in this area during 1991 established that remedial activity for the surface soils had achieved industrial cleanup levels, but groundwater treatment in the area was ongoing. The ESD called for an isolation wall to isolate this area of relatively low contamination from the rest of the site. This modification reduced the amount of groundwater pumping necessary to maintain containment. As a result of the low level of contamination in Sector 4, a RCRA cap was not required.

---

15 The carbon filters are operated in a lead-lag-standby configuration (sometimes referred to as a round robin configuration).

16 Additional information on extraction rates can be found in § 4.7.1.

17 This area is referred to as Cell 7 in site documents prior to construction of the isolation wall.

The isolation wall was constructed in 1997 using a soil-cement-bentonite backfill material. This varies from the mixture used in the original slurry wall in order to provide additional structural stability during the time when the City of Kent constructed an embankment for the South 196th Street arterial across the site.

4.7.4.1 Engineered Breach.

One year after the isolation wall was constructed, a 15' deep and 250' wide segment of the slurry wall for Sector 4 was removed to allow for a more natural drainage out of the area. Each side of this breach in the slurry wall is flanked with a "guardian" monitoring well, for purposes of ensuring that the natural drainage from this sector does not lead to the migration of contaminated groundwater. Samples collected from these monitoring wells since the creation of the breach indicate that the breach is functioning as expected.[18]

4.7.4.2 Soil Cover.

Two years after the isolation wall was constructed, a soil cover was placed over Sector 4. The purpose of this cover was to reduce rainfall infiltration as the cover was graded to enhance drainage.

4.7.4.3 Downgradient Monitoring Well (8M8B).

In addition to the "guardian" monitoring wells (wells 9M43A and 9M44A), an additional monitoring well is stationed west of Sector 4 for the purpose of detecting contaminants. During the fall 2007 sampling, toluene was detected in this downgradient monitoring well at a concentration of 17 µg/L.[19] This well was been sampled twice in 2008, and no VOCs were detected in those samples. Well 8M8B will be sampled again in the fall of 2008.

The Western Processing site was extensively characterized at the start of the cleanup action and monitored for over a decade; toluene has never been detected in any of the Sector 4 samples. None of the contaminants known to be present in Sector 4 were found at Well 8M8B. EPA currently believes that the toluene detected at well 8M8B may have originated from a source unrelated to Western Processing.[20]

4.7.5 Trans Plume Control.

In 1999, the Trust presented a proposal showing that proper conditions existed around the trans plume where the remaining contaminants could be remediated through monitored natural attenuation. This proposal was approved after a through review by EPA and WDOE and was initiated in April 2000. Geochemical indicators (redox potential, dissolved iron, VOCs, methane, ethane, and ethane) have been monitored since 1999, and the data continues to support that geochemical reducing conditions continue to exist in the trans plume area. The last detection in the trans plume area of TCE was in 1992, of 1,2-DCE was in 2002, and of chloroethene was in 2006. EPA supports the continued use of monitored natural attenuation for the trans plume until it is established that clean up conditions have been achieved.

4.7.6 Bioremediation.

[18] Sector 4 contains two extraction wells that are not currently in use but can be returned to service if conditions in Sector 4 were to change in the future.

[19] The MCL for toluene under the Safe Drinking Water Act is 1000µg/L.

[20] Several current and former solvent contaminated sites exist within three-quarters of a mile from Western Processing.

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 Sector 1, but was successfully implemented for the trans plume.

4.7.7 Long-Term Monitoring and Five-Year Reviews.

The Trust has prepared a long-term monitoring and sampling plan for the site. This plan was submitted to EPA and WDOE on October 26, 1999 and after some modifications, EPA accepted this plan on March 22, 2000.

Mill Creek and East Drain are monitored annually for metals[21] in addition to conventional surface water quality parameters.[22] Geochemical parameters are measured annually, and are a critical component of the monitored natural attenuation program in the trans plume area. Metals analyses for the groundwater occur annually. VOC analyses range from biannually to semiannually, depending on the location within the site.

EPA Issued Five Year Reviews for the Western Processing site in 1993, 1998 and 2003; EPA will publish this Five Year Review in 2008. The fifth Five Year Review will be due in 2013, five years after this the date of this review.

4.7.8 Institutional Controls.

The Trust has the responsibility for implementing institutional controls to protect the remedy, as required in the ROD and the Consent Decree. An institutional control plan was developed by the Trust, and this plan was approved by EPA and WDOE in March 2000. This plan included the following elements:

1. Deed restrictions and/or environmental easements for Sector I to protect the integrity of the final cap and the monitoring system, prohibit the extraction of groundwater for potable or other uses, and require foundation vapor barriers and building ventilation systems for any buildings that may be constructed.
2. A prohibition on the extraction and/or use of groundwater, other than for remedial purposes, both on site and in neighboring off property areas.
3. Annual notification to neighboring property owners to inform them of
   (a) the groundwater contamination and
   (b) the existing regulations that control groundwater use.
4. Regular maintenance, as specified in the Operations and Maintenance plan.
5. Regular monitoring, as specified in the Long Term Monitoring Program.
6. Maintenance of fencing and the site security plan.
7. A review of the Institutional Control status every five years.

With the exception of deed restrictions on the site property, all of the necessary institutional controls have either been established or are otherwise being carried out as required. Inspections and site visits indicate that these controls are effective in maintaining the remedy.

---

[21] Both areas are sampled for cadmium and zinc. Mill Creek is also sampled for lead, nickel, copper, and chromium.

[22] In this case: pH, hardness, suspended solids, conductivity, and temperature

As mentioned previously in this review, the previous land owner for the Western Processing property died in 2003, and deed restrictions were not implemented prior to his death. These will be necessary to ensure the protectiveness of the remedy, however, the title search performed for this review confirmed that title to the property has not yet passed on to any heirs or successors of the estate. After a new land owner is identified, EPA intends to resume efforts for establishing deed restrictions to ensure the remedy remains protective over the long term.

The RCRA cap and containment wall extend beyond the original property lines for Western Processing. As a result, four other parcels of property contain portions of the RCRA cap and/or the slurry wall. A title search was executed as part of this five year review, which identified that none of these parcels have deed restriction put in place in order to protect the remedy. EPA intends to work with the Trust to ensure that the Trust places deed restrictions on those parcels in order to protect the remedy.

4.7.8.1 Groundwater Use.

The area surrounding the site is currently served by a municipal water supply system that provides potable water. As the Western Processing Superfund site is located in King County within the Urban Growth Boundary installation of new private drinking water wells are prohibited in the vicinity of this Superfund site.[23]

4.7.8.2 Engineered Controls.

Engineered controls for the site include fencing, locked well caps or vaults, locked gates 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 and to ensure the engineered and institutional controls are in place and functioning properly.

4.7.8.3 Zoning.

The City of Kent has zoning authority over the area in which the Western Processing Superfund site is located, and has zoned this area for M2 industrial use. The Record of Decision (ROD) set cleanup standards that the site will be cleaned up to industrial use levels.

The City of Kent's parcel database allows the individual parcel records to be cross referenced with short external documents via electronic flags. EPA provided a letter to the City of Kent Planning Department in order to provide an easy record to which these property flags could refer. This letter identified (1) the parcels on which surface contamination was originally located, (2) that these properties will be cleaned to industrial cleanup standards, and (3) that these parcels may not be suitable for other uses (e.g. residential, child care or commercial uses) as some contamination will still be present after being delisted from the NPL.

EPA does not intend for this letter to serve as a permanent institutional control; the letter was only intended to assist the City of Kent. Nevertheless, it may augment the institutional controls, which is why it is noted in this Five Year Review.

4.7.9 Operations and Maintenance.

[23] King County Ordinance 13.24.140, Code of the King County Board of Health § 12.32.010

The Trust currently maintains the site in accordance with various existing work plans. Long-term maintenance and operations are addressed in the long-term site operations and maintenance plans that were approved by EPA and WDOE.

Major elements within the O&M plan include inspection of the grounds for erosion and the maintenance of the cap drainage system and detention basin, piezometers, sump pumps, berms, roads, fences, and gates. In addition to indirect monitoring of the cap and slurry wall through the piezometer network, inspections regularly check for any topographical changes on the surface, such as settlement, bulges, or cracking; no such changes have occurred in the past five years.

Within the water treatment plant, major O&M activities include calibration of the instruments, upkeep of the blower system (changeout of stripper trays, blower oil, belts), changeout of carbon filters, and cleaning scale off the interior of valves and piping, either by washing, scraping, or running a Styrofoam pig through the lines.

4.7.9.1 March 2007 Shutdown.

An abnormal event occurred at 4 pm on Saturday March 24, 2007. The stripper trays require regular cleaning to remove iron and other precipitates, but one of the stripper trays had an unusual amount of precipitate buildup prior to the normal cleaning period. This obstruction caused water to pass into the carbon lead filter, which was detected by existing sensors. The computer control system responded by shutting the system down and sending an alarm, both audible within the control room and via a pager system to two representatives for the Trust.

The Trust was unable to determine the issue by remotely logging into the system, so they arrived on site to fix the problem. The stripper tray was replaced with the clean standby spare. The supplier of the carbon informed the Trust[24] that the wet carbon would continue to remove the VOCs from the heated blower exhaust stream. The Trust instead opted to cycle the carbon filters early, disposing of the damp lead unit at a hazardous waste landfill, placing the damp lag unit into the lead position, and the clean, dry standby unit into the lag position to ensure successful system operation. As this required discussions with the carbon supplier, the system was not fully returned to service until 4 pm on Monday, March 26, 2007.

Continuous monitoring of the aquifers through this period showed that the flux continued in an upward direction, from Zone B into Zone A, so there was continuous containment throughout the event. The water treatment system shut down at the time of the alarm, so no untreated waste water was discharged. The procedures for system fault protection were executed as planned and containment was maintained.

4.7.10 Contingency Plan.

The Western Processing Trust Fund submitted a Long Term Contingency Plan to EPA and WDOE in November 1999, amended with errata and attachments in February 2000. This plan identifies procedures for evaluating containment and actions to be taken if those procedures indicate loss of containment; the plan covers a period of up to 30 years from the approval of the Long Term Contingency Plan. EPA approved this plan in March 2000.

---

[24] As stated within a March 27, 2007 e-mail from Wayne Schlappi (Trust) to Lynda Priddy (EPA) and Chris Maurer (WDOE).

5. Progress since Last Review

5.1 Protectiveness Statement from the Third 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 are decreasing 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 Recommendations from the Third Five-Year Review

Recommendations from the Third Five Year Review were to institute permanent Institutional Controls that would run with the land, as required by the ROD and ESD. Since the Third Five Year Review, ownership of the primary property has been unclear. The landowner of the Western Processing site died in 2003. A title search was performed in November 2007, and at that time the title to the property still had not passed on to any heirs or successors.

EPA is currently attempting to determine who the landowner is for the original Western Processing property. No probate proceedings have been filed in King County, which is the location of both the original Western Processing facility and the residence for the former landowner. In late March 2008, EPA located the attorney for the decedent's estate in New York State. At the time of that conversation, the attorney for the estate had not clarified whether the heirs to the estate would be asserting their claim to the property. As the Trust is ultimately responsible for instituting the institutional controls and is interested in purchasing the property, EPA provided the attorney for the estate and the attorney for the Trust with contact information for each other. The attorney for the Trust retired in early May 2008, and had not reached a resolution prior to his retirement. EPA intends to continue towards a resolution on the question of ownership as soon as the Trust selects a new attorney.

During review of the title information, EPA determined that portions of the slurry wall and/or the RCRA cap extend onto four parcels of property that were adjacent to the original Western Processing facility and that these properties lack institutional controls to protect the remedy. As the institutional controls need to protect the entirety of the slurry walls and RCRA cap, EPA is aware of no reason that prevents the implementation of institutional controls on these four properties. EPA will discuss this issue with the attorney for the Trust as soon as the Trust selects their new attorney.

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 Administrative Components

The initial planning for this Five Year review commenced with an internal EPA kick off meeting on January 7, 2008. Over the course of the following week, EPA updated the previous site mailing list to ensure current contact names and addresses. EPA Region 10 contacted the Trust on January 10, 2008 to inform them of the upcoming Five Year Review, request updates to their contacts on their mailing list and to ask if any additions that should be added to the site notification list.

Activities in this review consisted of:
a) Community notification,
b) Review of site-related documents,
c) Review of monitoring data,
d) Discussions with the Trust,
e) Site visit and inspection, and,
f) Preparation of the Five-Year Review report.

The Five-Year Review team was led by Chris Bellovary, EPA Remedial Project Manager (RPM). Bernie Zavala, EPA Hydrogeologist, Debra Sherbina, EPA Community Involvement Coordinator (CIC); Ted Yackulic, EPA Site Attorney; and Tim Brincefield, EPA Five Year Review Coordinator provided valuable assistance and review during the preparation of this report. Chris Maurer, WDOE Toxics Cleanup Program, also assisted in the preparation of this review.

6.2 Community Notification

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 late January 2008, EPA mailed postcard to the contacts on the site mailing list announcing the beginning of the Five-Year Review. On January 30, 2008, 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. The comment period closed on April 30, 2008; no comments were received by EPA during this time.

Upon completion and acceptance of this review, EPA will place a public notice in the Kent Reporter and will send a postcard mailing to the site mailing list to inform citizens that the finished report is available. A copy of the review will be sent to the Trust. 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.[25]

6.3 Document Review

The following documents were evaluated as part of the 2008 Five Year Review:

Feasibility Study for Subsurface Cleanup, Western Processing, EPA, Mar. 6, 1985
Record of Decision, EPA, Sept. 1985.
Record of Decision Amendment, EPA, Sept. 1986.
Western Processing Consent Decree (C83-252M), filed April 10, 1987.
1988 Annual Evaluation Western Processing, Landau Associates, Mar. 21, 1990
1989 Annual Evaluation Western Processing, Landau Associates, Dec. 30, 1991
1990 Annual Evaluation Western Processing, Landau Associates, Mar. 11, 1992
1991 Annual Evaluation Western Processing, Landau Associates, Aug. 5, 1992
1992 Annual Evaluation Western Processing, Landau Associates, Sept. 22, 1993
Memo: Western Processing Phase II, from H. Gaskill (Trust) to L. McPhillips (EPA) and M. Kuntz (WDOE), Feb. 9, 1994
1993 Annual Evaluation Western Processing, Landau Associates, July 27, 1994
1994 Annual Evaluation Western Processing, Landau Associates, Feb. 28, 1995
Explanation of Significant Differences, Western Processing Superfund Site, EPA, Dec. 11, 1995.
1995 Annual Evaluation Western Processing, Landau Associates, May 14, 1997
1996 Annual Evaluation Western Processing, Landau Associates, Sept. 1, 1998
1997 Annual Evaluation Western Processing, Landau Associates, Dec. 31, 1998
1998 Annual Evaluation Western Processing, Landau Associates, Sept. 14, 1999
Long-Term Monitoring Work Plan, Landau Associates, Oct. 26, 1999
Long-Term Contingency Plan, Landau Associates, Oct. 27, 1999
Institutional Controls Work Plan, Landau Associates, Nov. 16, 1999
Long-Term Site Security Plan, Landau Associates, Nov.19, 1999
1999 Annual Evaluation Western Processing, Landau Associates, Oct. 3, 2000
2000 Annual Evaluation Western Processing, Landau Associates, Oct. 5, 2001
2001 Annual Evaluation Western Processing, Landau Associates, June 18, 2002
Monitored Natural Attenuation Annual Summary - 2002 Western Processing, Landau Associates, March 19, 2003
2002 Annual Evaluation Western Processing, Landau Associates, April 30, 2003
Third Five Year Review for Western Processing Superfund Site, EPA, Sept. 2003
2003 Annual Report Western Processing, Landau Associates, July 16, 2004
2004 Annual Report Western Processing, Landau Associates, July 29, 2005
2005 Annual Report Western Processing, Landau Associates, May 30, 2006
2006 Annual Report Western Processing, Landau Associates, June 26, 2007
2007 Annual Report Western Processing, Landau Associates, June 23, 2008

6.4 Data Review

During 2007, 3.13 pounds of metals and 44.7 pounds of organics were removed from the extracted groundwater. As of the end of 2007, treatment of the extracted

[25] To locate the EPA Region 10 Western Processing webpage, please visit http://www.epa.gov/r10earth/, click on A to Z Subject Index, then W, then Western Processing.

groundwater has removed 80,328 pounds of metals[26] and 25,390 pounds of organics[27] over the entire course of the groundwater extraction and containment program, most of which occurred during the first eight years. (See Figures 9, 10) Piezometer readings over the past five years confirm that containment at the site has been continuously achieved. The groundwater extraction points are shown in Figure 4 in the Appendix, water quality monitor locations in Figure 5 and the groundwater elevation monitoring locations in Figure 6.

Water quality monitoring results have generally indicated a downward trend for the contaminants of concern for wells outside the Sector 1 containment cell. Chloroethene (i.e. vinyl chloride), a breakdown product of 1,2-DCE, was the only contaminant of concern that was detected in the trans plume area during the review period, and is further evidence that the natural attenuation is occurring as predicted at this location. Mill Creek surface water quality monitoring data do not reflect contamination from the site.

Within the containment area, recent samples from the monitoring wells show concentrations of DCE up to 9800 µg/L. Active containment acts to isolate these concentrations of DCE and other contaminants of concern within Sector 1 through the use of pumping and treatment, slurry walls and the RCRA cap. For additional site data, please refer to Figures 9-10 and Tables 1-6 in the appendix.

6.5 Site Inspection

A site visit was conducted on April 3, 2008. The purpose of the on site visit was to assess the protectiveness of the remedy, including the condition of the extraction and treatment system, condition of the cap and cover, stormwater control, and security fencing. 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 onsite personnel.
2. The RCRA cap and drainage system are well maintained and appear to functioning as designed.
3. The site groundwater extraction system has operated continuously with only very brief shut-downs for routine maintenance, with the exception of the March 2007 shutdown as detailed in Section 4.7.9. A process flow diagram for the Containment Extraction system can be found on Figure 7 in the Appendix.
4. The treatment plant has operated continuously in compliance with the King County water discharge requirements, and with only very brief shut-downs for routine maintenance and the March 2007 shutdown as detailed in Section 4.7.9. As a result of the reduced volume of treated wastewater discharged, on April 30, 2007 from King County Wastewater Discharge Permit No. 7686-02 was superseded by King County Major Discharge Authorization No. 4111-01. During 2007 the treatment plant

[26] 73521 lbs of zinc, 3583 lbs of nickel, 1557 lbs of chromium, 616 lbs of lead, 609 lbs of copper, and 443 lbs of cadmium.
[27] 603 lbs of PCE, 11315 lbs of TCE, 5693 lbs of DCE, 1002 lbs of TCM, 5571 lbs of DCM, and 1206 lbs of chloroethene.

processed 3.38 million gallons of water, while extracting 2.9 pounds of zinc, 0.2 pounds of chromium, and 44.7 pounds of volatile organic compounds (VOCs).

5. Piezometers are a necessary component for the monitoring system, and have a limited lifespan, so these are replaced as necessary throughout the year.

6.6 Interviews

The following people were interviewed during the process of preparing this Five Year Review:

Western Processing Trust Fund
Wayne Schlappi, Project Manager
Ken Brown, Contractor (Shaw Environmental)
Bill Enkeboll, Contractor (Landau Associates)
Christine Kimmel, Contractor (Landau Associates)

City of Kent
Mike Mactutis, Environmental Engineering Manager

Community interviews were not conducted for this Five Year Review, as the community has not expressed any interest in this site during the past five years.

7. Technical Assessment:

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

No. All components of the remedy have been implemented with the exception of the required deed restrictions. The purpose for the deed restrictions are to ensure that current or future property owners do not damage the containment system. EPA's review of documents, data, and site inspection indicate that all other aspects of the remedy are functioning as intended by the ROD.

7.1.1 Sector 1: Main Containment Area.

The first performance standard for the 1985 ROD is to prevent further degradation of the shallow groundwater, and the 1986 ROD amendment stated that the Trust would satisfy this standard if they achieve a shallow groundwater flow inward from the boundaries of the contaminated zone. In furtherance of this, the 1985 ROD put forth the plan for a RCRA cap and the 1986 ROD Amendment put forth the plan for the slurry wall surrounding the site. The 1995 ESD changed the strategy for Sector 1 from restoration to containment.

- The RCRA cap and slurry walls are in place and functioning properly;
- The monitoring system is in place to verify that containment is maintained,
- The extraction system is successfully maintaining an inward and upward flow throughout Sector 1, and properly contains the contaminants within Sector 1;
- The groundwater treatment plant properly treating the extracted groundwater prior to discharge to the POTW;
- O&M is implemented as approved;

As a result, EPA believes that the containment strategy is functioning as intended under the ESD, and that ingestion and inhalation exposure pathways to contaminated groundwater and/or subsurface soils are under control. By properly containing the contaminants, the first performance standard for the 1985 ROD is being achieved.

7.1.2 Sector 2 and Mill Creek.

The second performance standard for the 1985 ROD is to achieve a water quality within Mill Creek that is protective of aquatic organisms. This standard needs to be achieved both during and after the period in which pumping occurs.

Sector 2 is composed of the 50’ buffer strip between the containment wall of Sector 1 and Mill Creek, and the purpose of this buffer strip was to allow the creek to remain in a natural condition after it was properly restored. Containment is maintained in Sector 1 by continuously drawing shallow groundwater into the containment area; if the containment wall was closer than 50’ from Mill Creek, there was a risk that this activity could dewater the creek.

Any contaminants from Sector 2 leaching into Mill Creek have not been significant, as the cleanup standards for Mill Creek were achieved in 1993, and the site has continued to meet this standard for almost fifteen years. As a result, EPA believes that the second performance standard for the 1985 ROD is being achieved.

7.1.3 East Drain.

The ROD required the removal of contaminated sediments from East Drain and the 1986 Consent Decree contains the details for the East Drain monitoring program. The Trust completed the removal operations and remediation of East Drain in 1998. The Trust collects surface water from East Drain during each fall sampling period (assuming water is present) and analyzes these samples for metals and conventional parameters to ensure that the cleanup was successful. Groundwater near East Drain is sampled semiannually for VOCs and base-neutral/acid extractables and is sampled annually for geochemical parameters.

EPA has reviewed the sample data for East Drain and believes that the monitoring was performed as intended during the 2003-2008 review period.

7.1.4 Sector 3: Trans Plume Area.

The 1986 ROD Amendment was the document that first addressed the contamination in Sector 3, and stated that the concentration of 1,2-dichloroethene be reduced to below 70 ppb (which is the MCL) throughout the plume. The ESD did not modify this plan, but it did state that EPA and WDOE will revisit the need to set standards for chloroethene (i.e. vinyl chloride) during future five year reviews, or sooner if necessary

- The plume has been contracting, so there are no new areas are at risk of contamination, and
- Sample results have not detected 1,2-dichloroethene in the trans plume since 2002.

- Concentrations of chloroethene have been falling since their peak, and were only detected in one monitoring well for Sector 3 in 2005 and 2006.
- The MCL for chloroethene is 2 ppb; none of the detections over this monitoring period have exceeded 16 ppb.[28]
- Current measurements show that geochemical reducing conditions continue to exist in the trans plume area, so it is anticipated that the remaining contaminants will continue to break down in this area.

EPA believes that the remedy within Sector 3 is functioning as intended under the 1986 ROD Amendment.

7.1.5 Sector 4: North of 196th Street.

The 1985 ROD states that cleanup of surface and subsurface soils is to include the excavation of any soils contaminated with PCBs over 2 ppm and the excavation of all other soils that exceed either the acceptable daily intake (ADI) level or the 10^{-5} (1 in 100,000) excess cancer risk level. Any remaining soils that contain concentrations of priority pollutants which exceed background levels for industrial areas were to be covered. The end goal for soils in Sector 4 was to achieve an adequately low level of soil contamination that the City and the Health Departments could approve the use of the land for industrial development.

7.1.6 Institutional Controls.

The institutional control component to the remedy, in the form of deed restrictions on the parcels of property that contain portions of the containment walls and /or RCRA cap, have not been enacted. When properly implemented, the planned institutional controls are expected to be, and to remain, protective. 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.

7.1.7 Operations and Maintenance.

During EPA site visits and inspections, it appeared that O&M activities were properly conducted and logs of O&M activities were being maintained on site. O&M activities are discussed in more detail in § 4.7.9 of this review. At this time, EPA believes that O&M activities are being properly conducted and that these activities are effective in maintaining the remedy.

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?*

Yes. Review of the exposure assumptions, toxicity data, cleanup levels, and RAOs indicate that the remedy selected at the time of the ROD is still properly supported.

7.2.1 Human Exposure

Under current site conditions, potential or actual human exposures are under control. The site is protective for people under current conditions.

[28] For purposes of comparison, sample results detected chloroethene in six wells in 2002 and the maximum concentration in those samples was 150 ppb of chloroethene, so the decline has been significant.

There are no changes known 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. Although performance standards for chloroethene (i.e. vinyl chloride) have not been set at this time, the amount of chloroethene that remains in the trans plume is decreasing and appears to be approaching MCLs. With the exception of deed restrictions, all other necessary protective remedies have been implemented.

7.2.2 Review of Applicable or Relevant and Appropriate Requirements (ARARs)

On-site remedial actions must attain (or waive) Federal and more stringent State ARARs of environmental laws upon completion of the remedial action, and the ARARs are applied as written and interpreted at the time the ROD is signed.[29] EPA reviews changes in ARARs that have occurred during the previous five years during each Five Year Review, to determine whether the change in regulation calls into question the protectiveness of the remedy.[30]

In October 2004, the Washington State Department of Ecology updated risk levels for TCE under Washington State's Model Toxic Control Act to include a cancer slope factor for ingestion and inhalation of trichloroethene (TCE).[31] EPA expects to complete its own review of the carcinogenicity of TCE by late 2010.[32]

At this time, these changes do not appear to require a change in the remedy. The strategy within the slurry wall is for containment of all contaminants within the site boundaries, and this strategy would not be impacted by a change in TCE risk levels. In regards to monitored natural attenuation of offsite areas, no TCE has been detected in any offsite well since 2002.

As a result, no changes are necessary at this time. EPA intends to take any changes in ARARs into consideration for any future remedy changes.

7.2.3 Groundwater Migration

Contaminated groundwater migration at this site is under control.

The Western Processing Superfund site contains several areas of contaminated groundwater. The contaminated groundwater in offsite areas are monitored to ensure that natural attenuation is occurring as predicted, and the data reviewed for this evaluation show that these areas are contracting in area and decreasing in concentration. As a result, migration of groundwater from those areas is under control.

---

[29] "Once a ROD is signed and a remedy chosen, EPA will not reopen that decision unless the new or modified requirement calls into question the protectiveness of the selected remedy." Preamble to the National Contingency Plan, 55 FR 8757.

[30] "[A] policy of freezing ARARs at the time of the ROD signing will not sacrifice protection of human health and the environment, because the remedy will be reviewed for protectiveness every five years, considering new or modified requirements at that point, or more frequently, if there is reason to believe that the remedy is no longer protective of health and environment." Preamble to the National Contingency Plan, 55 FR 8758.

[31] Ref: *Trichloroethylene Toxicity Information*, Ecology, October 2004. Available at: https://fortress.wa.gov/ecy/clarc/focussheets/tce%20pce%20oct%202004%20final.pdf. Last accessed on June 26, 2008.

[32] Ref: *Economic Impact Analysis of the Halogenated Solvent Cleaners Residual Risk Standard*, EPA, April 2007. Available at http://www.epa.gov/ttnecas1/regdata/EIAs/hsceconanalysisreportfinaldraft60000.pdf. Last accessed on June 26, 2008.

For the area under the RCRA cap, a small amount of groundwater is continuously extracted in order to contain the contaminated soils and groundwater within the containment area. The computer controlled system continuously monitors the efficacy of this extraction through a network of piezometers. Data reviewed for this evaluation show that the system is properly containing the contaminated groundwater within the containment area. As a result, migration of Sector 1 groundwater is under control.

Sector 4, which is north of South 196th Street, historically had lower levels of contamination. As a result, no cap was necessary for this area, and only two extraction wells were located within Sector 4. These pumps were shut down in 2000 as part of the containment strategy, and are only currently used for taking samples, but these pumps remain available for possible use in case site conditions change in the future.

Each side of the 250' wide breach in the slurry wall has a monitoring well, sometimes referred to as guardian wells, for purposes of ensuring that the natural drainage from this sector does not lead to the migration of contaminated groundwater. Data reviewed for this evaluation indicates that the drainage past these guardian wells has not contained contaminants. As a result, migration of Sector 4 groundwater is under control.

7.2.4 Ready for Reuse?

In the 1985 ROD, as later modified by the 1986 ROD Amendment and the 1995 ESD, EPA selected response actions for the Western Processing Site to manage risks to human health and the environment. With the completion of the response actions for surface soils, surface conditions in Sector 1 meet the cleanup criteria and the sector is suitable for development.

Sector 2 largely consists of the buffer zone to the east of Mill Creek. That area of the site is not suitable for development for both zoning and drainage reasons. For the area of Sector 2 that is suitable for development, surface conditions at this are of the site meet cleanup criteria. This area of the site currently houses offices used by the Trust for conducting site security, monitoring, operations and maintenance.

Sector 3 consists of the area west of Mill Creek. This area was not impacted by site-related surface contamination; it is part of the site due to the existence of the trans plume. This area of the site has been used for industrial activities throughout the life of the project, and continues to be suitable for these uses.

Sector 4 physical constraints appear to preclude development. The sector is irregularly shaped, has a 30' wide drainage strip centered on Mill Creek as a western border, the embankment to the elevated S. 196th Street on its southern border, and no road access on any side. The zoning requirements require a 30' setback from property lines, which results in a parcel that has very little available area for development. Due to these physical constraints, Sector 4 has not been considered for reuse at this time.

Restrictions on the potential uses for Sectors 1-2 include:

A. Any use must be appropriate for M2 Light Industrial zoning requirements.[33]
B. Any use must provide access to the monitoring and extraction wells.
C. Any use must protect the integrity of the monitoring and extraction wells.
D. Any use must protect the integrity of the site cap and barrier walls.
E. Any use must not adversely disturb the subsurface soils
F. Any constructed buildings in Sector 1 must include foundation vapor barriers and building ventilation systems.
G. A prohibition on the extraction of groundwater for potable or other uses.

Based on information available as of this date, EPA has determined that the surface soils in Sectors 1-2 are ready for reuse, as long as any lease agreement includes the restrictions above among the provisions that protect the remedy and the intended use does not interfere with ongoing sampling and monitoring. These same provisions will need to be incorporated into a deed restriction once the landowner for the site is identified. Sector 3 has been available for use throughout the history of this site.

The most recent evaluation by the Trust is that there are insufficient profit margins to make reuse a worthwhile goal to pursue at this time, but this may change in response to future market conditions.

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

Yes. To ensure the long term protectiveness of the remedy, the Contingent Action Criteria should be updated to reflect current site conditions.

7.3.1 Contingent Action Criteria

The 1995 ESD altered the remediation strategy for the Western Processing site from restoration to containment, and the Trust phased this containment strategy into effect during 1997. Part of this strategy included the creation of a Long Term Contingency Plan, approved in March of 2000. The purpose of this contingency plan was to evaluate and verify whether the new system properly maintained containment of contaminated soil and groundwater, and this plan identified procedures and potential contingent actions to implement if loss of containment was to occur. Assessments of the effectiveness of the contingency plan were to occur at five year intervals.

The Trust performed a statistical evaluation for critical monitoring wells based on their historic monitoring results in order to establish a series of set points which are referred to as the Contingent Action Criteria (CAC). The previously identified contingency procedures are triggered if the CAC are exceeded.

During this Five Year Review, it was noted that the CAC have not been updated since they were originally approved. Due to declining concentrations of contaminants in many areas, some of the CACs remained set at concentrations that were several orders of magnitude higher than anything recently recorded at that location. EPA has brought this issue to the attention of the Trust, and the Trust has agreed that the CACs for some of the critical wells do need to be updated.

---

33 Kent City Code § 15.03.010.

Current discussions involve whether it would be advisable to first perform a long term monitoring optimization (LTMO) analysis based on the site data. LTMO analyses evaluate the historical site data to determine whether the number and placement of monitoring wells are optimal, and what would be the optimal sampling frequencies for these wells. It is possible that the results of a LTMO could reveal that it is not necessary to maintain all of the existing monitoring wells. If a LTMO is to occur at this site at this time, this analysis should occur prior to updating the CAC. These discussions are currently ongoing.

7.3.2 Potential Climate Change Impacts

Average annual temperatures in the Pacific Northwest are projected to increase by 2°F by the 2020s and 3°F by the 2040s when compared with a 1970 to 1999 reference period. This increase is projected to occur in all seasons, but most models project the largest temperature increases in summer (June-August).[34] The remedy selected at the Western Processing Superfund site has been used in similar sites throughout the United States, including those in much warmer climates, and so the anticipated increase in temperature does not pose an area of concern.

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.[35] 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.[36] As portions of the Western Processing Superfund site are located within a 100 year flood plain, increases in winter precipitation could present an increased flood risk for the site in the future. As the projected precipitation changes are smaller than 20th century year-to-year variability, this data is currently inconclusive, but should be re-evaluated during the next five year review.

The Western Processing site has an elevation of 28' above the current sea level. Current estimates of relative sea level rise for the area of the Puget Sound between Tacoma and Seattle are around +1' by the year 2040 and +3' by the year 2100, so the Western Processing Superfund site is well outside of any areas that may be impacted by local sea level rise.

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.

---

[34] Ref: *Climate Change Scenarios*, Climate Impacts Group, University of Washington. Available at http://www.cses.washington.edu/data/ipccar4/. Last accessed on June 27, 2008.

[35] Mill Creek data is available at http://wa.water.usgs.gov/data/realtime/adr/2007/12113349.2007.pdf and http://dnr.metrokc.gov/wlr/waterres/streamsdata/Mill.htm. Last accessed on June 27, 2008.

[36] Ref: *Scenarios of Future Climate for the Pacific Northwest*, Climate Impacts Group, University of Washington. Available at http://cses.washington.edu/db/pdf/kc05scenarios462.pdf. Last accessed on June 27, 2008.

8. Issues, Recommendations and Follow-up Actions

The major issues, recommendations, and follow-up actions for the Western Processing site are presented in the table below:

Issues	Affects Protectiveness	
	Current	**Future**
Permanent Institutional Controls need to be implemented that run with the land on the original facility property.	No	Yes
Permanent Institutional Controls need to be implemented that run with the land on the adjacent properties which contain part of the cap and/or slurry walls.	Possibly	Yes
The Contingent Action Criteria need to be updated to reflect current site conditions.	Possibly	Yes

Recommendations / Follow-up Actions	Accountable Party	Oversight Agency	Milestone Date	Affects Protectiveness	
				Current	**Future**
Implement remaining Institutional Controls for the site property	Western Processing Trust Fund	EPA	Dec. 2009	No	Yes
Implement remaining Institutional Controls for adjacent properties	Western Processing Trust Fund	EPA	Oct. 2009	Possibly	Yes
Update Contingent Action Criteria	Western Processing Trust Fund	EPA	Mar. 2009	Possibly	Yes

9. Protectiveness Summary

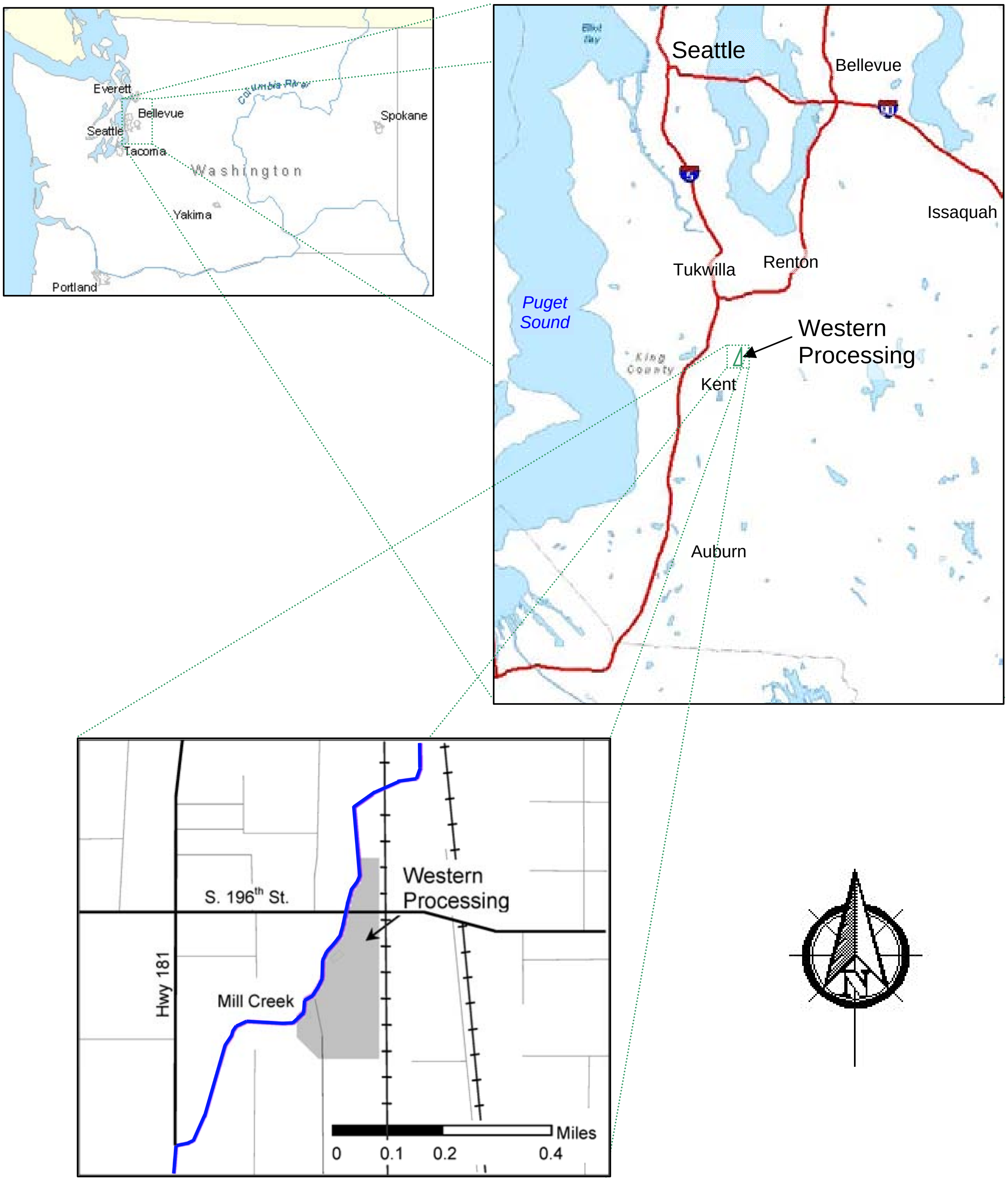
The remedy at the Western Processing site currently protects human health and the environment because the slurry wall, RCRA cap, containment pumping and extraction treatment system contain the contaminated groundwater and soil within the source area. The groundwater concentrations off the Western Processing property are decreasing and there are no exposure routes to the site contaminants. However, institutional controls that will run with the land still need to be placed on the property to ensure long-term protectiveness.

10. Next Review

Hazardous substances remain on site. The Fifth Five-Year Review for the Western Processing Superfund Site will be required to be complete by July 25, 2013.

FIGURES AND TABLES

Figure 1: Site Location

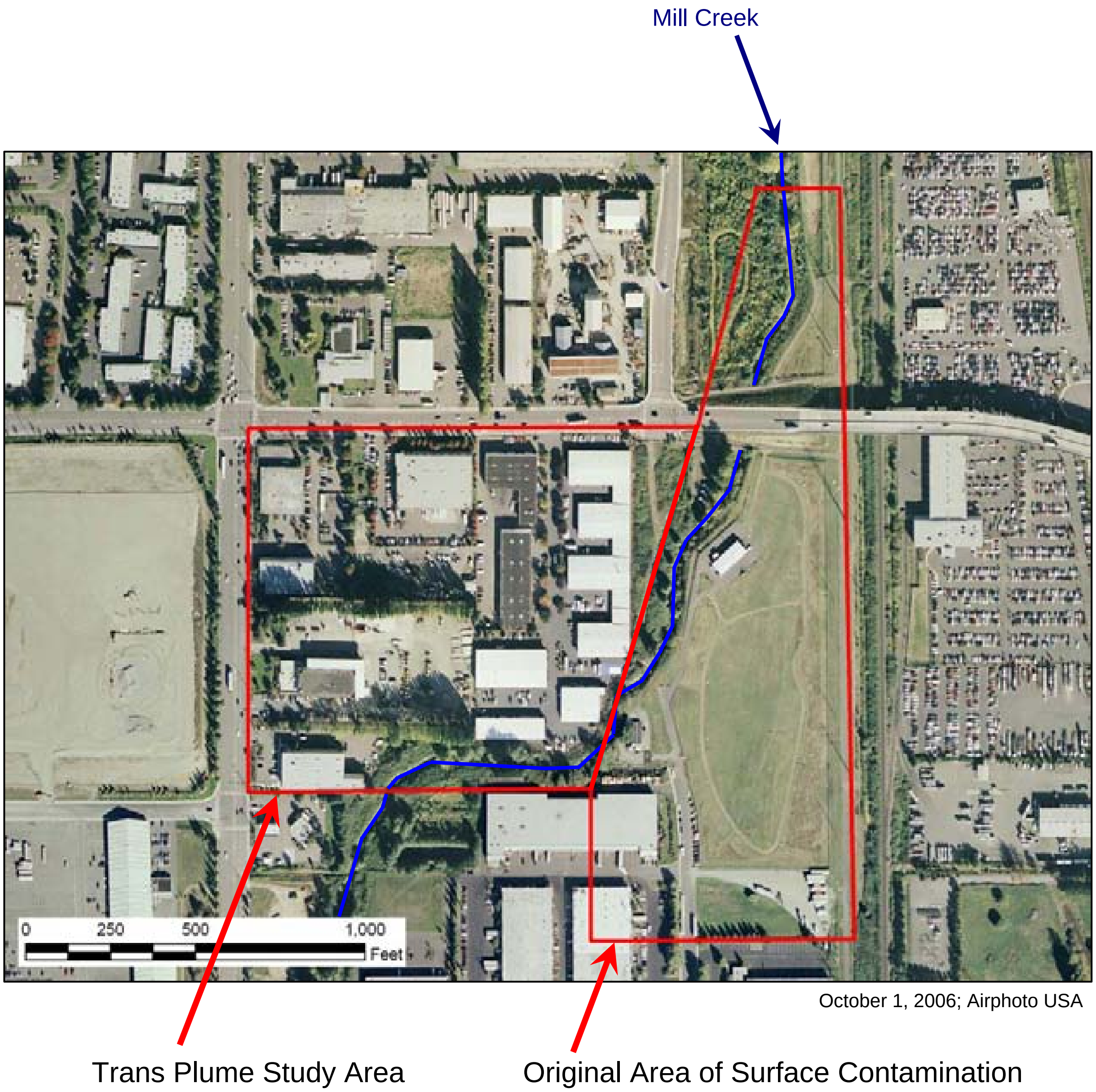


Reference Coordinates

Latitude: 47° 25' 30" N

Longitude: 122° 14' 35" W

Figure 2: Aerial Photo of Western Processing Site



October 1, 2006; Airphoto USA

Figure 3: Sector Map

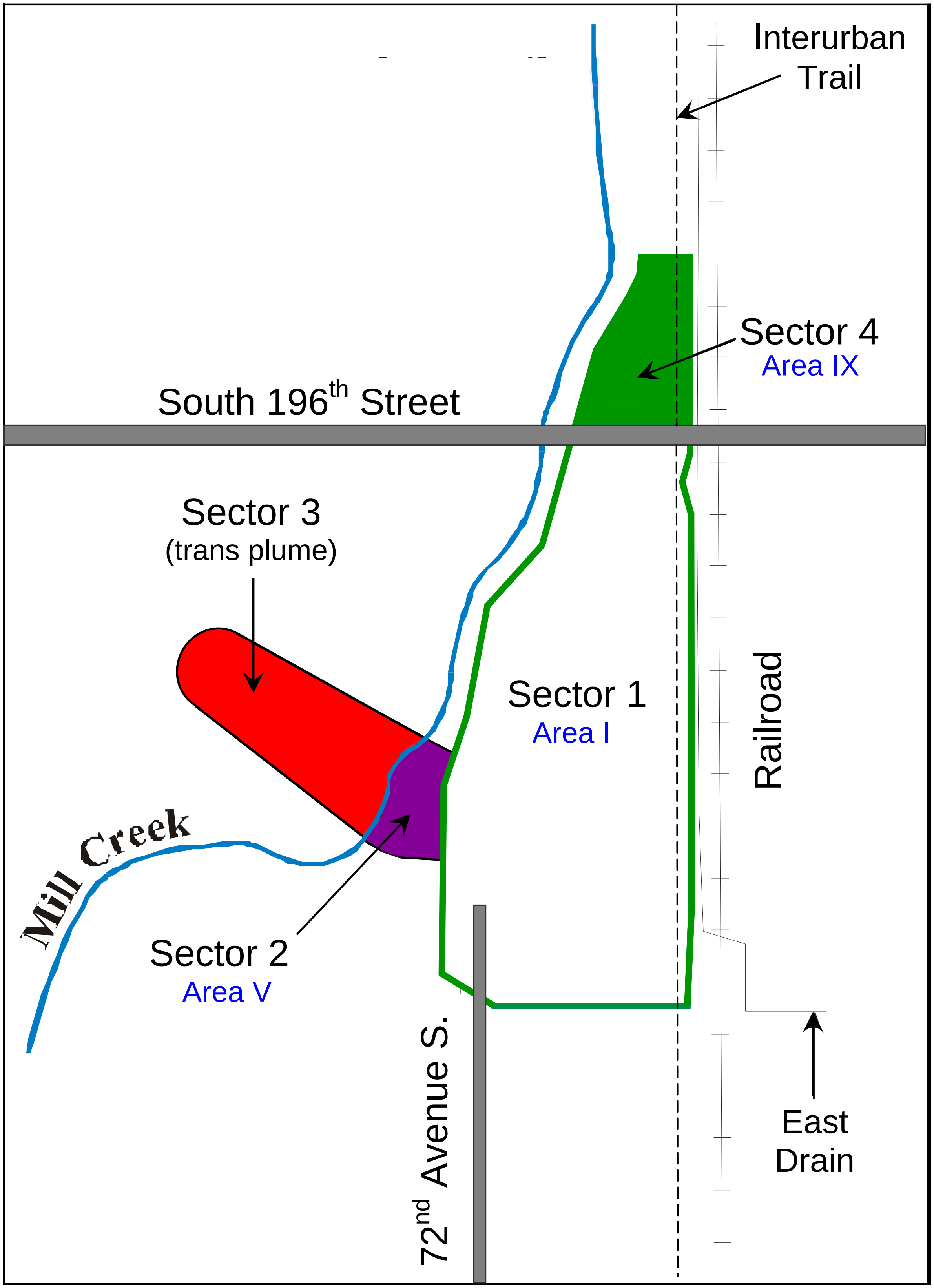


Figure 4: Site Map

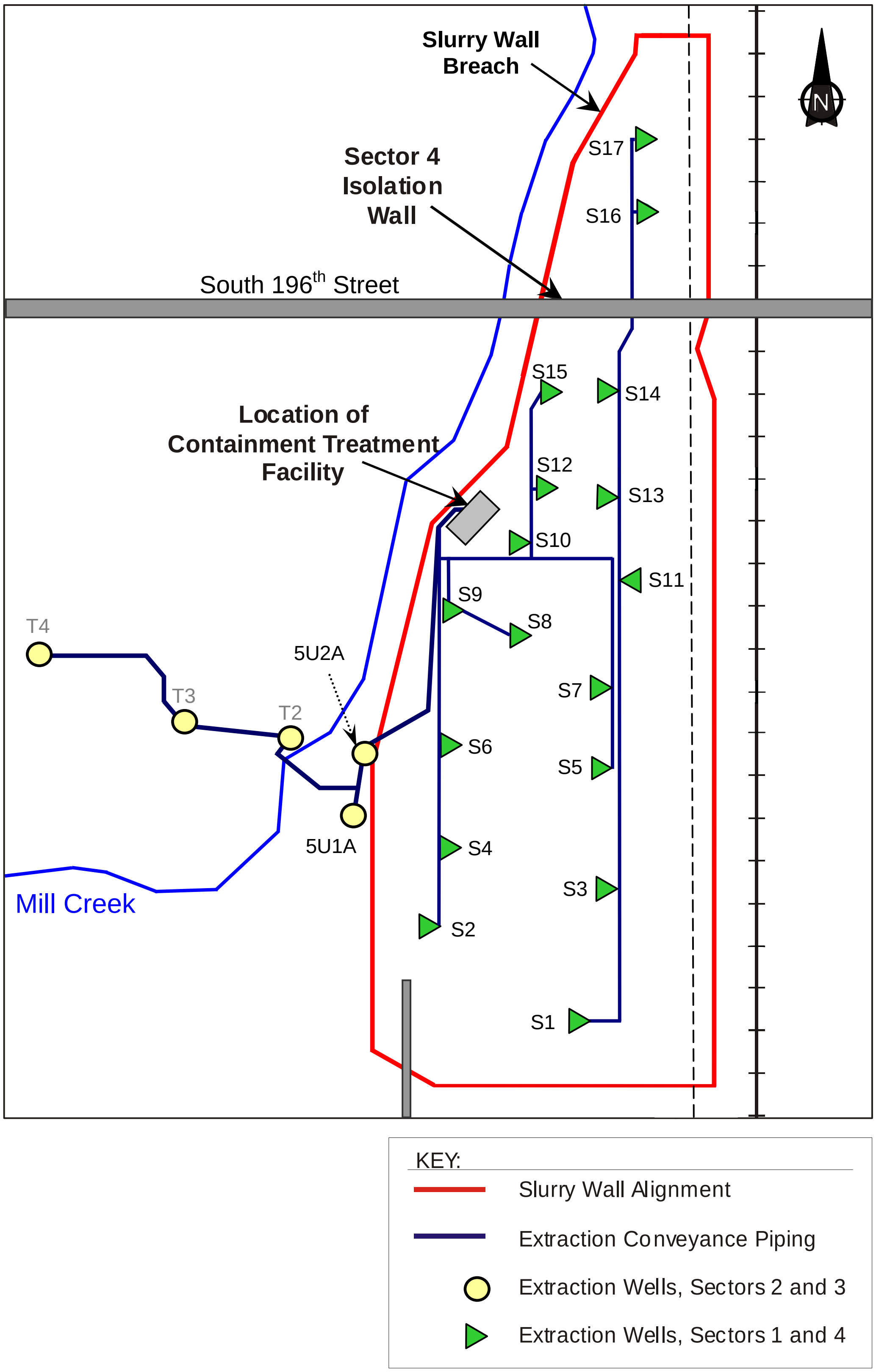


Figure 5: Groundwater Elevation Monitoring Locations

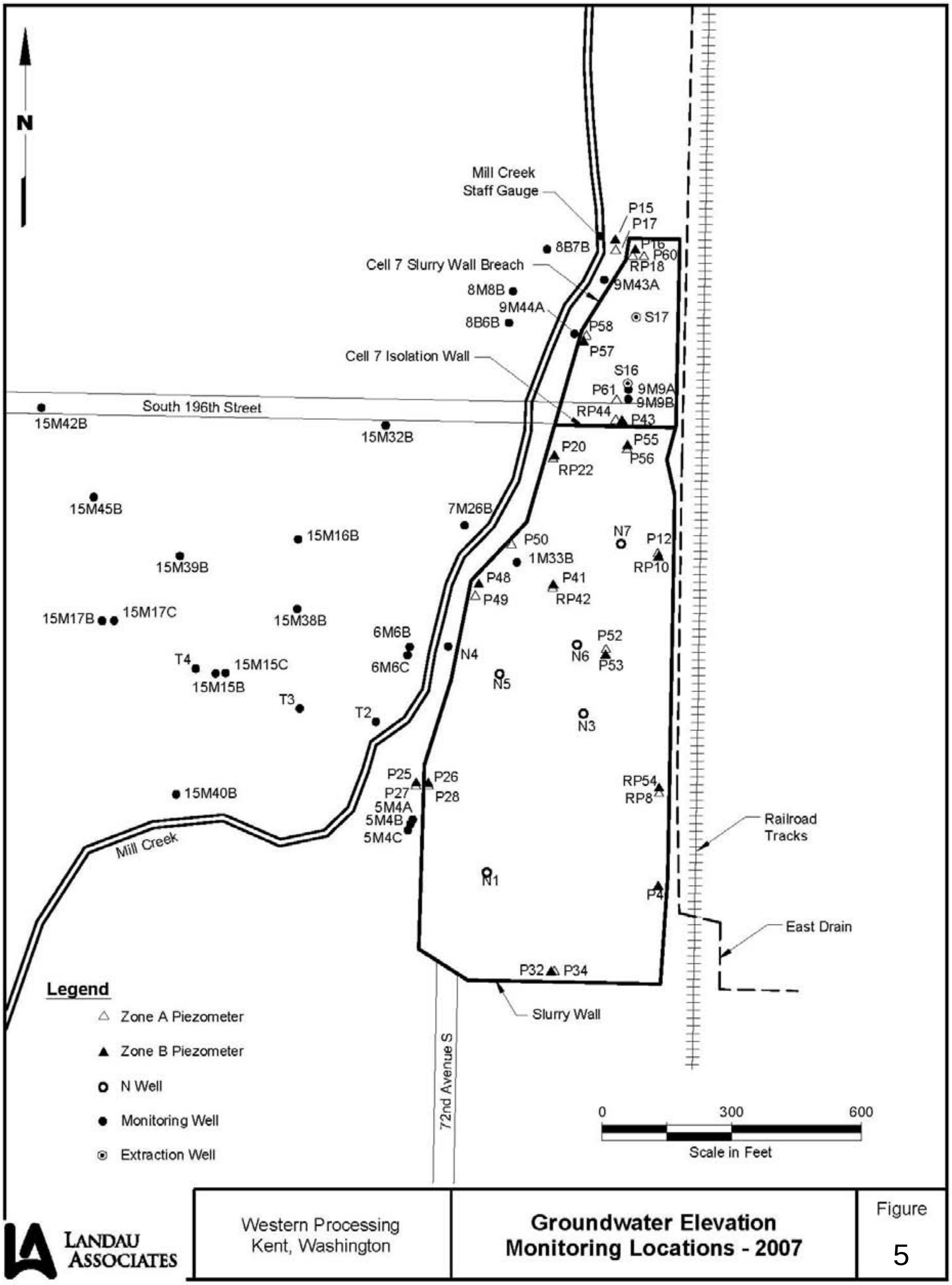


Figure 5 is originally from the *2007 Annual Evaluation Western Processing*, Landau Associates.

Figure 6: Water Quality Monitoring Locations

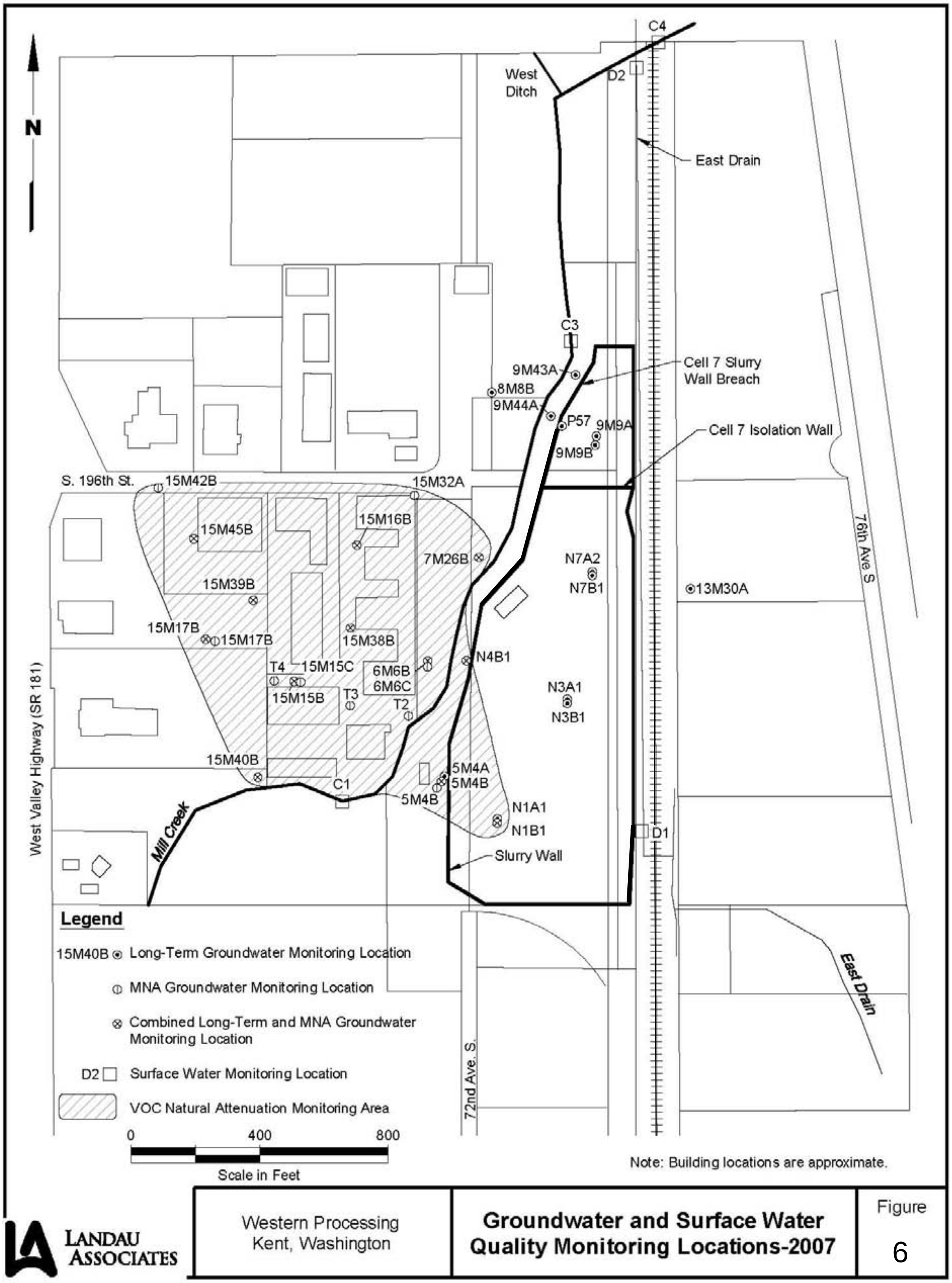


Figure 6 is originally from the *2007 Annual Evaluation Western Processing*, Landau Associates.

Figure 7: Process Flow Diagram for the Extraction System

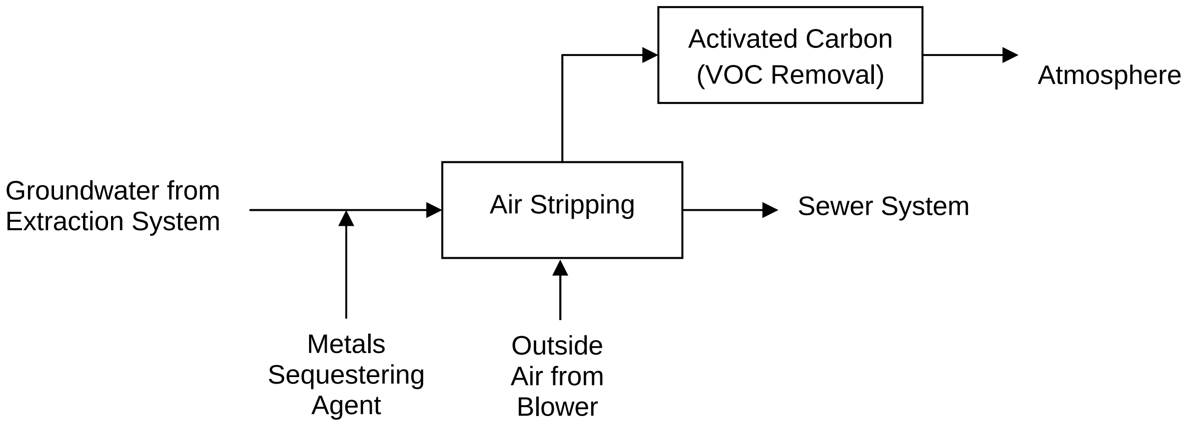


Figure 8: Site Cap Layers

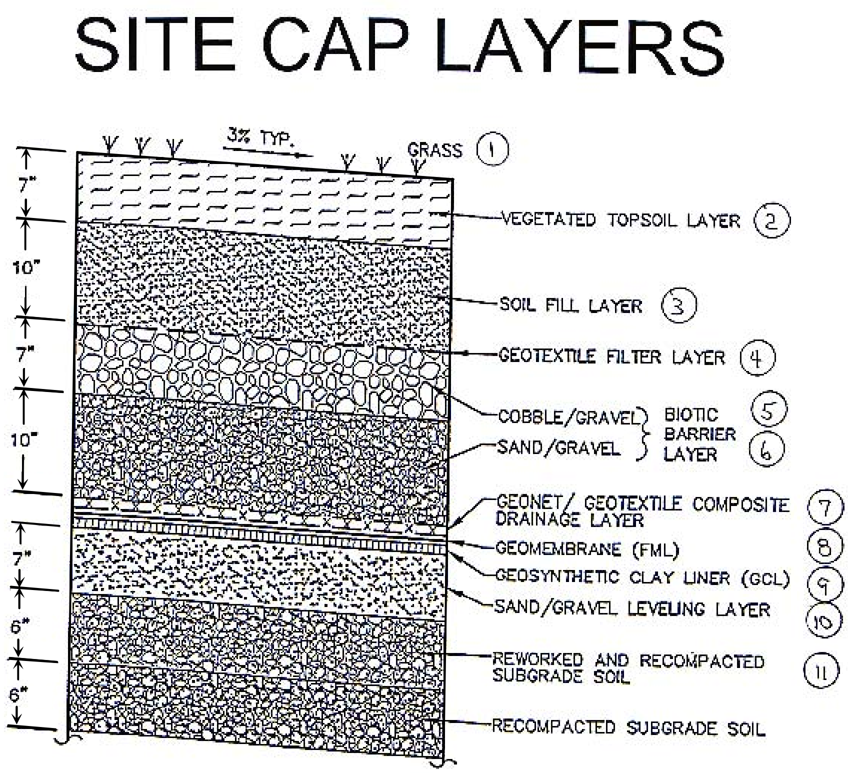


Figure 9: Cumulative Selected Organics Removed

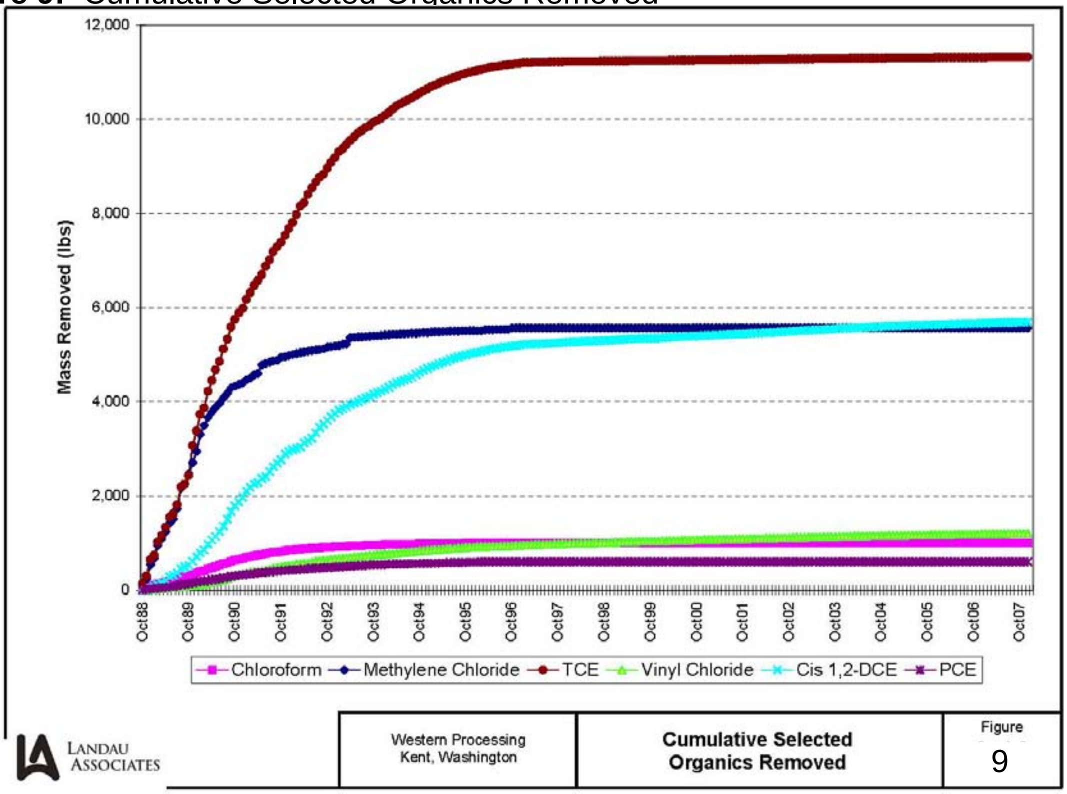
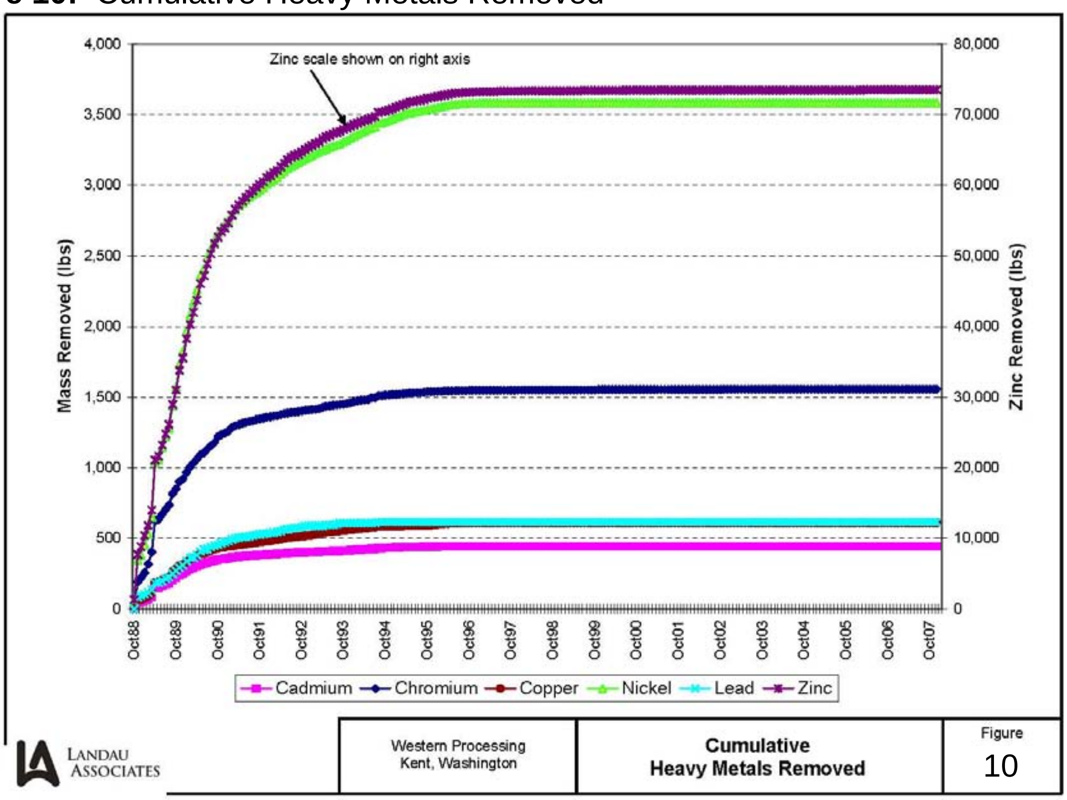


Figure 10: Cumulative Heavy Metals Removed



Figures 9 and 10 are originally from the *2007 Annual Evaluation Western Processing*, Landau Associates.

Table 1: 2007 Environmental Monitoring Schedule[37]

Location	Source	Sites	Frequency	Analytes
Sector 1	Groundwater	6	Annual	VOCs, Metals
		1	Annual	Geochemical Parameters
Sector 2	Groundwater	2	Semiannual	VOCs, Geochemical Parameters
		1	Annual	VOCs
		1	Biennial	VOCs
		1	Annual	Metals
Sector 3	Groundwater	8	Annual (A)	VOCs, Geochemical Parameters
		6	Conditional	VOCs, Geochemical Parameters
		3	Biennial	VOCs
		1	Annual	Metals
Sector 4	Groundwater	5	Annual (A)	VOCs, Metals
Downgradient	Groundwater	1	Annual	VOCs, Metals
East Drain	Groundwater	1	Annual (A)	VOCs
	Groundwater	1	Annual	Geochemical Parameters
	Surface water	2	Annual	Metals, Conventional Parameters
Mill Creek	Surface water	3	Annual	Metals, Conventional Parameters

(A) = Wells 9M44A, 13M30A, 15M15B, 15M16B, 15M17B, 15M39B, 15M40B, and 15M45B are currently sampled semiannually for VOCs.

37 For an environmental monitoring schedule that is broken down by individual wells, please refer to Table 2-1 of the 2007 Annual Report, Western Processing, Landau Associates (June 23, 2008).

Table 2: Environmental Monitoring Target Compound List

Volatile Organic Compounds	Total Metals	Oxazolidinone
Tetrachloroethene	Cadmium	Oxazolidinone (HPMO)
Trichloroethene	Chromium	Oxazolidinone (OPMO)
cis-1,2-Dichloroethene	Copper	
trans-1,2-Dichloroethene	Lead	
1,1,1-Trichloroethane	Nickel	
1,1-Dichloroethene	Zinc	
Chloroethene (vinyl chloride)		
1,1-Dichloroethane		
Trichloromethane		
1,2-Dichlorobenzene		
Chlorobenzene		
Styrene		
Ethylbenzene		
Toluene		
Benzene		
o-Xylene		
m,p-Xylene		

Table 3: 2007 Mill Creek Surface Water Quality

Location:	Constituent:	Third Quarter 2007 Conc.		Ambient Water Quality Criterion	Units
C1	Conductivity (avg)	190			µmhos/cm
	Hardness	114			mg/L
	pH (avg)	7.36			
	Suspended Solids	14			mg/L
	Temperature (avg)	60.8			deg F
	Cadmium (total)	0.25	U	1.3	µg/L
	Chromium (total)	1.4		230	µg/L
	Copper (total)	3.7		13.2	µg/L
	Lead (total)	3.2		3.8	µg/L
	Nickel (total)	2.5	U	176	µg/L
	Zinc (total)	30		118	µg/L
C3	Conductivity (avg)	193			µmhos/cm
	Hardness	92.1			mg/L
	pH (avg)	7.41			
	Suspended Solids	5			mg/L
	Temperature (avg)	60.8			deg F
	Cadmium (total)	0.25	U	1.1	µg/L
	Chromium (total)	0.8		194	µg/L
	Copper (total)	1	U	11.0	µg/L
	Lead (total)	1	U	2.9	µg/L
	Nickel (total)	2.5	U	147	µg/L
	Zinc (total)	12		99	µg/L
C4	Conductivity (avg)	193			µmhos/cm
	Hardness	100			mg/L
	pH (avg)	7.38			
	Suspended Solids	5	U		mg/L
	Temperature (avg)	60.98			deg F
	Cadmium (total)	0.25	U		µg/L
	Zinc (total)	9.5			µg/L

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Note 1: C1 is located upstream of the site, C3 is immediately downstream of the site, and C4 is 300’ downstream of where East Drain discharges into Mill Creek.

Note 2: The Ambient Water Quality Criteria (AWQC) shown are based on the hardness measured during the sampling event. The constituent specific AWQC at C3 also represents the allowable concentration per the Consent Decree if the measured concentration at C1 is less than 2/3 of the AWQC at C1.
If the measured concentration of the constituent at C1 is greater than 2/3 of the AWQC at C1, the allowable concentration at C3 is increased per the Consent Decree.

Table 4: 2006* East Drain Surface Water Quality

Third Quarter 2006	Location **D1**	Location **D2**	Units
Constituent:			
Conductivity (avg)	52	103	µmhos/cm
Hardness	16.3	28.3	mg/L
pH (avg)	6.81	6.24	
Suspended Solids	21	9	mg/L
Temperature (avg)	62.24	55.58	° F
Cadmium (total)	0.45	0.25 U	µg/L
Zinc (total)	145	597	µg/L

* During the third quarter of 2007, East Drain Stations D1 and D2 were dry and therefore were not sampled. For that reason, 2006 data is shown on this table.

Only detected constituents normally analyzed as part of the Long-Term Monitoring Plan are included in this table.

Table 5: 2007 Detected Constituents in Monitoring Wells

Location	Constituent		Units	Contingent Action Criterion	First Quarter Quarter, 2007	Third Quarter Quarter, 2007
Sector 1						
Well N1A1	Zinc	(total)	µg/L		NT	24
	cis-1,2-Dichloroethene		µg/L	8200	NT	350
	Chloroethene		µg/L	35000	NT	390
Well N3A1	Cadmium	(total)	µg/L	70	NT	9.9
	Chromium	(total)	µg/L	150	NT	222
	Copper	(total)	µg/L	129	NT	432
	Lead	(total)	µg/L	99	NT	74.6
	Nickel	(total)	µg/L	1200	NT	112
	Zinc	(total)	µg/L	336000	NT	20300
	1,1,1-Trichloroethane		µg/L	19000	NT	110
	1,1-Dichloroethane		µg/L	556	NT	120
	1,1-Dichloroethene		µg/L	779	NT	43
	Benzene		µg/L	2600	NT	320
	Chloroform		µg/L	3800	NT	170
	cis-1,2-Dichloroethene		µg/L	33000	NT	8200
	Ethylbenzene		µg/L	42000	NT	810
	m,p-Xylene		µg/L	100000	NT	1000
	o-Xylene		µg/L	39000	NT	500
	Tetrachloroethene		µg/L	3200	NT	150
	Toluene		µg/L	515000	NT	2400
	trans-1,2-Dichloroethene		µg/L		NT	27
	Trichloroethene		µg/L	330000	NT	340
	Chloroethene		µg/L	2400	NT	340
Well N7A2	1,1-Dichloroethane		µg/L	690	NT	140
	1,1-Dichloroethene		µg/L		NT	11
	Benzene		µg/L		NT	12
	cis-1,2-Dichloroethene		µg/L	6000	NT	1400
	Toluene		µg/L		NT	6.6
	Chloroethene		µg/L	4800	NT	2800
Sector 2						
Well 5M4A	HPMO		µg/L	14000	NT	261 J
	OPMO		µg/L	64000	NT	382 J
	1,2-Dichlorobenzene		µg/L	10	NT	20
	Chlorobenzene		µg/L	5	NT	19
	Chloroethene		µg/L	1200	NT	2.5
Sector 4						
Well 9M9A	Zinc	(total)	µg/L	227	NT	75
	1,1-Dichloroethane		µg/L	5	NT	31
	cis-1,2-Dichloroethene		µg/L		NT	6.7
	Chloroethene		µg/L	11	NT	100
Well 9M44A	Zinc	(total)	µg/L		5 U	114
Downgradient						
Well 8M8B	Zinc	(total)	µg/L		NT	24
	Toluene		µg/L	5	NT	17

NT = Not tested during this sampling period.
U = Indicates compound was analyzed for, but was not detected at the reported sample detection limit.
J = Data validation flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
Only detected constituents analyzed as part of the Long-Term Monitoring Plan are included in this table.
Third quarter data represent the annual sampling of the long-Term monitoring wells.
First quarter data represent results from the semiannual MNA sampling event.

Table 6: 2007 Detected VOCs and SVOCs in S-Wells and U-Wells

			Cumulative Results 1996-2007					
Well	**Constituent**	**Units**	**Mean**	**Maximum**	**Minimum**	Standard Deviation	Number Detects	Number Samples
Sector 1								
S1	Bicarbonates	mg/L	275	320	191	36	13	13
	Chloride	mg/L	606	606	606		1	1
	Conductivity (avg)	µmhos/cm	1743	2340	445	541	22	22
	Dissolved Oxygen (avg)	mg/L	2	9	0	3	13	13
	Hardness	mg/L	174	245	102	58	14	14
	pH (avg)		7	7	6	0	22	22
	Sulfate	mg/L	4	4	4		1	1
	Suspended Solids	mg/L	40	102	6	44	5	8
	Temperature (avg)	° F	58	64	50	5	22	22
	Total Dissolved Solids	mg/L	1370	1370	1370		1	1
	Turbidity	NTU	6	22	1	8	12	12
	Aluminum (total)	µg/L	369	369	369		1	6
	Calcium (dissolved)	µg/L	66700	66700	66700		1	1
	Calcium (total)	µg/L	50900	53200	48600	3253	2	2
	Chromium (total)	µg/L	12	13	11	1	2	16
	Iron (dissolved)	µg/L	77200	77200	77200		1	1
	Iron (total)	µg/L	53107	83200	26500	21960	15	15
	Magnesium (dissolved)	µg/L	21600	21600	21600		1	1
	Magnesium (total)	µg/L	18900	21600	16200	3818	2	2
	Manganese (dissolved)	µg/L	4530	4530	4530		1	1
	Manganese (total)	µg/L	2573	4730	1360	1025	15	15
	Sodium (dissolved)	µg/L	332000	332000	332000		1	1
	Sodium (total)	µg/L	327000	327000	327000		1	1
	Zinc (dissolved)	µg/L	157	157	157		1	1
	Zinc (total)	µg/L	139	149	128	15	2	16
	(HPMO) Oxazolidinone	µg/L	107	240	31	72	14	16
	(OPMO) Oxazolidinone	µg/L	95	180	34	51	11	16
S2	Bicarbonates	mg/L	431	482	373	43	13	13
	Chloride	mg/L	469	469	469		1	1
	Conductivity (avg)	µmhos/cm	2175	3140	793	589	22	22
	Dissolved Oxygen (avg)	mg/L	2	7	0	3	12	12
	Hardness	mg/L	186	285	128	58	15	15
	pH (avg)		7	8	7	0	22	22
	Sulfate	mg/L	4	4	4		1	1
	Temperature (avg)	° F	57	65	52	3	22	22
	Total Dissolved Solids	mg/L	1280	1280	1280		1	1
	Turbidity	NTU	12	35	1	12	11	11
	Aluminum (total)	µg/L	329	550	212	158	4	6
	Arsenic (total)	µg/L	22	67	11	19	8	15
	Calcium (dissolved)	µg/L	45500	45500	45500		1	1
	Calcium (total)	µg/L	41500	41500	41500		1	1
	Chromium (dissolved)	µg/L	25	25	25		1	1
	Chromium (total)	µg/L	33	47	21	9	15	16
	Iron (dissolved)	µg/L	28200	28200	28200		1	1
	Iron (total)	µg/L	27400	39200	20000	5227	15	15
	Lead (total)	µg/L	11	11	11		1	16
	Magnesium (dissolved)	µg/L	20200	20200	20200		1	1
	Magnesium (total)	µg/L	19300	19300	19300		1	1
	Manganese (dissolved)	µg/L	1950	1950	1950		1	1
	Manganese (total)	µg/L	1673	2270	1250	400	15	15
	Sodium (dissolved)	µg/L	372000	372000	372000		1	1
	Sodium (total)	µg/L	357000	357000	357000		1	1

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S2	Zinc	(total)	µg/L	452	1650	34	629	10	16
	(HPMO) Oxazolidinone		µg/L	2339	4500	1080	1041	16	16
	(OPMO) Oxazolidinone		µg/L	3815	9190	1020	2094	16	16
	1,2-Dichlorobenzene		µg/L	7	9	5	2	8	14
	2,4-Dimethylphenol		µg/L	89	167	31	38	15	15
	bis(2-Ethylhexyl)phthalate		µg/L	9	9	9		1	15
	1,1-Dichloroethane		µg/L	18	28	5	7	12	22
	1,1-Dichloroethene		µg/L	16	28	7	7	12	22
	1,2-Dichlorobenzene		µg/L	11	12	10	1	9	22
	Benzene		µg/L	11	14	9	2	21	22
	Chlorobenzene		µg/L	30	39	6	9	21	22
	cis 1,2-Dichloroethene		µg/L	1620	3400	7	1198	21	22
	Methylene Chloride		µg/L	18	18	18		1	22
	Toluene		µg/L	6	6	6		2	22
	trans 1,2-Dichloroethene		µg/L	9	15	5	3	8	22
	Trichloroethene		µg/L	297	670	56	202	18	22
	Chloroethene		µg/L	1472	2700	49	834	21	22
S3	Bicarbonates		mg/L	209	244	156	31	13	13
	Chloride		mg/L	134	134	134		1	1
	Conductivity	(avg)	µmhos/cm	1258	1565	753	235	23	23
	Dissolved Oxygen	(avg)	mg/L	2	6	0	2	13	13
	Hardness		mg/L	159	210	118	28	14	14
	pH	(avg)		7	7	6	0	23	23
	Sulfate		mg/L	12	12	12		1	1
	Suspended	Solids	mg/L	105	118	90	9	8	8
	Temperature	(avg)	° F	57	65	48	4	22	22
	Total Dissolved Solids		mg/L	463	463	463		1	1
	Turbidity		NTU	4	17	1	5	12	12
	Aluminum	(total)	µg/L	352	633	202	244	3	6
	Arsenic	(total)	µg/L	12	14	11	1	8	15
	Cadmium	(total)	µg/L	1	1	1		1	16
	Calcium	(dissolved)	µg/L	28600	28600	28600		1	1
	Calcium	(total)	µg/L	27200	28100	26300	1273	2	2
	Chromium	(total)	µg/L	8	10	6	3	2	16
	Iron	(dissolved)	µg/L	28400	28400	28400		1	1
	Iron	(total)	µg/L	37007	45000	18700	6773	15	15
	Lead	(total)	µg/L	22	22	22		1	16
	Magnesium	(dissolved)	µg/L	14400	14400	14400		1	1
	Magnesium	(total)	µg/L	12500	12600	12400	141	2	2
	Manganese	(dissolved)	µg/L	2760	2760	2760		1	1
	Manganese	(total)	µg/L	2462	3170	1060	554	15	15
	Mercury	(total)	µg/L	0	0	0		1	1
	Selenium	(total)	µg/L	6	6	6		1	1
	Sodium	(dissolved)	µg/L	72000	72000	72000		1	1
	Sodium	(total)	µg/L	81700	81700	81700		1	1
	Zinc	(dissolved)	µg/L	1720	1720	1720		1	1
	Zinc	(total)	µg/L	3676	8950	816	2529	16	16
	(HPMO) Oxazolidinone		µg/L	890	1890	235	501	16	16
	(OPMO) Oxazolidinone		µg/L	2319	4240	460	960	16	16
	1,1,1-Trichloroethane		µg/L	6	6	6		1	22
	1,1-Dichloroethane		µg/L	7	11	5	2	14	22
	1,1-Dichloroethene		µg/L	20	35	6	8	19	22
	Benzene		µg/L	6	7	5	1	9	22
	cis 1,2-Dichloroethene		µg/L	2813	5400	110	1477	22	22
	Toluene		µg/L	9	23	5	6	8	22
	trans 1,2-Dichloroethene		µg/L	19	34	6	8	21	22

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S3	Trichloroethene		µg/L	1482	3000	36	1003	22	22
	Chloroethene		µg/L	984	2060	15	479	22	22
S4	Bicarbonates		mg/L	314	364	59	79	13	13
	Chloride		mg/L	640	640	640		1	1
	Conductivity	(avg)	µmhos/cm	1918	2640	428	697	22	22
	Dissolved Oxygen (avg)		mg/L	2	8	0	3	12	12
	Hardness		mg/L	192	285	26	73	15	15
	pH	(avg)		7	7	6	0	22	22
	Sulfate		mg/L	8	8	8		1	1
	Suspended	Solids	mg/L	106	162	7	45	8	8
	Temperature	(avg)	° F	60	70	52	6	22	22
	Total Dissolved Solids		mg/L	1440	1440	1440		1	1
	Turbidity		NTU	15	60	1	20	11	11
	Aluminum	(total)	µg/L	3257	8570	503	4602	3	6
	Arsenic	(dissolved)	µg/L	62	62	62		1	1
	Arsenic	(total)	µg/L	58	112	12	23	14	15
	Calcium	(dissolved)	µg/L	64800	64800	64800		1	1
	Calcium	(total)	µg/L	65300	65300	65300		1	1
	Chromium	(total)	µg/L	16	19	11	4	4	16
	Copper	(total)	µg/L	37	44	30	10	2	16
	Iron	(dissolved)	µg/L	39500	39500	39500		1	1
	Iron	(total)	µg/L	43723	83800	7950	18842	15	15
	Lead	(total)	µg/L	40	42	39	2	2	16
	Magnesium	(dissolved)	µg/L	20500	20500	20500		1	1
	Magnesium	(total)	µg/L	23100	23100	23100		1	1
	Manganese	(dissolved)	µg/L	6220	6220	6220		1	1
	Manganese	(total)	µg/L	3216	6010	244	1810	15	15
	Sodium	(dissolved)	µg/L	358000	358000	358000		1	1
	Sodium	(total)	µg/L	413000	413000	413000		1	1
	Zinc	(dissolved)	µg/L	670	670	670		1	1
	Zinc	(total)	µg/L	753	6550	73	1556	16	16
	(HPMO) Oxazolidinone		µg/L	1809	11000	87	2761	16	16
	(OPMO) Oxazolidinone		µg/L	7941	29000	188	7306	16	16
	1,1-Dichloroethane		µg/L	7	12	5	3	5	22
	1,1-Dichloroethene		µg/L	9	9	9		1	22
	cis 1,2-Dichloroethene		µg/L	200	859	5	184	20	22
	Trichloroethene		µg/L	34	58	5	13	17	22
	Chloroethene		µg/L	275	1270	3	325	21	22
S5	Bicarbonates		mg/L	157	190	122	21	13	13
	Chloride		mg/L	49	49	49		1	1
	Conductivity	(avg)	µmhos/cm	1183	1711	501	352	23	23
	Dissolved Oxygen (avg)		mg/L	2	8	0	3	12	12
	Hardness		mg/L	222	278	102	42	15	15
	pH	(avg)		7	7	6	0	22	22
	Sulfate		mg/L	12	12	12		1	1
	Suspended	Solids	mg/L	103	128	77	17	8	8
	Temperature	(avg)	° F	57	64	50	4	21	21
	Total Dissolved Solids		mg/L	259	259	259		1	1
	Turbidity		NTU	19	92	2	33	11	11
	Aluminum	(total)	µg/L	401	507	294	151	2	6
	Arsenic	(total)	µg/L	10	11	10	0	2	15
	Calcium	(dissolved)	µg/L	22200	22200	22200		1	1
	Calcium	(total)	µg/L	22400	22400	22400		1	1
	Chromium	(total)	µg/L	2	2	2		1	16
	Iron	(dissolved)	µg/L	36600	36600	36600		1	1
	Iron	(total)	µg/L	64333	87400	29200	14524	15	15

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S5	Magnesium	(dissolved)	µg/L	11900	11900	11900		1	1
	Magnesium	(total)	µg/L	11100	11100	11100		1	1
	Manganese	(dissolved)	µg/L	1980	1980	1980		1	1
	Manganese	(total)	µg/L	3753	4770	1710	835	15	15
	Sodium	(dissolved)	µg/L	34100	34100	34100		1	1
	Sodium	(total)	µg/L	27900	27900	27900		1	1
	Zinc	(dissolved)	µg/L	130	130	130		1	1
	Zinc	(total)	µg/L	451	857	133	188	15	16
	(HPMO) Oxazolidinone		µg/L	1683	3100	712	708	16	16
	(OPMO) Oxazolidinone		µg/L	5155	8900	471	2371	16	16
	1,1,1-Trichloroethane		µg/L	37	97	6	29	15	22
	1,1-Dichloroethane		µg/L	37	86	10	23	19	22
	1,1-Dichloroethene		µg/L	17	27	6	6	16	22
	Benzene		µg/L	10	14	6	3	13	22
	Chloroform		µg/L	7	9	5	1	5	22
	cis 1,2-Dichloroethene		µg/L	1357	3600	8	1024	22	22
	Ethylbenzene		µg/L	13	18	6	4	8	22
	m,p-xylene		µg/L	14	20	8	4	7	22
	o-xylene		µg/L	5	5	5		1	22
	Tetrachloroethene		µg/L	10	14	6	3	11	22
	Toluene		µg/L	60	93	31	23	7	22
	trans 1,2-Dichloroethene		µg/L	19	43	7	11	16	22
	Trichloroethene		µg/L	525	1300	13	437	22	22
	Chloroethene		µg/L	271	570	28	182	21	22
S6	Bicarbonates		mg/L	212	252	91	48	13	13
	Chloride		mg/L	202	202	202		1	1
	Conductivity	(avg)	µmhos/cm	1536	5560	225	995	21	21
	Dissolved Oxygen (avg)		mg/L	2	6	0	2	12	12
	Fluoride		mg/L	3	3	3		1	1
	Hardness		mg/L	165	230	31	51	15	15
	pH	(avg)		7	8	6	0	22	22
	Sulfate		mg/L	33	33	33		1	1
	Suspended	Solids	mg/L	130	148	103	16	8	8
	Temperature	(avg)	° F	60	69	50	6	22	22
	Total Dissolved Solids		mg/L	742	742	742		1	1
	Turbidity		NTU	15	43	1	16	11	11
	Aluminum	(total)	µg/L	2884	10100	217	4818	4	6
	Arsenic	(total)	µg/L	12	13	11	2	2	15
	Calcium	(dissolved)	µg/L	22500	22500	22500		1	1
	Calcium	(total)	µg/L	26200	26200	26200		1	1
	Chromium	(total)	µg/L	33	65	12	21	5	16
	Copper	(total)	µg/L	42	42	42		1	16
	Iron	(dissolved)	µg/L	41200	41200	41200		1	1
	Iron	(total)	µg/L	51643	69700	9540	15964	15	15
	Lead	(total)	µg/L	37	37	37		1	16
	Magnesium	(dissolved)	µg/L	13200	13200	13200		1	1
	Magnesium	(total)	µg/L	13500	13500	13500		1	1
	Manganese	(dissolved)	µg/L	2200	2200	2200		1	1
	Manganese	(total)	µg/L	3073	4110	106	1076	15	15
	Nickel	(total)	µg/L	404	404	404		1	16
	Sodium	(dissolved)	µg/L	208000	208000	208000		1	1
	Sodium	(total)	µg/L	176000	176000	176000		1	1
	Zinc	(dissolved)	µg/L	32	32	32		1	1
	Zinc	(total)	µg/L	68	161	26	42	9	16
	(HPMO) Oxazolidinone		µg/L	2679	5100	1050	1012	15	16
	(OPMO) Oxazolidinone		µg/L	5129	10000	2480	2634	15	16

Well	Constituent	Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
			Cumulative Results 1996-2007					
S6	bis(2-Ethylhexyl)phthalate	µg/L	27	27	27		1	16
	1,1,1-Trichloroethane	µg/L	99	392	37	76	21	22
	1,1-Dichloroethane	µg/L	110	210	46	50	21	22
	1,1-Dichloroethene	µg/L	28	55	12	13	21	22
	Benzene	µg/L	7	9	5	1	9	22
	cis 1,2-Dichloroethene	µg/L	4958	9800	10	2538	22	22
	Ethylbenzene	µg/L	6	6	6		1	22
	m,p-xylene	µg/L	11	11	11		1	22
	o-xylene	µg/L	7	7	7		1	22
	Tetrachloroethene	µg/L	18	104	5	27	13	22
	Toluene	µg/L	10	29	5	6	17	22
	trans 1,2-Dichloroethene	µg/L	34	68	13	17	21	22
	Trichloroethene	µg/L	1339	6310	5	1162	22	22
	Chloroethene	µg/L	507	750	267	125	21	22
S7	Bicarbonates	mg/L	166	225	54	42	13	13
	Chloride	mg/L	60	60	60		1	1
	Conductivity (avg)	µmhos/cm	1514	2180	717	430	20	20
	Dissolved Oxygen (avg)	mg/L	1	4	0	1	11	11
	Fluoride	mg/L	1	1	1		1	1
	Hardness	mg/L	295	386	77	75	15	15
	pH (avg)		7	7	6	0	20	20
	Sulfate	mg/L	23	23	23		1	1
	Suspended Solids	mg/L	141	186	98	31	8	8
	Temperature (avg)	° F	58	65	52	4	20	20
	Total Dissolved Solids	mg/L	440	440	440		1	1
	Turbidity	NTU	14	37	2	13	10	10
	Aluminum (total)	µg/L	245	248	241	5	2	6
	Calcium (dissolved)	µg/L	19500	19500	19500		1	1
	Calcium (total)	µg/L	17200	17200	17200		1	1
	Chromium (total)	µg/L	4	4	4		1	16
	Iron (dissolved)	µg/L	30800	30800	30800		1	1
	Iron (total)	µg/L	92167	126000	28300	23489	15	15
	Magnesium (dissolved)	µg/L	8620	8620	8620		1	1
	Magnesium (total)	µg/L	8270	8270	8270		1	1
	Manganese (dissolved)	µg/L	1520	1520	1520		1	1
	Manganese (total)	µg/L	6381	8940	1640	1892	15	15
	Sodium (dissolved)	µg/L	102000	102000	102000		1	1
	Sodium (total)	µg/L	101000	101000	101000		1	1
	Zinc (dissolved)	µg/L	251	251	251		1	1
	Zinc (total)	µg/L	889	2630	286	603	16	16
	(HPMO) Oxazolidinone	µg/L	1814	3800	386	1098	16	16
	(OPMO) Oxazolidinone	µg/L	3689	10000	228	2689	16	16
	1,1-Dichloroethane	µg/L	10	14	6	3	14	20
	1,2,4-Trichlorobenzene	µg/L	39	39	39		1	20
	Benzene	µg/L	7	10	5	2	9	20
	cis 1,2-Dichloroethene	µg/L	159	370	18	122	20	20
	Methylene chloride	µg/L	30	30	30		1	20
	Toluene	µg/L	7	7	7		1	20
	Trichloroethene	µg/L	25	50	5	12	16	20
	Chloroethene	µg/L	65	120	14	29	20	20
S8	Bicarbonates	mg/L	204	330	134	54	13	13
	Chloride	mg/L	135	135	135		1	1
	Conductivity (avg)	µmhos/cm	1302	2160	246	727	15	15
	Dissolved Oxygen (avg)	mg/L	2	5	0	2	9	9
	Fluoride	mg/L	7	7	7		1	1
	Hardness	mg/L	330	696	74	162	14	14

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S8	pH	(avg)		6	7	6	0	15	15
	Sulfate		mg/L	80	80	80		1	1
	Suspended	Solids	mg/L	50	79	8	28	6	8
	Temperature	(avg)	° F	61	69	50	5	15	15
	Total Dissolved Solids		mg/L	625	625	625		1	1
	Turbidity		NTU	120	484	1	208	8	8
	Aluminum	(total)	µg/L	13206	21600	9730	4812	5	5
	Arsenic	(total)	µg/L	22	22	22		1	14
	Cadmium	(total)	µg/L	20	50	6	12	12	15
	Calcium	(dissolved)	µg/L	54900	54900	54900		1	1
	Calcium	(total)	µg/L	55300	55300	55300		1	1
	Chromium	(total)	µg/L	33	49	17	22	2	15
	Iron	(dissolved)	µg/L	29400	29400	29400		1	1
	Iron	(total)	µg/L	30634	59100	2550	18358	14	14
	Magnesium	(dissolved)	µg/L	23300	23300	23300		1	1
	Magnesium	(total)	µg/L	22800	22800	22800		1	1
	Manganese	(dissolved)	µg/L	3800	3800	3800		1	1
	Manganese	(total)	µg/L	5761	9090	707	1934	14	14
	Nickel	(dissolved)	µg/L	68	68	68		1	1
	Nickel	(total)	µg/L	125	307	45	89	12	15
	Sodium	(dissolved)	µg/L	86800	86800	86800		1	1
	Sodium	(total)	µg/L	84500	84500	84500		1	1
	Zinc	(dissolved)	µg/L	808	808	808		1	1
	Zinc	(total)	µg/L	1828	5270	260	1620	15	15
	(HPMO) Oxazolidinone		µg/L	5310	9840	249	3787	9	15
	(OPMO) Oxazolidinone		µg/L	6362	11800	1200	3431	13	15
	Benzoic	acid	µg/L	66	78	48	16	3	15
	bis(2-Ethylhexyl)phthalate		µg/L	7	10	5	3	2	15
	1,1,1-Trichloroethane		µg/L	15	24	6	6	7	15
	1,1-Dichloroethane		µg/L	14	30	6	8	10	15
	1,1-Dichloroethene		µg/L	7	9	5	1	7	15
	1,2-Dichloroethane		µg/L	6	6	5	1	2	15
	Benzene		µg/L	13	17	6	4	6	15
	Chloroform		µg/L	195	600	21	154	13	15
	cis 1,2-Dichloroethene		µg/L	177	410	5	154	15	15
	Ethylbenzene		µg/L	7	10	5	3	3	15
	m,p-xylene		µg/L	9	12	7	3	3	15
	Methyl ethyl ketone		µg/L	204	240	168	51	2	15
	Methylene Chloride		µg/L	306	688	160	191	7	15
	Tetrachloroethene		µg/L	12	22	6	6	5	15
	Toluene		µg/L	19	19	19		1	15
	trans 1,2-Dichloroethene		µg/L	6	7	5	1	4	15
	Trichloroethene		µg/L	316	800	15	212	15	15
	Chloroethene		µg/L	31	82	3	28	12	15
S9	Bicarbonates		mg/L	226	341	83	68	13	13
	Chloride		mg/L	187	187	187		1	1
	Conductivity	(avg)	µmhos/cm	1654	2280	163	778	15	15
	Dissolved Oxygen (avg)		mg/L	2	7	0	2	9	9
	Fluoride		mg/L	5	5	5		1	1
	Hardness		mg/L	321	607	60	169	14	14
	Nitrate		mg/L	39	39	39		1	1
	pH	(avg)		6	7	6	0	15	15
	Sulfate		mg/L	109	109	109		1	1
	Suspended	Solids	mg/L	72	124	14	43	6	8
	Temperature	(avg)	° F	60	71	51	5	15	15
	Total Dissolved Solids		mg/L	854	854	854		1	1

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S9	Turbidity		NTU	117	350	1	130	8	8
	Aluminum	(total)	µg/L	9920	19100	7230	5141	5	5
	Arsenic	(total)	µg/L	17	24	14	5	4	14
	Cadmium	(total)	µg/L	9	15	5	4	6	15
	Calcium	(dissolved)	µg/L	32400	32400	32400		1	1
	Calcium	(total)	µg/L	38500	38500	38500		1	1
	Chromium	(total)	µg/L	16	18	14	3	2	15
	Iron	(dissolved)	µg/L	5110	5110	5110		1	1
	Iron	(total)	µg/L	15720	48500	235	15379	14	14
	Lead	(total)	µg/L	9	11	6	4	2	15
	Magnesium	(dissolved)	µg/L	17600	17600	17600		1	1
	Magnesium	(total)	µg/L	16900	16900	16900		1	1
	Manganese	(dissolved)	µg/L	2970	2970	2970		1	1
	Manganese	(total)	µg/L	6813	12400	43	3826	14	14
	Nickel	(total)	µg/L	99	183	48	46	9	15
	Sodium	(dissolved)	µg/L	224000	224000	224000		1	1
	Sodium	(total)	µg/L	218000	218000	218000		1	1
	Zinc	(dissolved)	µg/L	110	110	110		1	1
	Zinc	(total)	µg/L	357	677	143	145	15	15
	(HPMO) Oxazolidinone		µg/L	1959	3510	915	964	7	15
	(OPMO) Oxazolidinone		µg/L	4081	8540	175	2770	11	15
	1,1,1-Trichloroethane		µg/L	8	9	6	1	5	15
	1,1-Dichloroethane		µg/L	6	7	5	1	6	15
	Acetone		µg/L	40	40	40		1	15
	Benzene		µg/L	5	5	5		1	15
	Chloroform		µg/L	119	159	40	50	7	15
	cis 1,2-Dichloroethene		µg/L	31	65	7	22	12	15
	Methylene	chloride	µg/L	67	116	20	31	7	15
	Tetrachloroethene		µg/L	15	20	10	4	6	15
	trans 1,2-Dichloroethene		µg/L	5	5	5		1	15
	Trichloroethene		µg/L	98	283	7	111	14	15
	Chloroethene		µg/L	15	33	6	10	8	15
S10	Bicarbonates		mg/L	356	434	222	75	13	13
	Chloride		mg/L	243	243	243		1	1
	Conductivity	(avg)	µmhos/cm	1034	1920	301	507	21	21
	Dissolved Oxygen (avg)		mg/L	1	7	0	2	11	11
	Hardness		mg/L	85	147	48	30	15	15
	pH	(avg)		7	7	6	0	21	21
	Suspended	Solids	mg/L	50	66	34	11	6	8
	Temperature	(avg)	° F	56	67	48	4	21	21
	Total Dissolved Solids		mg/L	915	915	915		1	1
	Turbidity		NTU	5	23	0	8	10	10
	Aluminum	(total)	µg/L	229	237	220	12	2	6
	Calcium	(dissolved)	µg/L	7480	7480	7480		1	1
	Calcium	(total)	µg/L	7320	7320	7320		1	1
	Chromium	(total)	µg/L	14	14	14		1	16
	Iron	(dissolved)	µg/L	3520	3520	3520		1	1
	Iron	(total)	µg/L	12041	23900	2560	6204	15	15
	Magnesium	(dissolved)	µg/L	4030	4030	4030		1	1
	Magnesium	(total)	µg/L	7760	7760	7760		1	1
	Manganese	(dissolved)	µg/L	178	178	178		1	1
	Manganese	(total)	µg/L	568	1120	154	271	15	15
	Selenium	(dissolved)	µg/L	9	9	9		1	1
	Selenium	(total)	µg/L	11	11	11		1	1
	Sodium	(dissolved)	µg/L	332000	332000	332000		1	1
	Sodium	(total)	µg/L	332000	332000	332000		1	1

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S10	Zinc	(total)	µg/L	80	168	20	59	8	16
	(HPMO) Oxazolidinone		µg/L	51	67	35	12	7	16
	(OPMO) Oxazolidinone		µg/L	99	333	25	82	13	16
	4-Methylphenol		µg/L	25	25	25		1	16
	Phenol		µg/L	33	33	33		1	16
	1,1,1-Trichloroethane		µg/L	20	27	10	6	6	21
	1,1-Dichloroethane		µg/L	9	11	5	2	6	21
	1,2,4-Trichlorobenzene		µg/L	10	10	10		1	21
	cis 1,2-Dichloroethene		µg/L	88	160	14	61	11	21
	Ethylbenzene		µg/L	7	10	6	2	5	21
	m,p-xylene		µg/L	9	13	8	2	5	21
	Methyl ethyl ketone		µg/L	168	168	168		1	21
	o-xylene		µg/L	9	9	8	1	5	21
	Toluene		µg/L	11	15	6	3	6	21
	Trichloroethene		µg/L	5	5	5		1	21
	Chloroethene		µg/L	14	17	11	2	8	21
S11	Bicarbonates		mg/L	253	318	193	34	13	13
	Chloride		mg/L	202	202	202		1	1
	Conductivity	(avg)	µmhos/cm	1533	2110	419	546	22	22
	Dissolved Oxygen	(avg)	mg/L	2	7	0	2	12	12
	Fluoride		mg/L	3	3	3		1	1
	Hardness		mg/L	221	349	130	77	15	15
	pH	(avg)		7	7	6	0	22	22
	Sulfate		mg/L	104	104	104		1	1
	Suspended	Solids	mg/L	107	131	93	16	8	8
	Temperature	(avg)	° F	58	68	52	4	22	22
	Total Dissolved Solids		mg/L	712	712	712		1	1
	Turbidity		NTU	11	50	1	18	11	11
	Aluminum	(total)	µg/L	692	1210	220	436	5	6
	Arsenic	(total)	µg/L	10	10	10		1	15
	Calcium	(dissolved)	µg/L	36300	36300	36300		1	1
	Calcium	(total)	µg/L	34700	34700	34700		1	1
	Chromium	(dissolved)	µg/L	13	13	13		1	1
	Chromium	(total)	µg/L	16	30	4	8	7	16
	Iron	(dissolved)	µg/L	68500	68500	68500		1	1
	Iron	(total)	µg/L	68100	115000	37400	28054	15	15
	Magnesium	(dissolved)	µg/L	15100	15100	15100		1	1
	Magnesium	(total)	µg/L	14600	14600	14600		1	1
	Manganese	(dissolved)	µg/L	2570	2570	2570		1	1
	Manganese	(total)	µg/L	3673	5580	2070	1385	15	15
	Nickel	(total)	µg/L	106	153	45	47	6	16
	Selenium	(total)	µg/L	5	5	5		1	1
	Sodium	(dissolved)	µg/L	169000	169000	169000		1	1
	Sodium	(total)	µg/L	167000	167000	167000		1	1
	Zinc	(dissolved)	µg/L	535	535	535		1	1
	Zinc	(total)	µg/L	503	1080	64	404	16	16
	(HPMO) Oxazolidinone		µg/L	650	1590	102	451	16	16
	(OPMO) Oxazolidinone		µg/L	939	1420	551	234	16	16
	2,4-Dimethylphenol		µg/L	39	47	35	7	3	16
	2-Methylphenol		µg/L	40	53	31	8	6	16
	4-Methylphenol		µg/L	31	31	31		1	16
	bis(2-Ethylhexyl)phthalate		µg/L	15	15	15		1	16
	Phenol		µg/L	55	99	27	28	5	16
	1,1,1-Trichloroethane		µg/L	402	1250	5	487	16	22
	1,1-Dichloroethane		µg/L	94	151	47	32	21	22
	1,1-Dichloroethene		µg/L	35	87	7	29	21	22

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S11	1,2-Dichloroethane		µg/L	26	77	8	16	15	22
	Benzene		µg/L	14	21	8	3	15	22
	Chloroform		µg/L	73	206	31	45	14	22
	cis 1,2-Dichloroethene		µg/L	1164	3300	200	887	22	22
	Ethylbenzene		µg/L	8	10	5	2	11	22
	m,p-xylene		µg/L	10	14	6	2	11	22
	Methyl isobutyl ketone		µg/L	16	18	13	2	4	22
	Methylene chloride		µg/L	39	136	6	41	14	22
	o-xylene		µg/L	6	8	5	2	4	22
	Tetrachloroethene		µg/L	45	145	5	39	19	22
	Toluene		µg/L	36	82	7	28	14	22
	trans 1,2-Dichloroethene		µg/L	6	8	5	2	3	22
	Trichloroethene		µg/L	399	1660	39	466	22	22
	Chloroethene		µg/L	239	458	101	89	22	22
S12	Bicarbonates		mg/L	373	413	318	36	13	13
	Chloride		mg/L	350	350	350		1	1
	Conductivity	(avg)	µmhos/cm	1289	1890	388	492	22	22
	Dissolved Oxygen	(avg)	mg/L	1	4	0	1	13	13
	Fluoride		mg/L	1	1	1		1	1
	Hardness		mg/L	116	179	49	47	15	15
	pH	(avg)		7	7	7	0	22	22
	Sulfate		mg/L	2	2	2		1	1
	Suspended	Solids	mg/L	33	44	11	19	3	8
	Temperature	(avg)	° F	56	66	49	4	22	22
	Total Dissolved Solids		mg/L	1040	1040	1040		1	1
	Turbidity		NTU	10	66	1	21	12	12
	Aluminum	(total)	µg/L	526	708	344	257	2	6
	Calcium	(dissolved)	µg/L	26800	26800	26800		1	1
	Calcium	(total)	µg/L	31900	31900	31900		1	1
	Chromium	(total)	µg/L	8	12	5	5	2	16
	Iron	(dissolved)	µg/L	21900	21900	21900		1	1
	Iron	(total)	µg/L	16675	25600	9210	4793	15	15
	Magnesium	(dissolved)	µg/L	22500	22500	22500		1	1
	Magnesium	(total)	µg/L	19500	19500	19500		1	1
	Manganese	(dissolved)	µg/L	1400	1400	1400		1	1
	Manganese	(total)	µg/L	1063	1480	524	370	15	15
	Selenium	(total)	µg/L	19	19	19		1	1
	Sodium	(dissolved)	µg/L	344000	344000	344000		1	1
	Sodium	(total)	µg/L	317000	317000	317000		1	1
	Zinc	(total)	µg/L	42	93	21	28	6	16
	(HPMO) Oxazolidinone		µg/L	108	220	43	55	13	16
	(OPMO) Oxazolidinone		µg/L	161	332	65	81	11	16
	1,1,1-Trichloroethane		µg/L	25	44	6	27	2	22
	1,1-Dichloroethane		µg/L	14	19	7	4	16	22
	cis 1,2-Dichloroethene		µg/L	36	124	5	29	20	22
	Methyl ethyl ketone		µg/L	41	61	21	28	2	22
	Trichloroethene		µg/L	17	67	5	15	15	22
	Chloroethene		µg/L	29	73	7	19	21	22
S13	Bicarbonates		mg/L	253	296	214	30	13	13
	Chloride		mg/L	18	18	18		1	1
	Conductivity	(avg)	µmhos/cm	725	1110	375	218	22	22
	Dissolved Oxygen	(avg)	mg/L	1	5	0	2	13	13
	Hardness		mg/L	118	150	87	18	15	15
	pH	(avg)		7	7	6	0	22	22
	Sulfate		mg/L	1	1	1		1	1
	Suspended	Solids	mg/L	86	100	73	9	8	8

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S13	Temperature	(avg)	° F	55	63	50	4	21	21
	Total Dissolved Solids		mg/L	322	322	322		1	1
	Turbidity		NTU	7	32	2	11	12	12
	Aluminum	(total)	µg/L	245	284	208	38	3	6
	Calcium	(dissolved)	µg/L	21700	21700	21700		1	1
	Calcium	(total)	µg/L	15000	15000	15000		1	1
	Iron	(dissolved)	µg/L	40800	40800	40800		1	1
	Iron	(total)	µg/L	31027	42100	20100	5764	15	15
	Magnesium	(dissolved)	µg/L	14000	14000	14000		1	1
	Magnesium	(total)	µg/L	11900	11900	11900		1	1
	Manganese	(dissolved)	µg/L	1750	1750	1750		1	1
	Manganese	(total)	µg/L	1530	2020	1010	265	15	15
	Selenium	(dissolved)	µg/L	14	14	14		1	1
	Selenium	(total)	µg/L	21	21	21		1	1
	Sodium	(dissolved)	µg/L	47600	47600	47600		1	1
	Sodium	(total)	µg/L	46100	46100	46100		1	1
	Zinc	(total)	µg/L	42	64	22	17	6	16
	(HPMO) Oxazolidinone		µg/L	37	46	29	7	5	16
	(OPMO) Oxazolidinone		µg/L	56	78	28	21	6	16
	1,1,1-Trichloroethane		µg/L	101	340	7	92	12	22
	1,1-Dichloroethane		µg/L	28	94	6	23	22	22
	1,1-Dichloroethene		µg/L	19	58	7	14	11	22
	cis 1,2-Dichloroethene		µg/L	464	1500	51	403	21	22
	Ethylbenzene		µg/L	5	5	5		1	22
	m,p-xylene		µg/L	6	6	6		1	22
	Tetrachloroethene		µg/L	8	12	5	4	3	22
	Toluene		µg/L	12	34	6	8	11	22
	Trichloroethene		µg/L	27	173	6	45	13	22
	Chloroethene		µg/L	66	109	33	20	21	22
S14	Bicarbonates		mg/L	328	350	297	17	13	13
	Chloride		mg/L	131	131	131		1	1
	Conductivity	(avg)	µmhos/cm	1375	1800	437	423	22	22
	Dissolved Oxygen (avg)		mg/L	2	6	0	2	13	13
	Fluoride		mg/L	3	3	3		1	1
	Hardness		mg/L	173	219	121	36	15	15
	pH	(avg)		7	7	7	0	22	22
	Sulfate		mg/L	92	92	92		1	1
	Suspended	Solids	mg/L	59	119	10	57	4	8
	Temperature	(avg)	° F	57	66	52	3	22	22
	Total Dissolved Solids		mg/L	814	814	814		1	1
	Turbidity		NTU	28	110	1	42	12	12
	Aluminum	(total)	µg/L	237	237	237		1	6
	Arsenic	(total)	µg/L	12	12	12		1	15
	Calcium	(dissolved)	µg/L	22100	22100	22100		1	1
	Calcium	(total)	µg/L	19100	19100	19100		1	1
	Chromium	(total)	µg/L	11	11	11		1	16
	Iron	(dissolved)	µg/L	31300	31300	31300		1	1
	Iron	(total)	µg/L	36620	46100	28100	5911	15	15
	Magnesium	(dissolved)	µg/L	15600	15600	15600		1	1
	Magnesium	(total)	µg/L	17700	17700	17700		1	1
	Manganese	(dissolved)	µg/L	1690	1690	1690		1	1
	Manganese	(total)	µg/L	1935	2410	1500	298	15	15
	Mercury	(dissolved)	µg/L	1	1	1		1	1
	Mercury	(total)	µg/L	1	1	1		1	1
	Selenium	(dissolved)	µg/L	15	15	15		1	1
	Selenium	(total)	µg/L	9	9	9		1	1

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S14	Sodium	(dissolved)	µg/L	153000	153000	153000		1	1
	Sodium	(total)	µg/L	195000	195000	195000		1	1
	Zinc	(dissolved)	µg/L	24	24	24		1	1
	Zinc	(total)	µg/L	27	29	24	4	2	16
	(HPMO)	Oxazolidinoı	µg/L	382	599	226	105	16	16
	(OPMO)	Oxazolidinoı	µg/L	802	1580	510	277	16	16
	Di-n-butylphthalate		µg/L	6	6	6		1	16
	1,1,1-Trichloroethane		µg/L	7	10	6	2	4	22
	1,1-Dichloroethane		µg/L	36	54	6	12	22	22
	Benzene		µg/L	6	6	5	1	2	22
	cis 1,2-Dichloroethene		µg/L	41	79	8	21	21	22
	Ethylbenzene		µg/L	11	16	5	4	7	22
	m,p-xylene		µg/L	8	9	7	1	2	22
	Methyl ethyl ketone		µg/L	81	126	36	64	2	22
	o-xylene		µg/L	7	7	6	1	2	22
	Chloroethene		µg/L	171	400	11	111	22	22
S15	Bicarbonates		mg/L	337	373	324	12	13	13
	Chloride		mg/L	663	663	663		1	1
	Conductivity	(avg)	µmhos/cm	1626	2620	321	639	22	22
	Dissolved Oxygen (avg)		mg/L	1	4	0	1	13	13
	Hardness		mg/L	183	298	106	72	15	15
	pH	(avg)		7	7	6	0	22	22
	Sulfate		mg/L	73	73	73		1	1
	Suspended	Solids	mg/L	65	75	30	15	8	8
	Temperature	(avg)	° F	57	65	51	4	22	22
	Total Dissolved Solids		mg/L	1500	1500	1500		1	1
	Turbidity		NTU	5	21	1	8	12	12
	Aluminum	(total)	µg/L	223	257	205	30	3	6
	Arsenic	(total)	µg/L	24	24	24		1	15
	Calcium	(dissolved)	µg/L	47100	47100	47100		1	1
	Calcium	(total)	µg/L	51700	51700	51700		1	1
	Chromium	(total)	µg/L	7	12	3	6	2	16
	Iron	(dissolved)	µg/L	73900	73900	73900		1	1
	Iron	(total)	µg/L	39713	64700	15400	16084	15	15
	Magnesium	(dissolved)	µg/L	44100	44100	44100		1	1
	Magnesium	(total)	µg/L	40900	40900	40900		1	1
	Manganese	(dissolved)	µg/L	2190	2190	2190		1	1
	Manganese	(total)	µg/L	1858	2860	778	686	15	15
	Mercury	(total)	µg/L	0	0	0		1	1
	Selenium	(dissolved)	µg/L	7	7	7		1	1
	Selenium	(total)	µg/L	42	42	42		1	1
	Sodium	(dissolved)	µg/L	432000	432000	432000		1	1
	Sodium	(total)	µg/L	458000	458000	458000		1	1
	Zinc	(dissolved)	µg/L	22	22	22		1	1
	Zinc	(total)	µg/L	221	421	23	199	3	16
	(HPMO)	Oxazolidinoı	µg/L	618	1100	200	221	16	16
	(OPMO)	Oxazolidinoı	µg/L	801	1360	141	314	16	16
	Di-n-butylphthalate		µg/L	7	7	7		1	16
	1,1-Dichloroethane		µg/L	27	200	6	44	18	22
	1,2,3-Trichlorobenzene		µg/L	30	30	30		1	22
	1,2,4-Trichlorobenzene		µg/L	24	24	24		1	22
	1,2-Dichloroethane		µg/L	12	12	12		1	22
	1,3,5-Trichlorobenzene		µg/L	19	19	19		1	22
	Benzene		µg/L	10	57	5	15	12	22
	Chloroethane		µg/L	12	14	10	1	10	22
	cis 1,2-Dichloroethene		µg/L	26	183	6	46	14	22

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S15	Ethylbenzene		µg/L	34	136	10	50	6	22
	m,p-xylene		µg/L	35	35	35		1	22
	Methyl ethyl ketone		µg/L	260	260	260		1	22
	Methylene Chloride		µg/L	5	5	5		1	22
	o-xylene		µg/L	18	18	18		1	22
	Toluene		µg/L	21	21	21		1	22
	Trichloroethene		µg/L	25	45	7	19	3	22
	Chloroethene		µg/L	31	100	3	27	12	22
Sector 2									
U1	Bicarbonates		mg/L	333	360	245	44	6	6
	Chloride		mg/L	203	203	203		1	1
	Conductivity	(avg)	µmhos/cm	1045	1460	595	178	44	44
	Dissolved Oxygen	(avg)	mg/L	1	3	0	1	12	12
	Hardness		mg/L	146	262	109	55	7	7
	pH	(avg)		7	8	7	0	44	44
	Sulfate		mg/L	72	72	72		1	1
	Suspended	Solids	mg/L	60	89	18	27	8	8
	Temperature	(avg)	° F	57	92	40	9	44	44
	Turbidity		NTU	6	19	1	7	11	11
	Aluminum	(dissolved)	µg/L	246	263	228	25	2	14
	Aluminum	(total)	µg/L	985	985	985		1	1
	Arsenic	(dissolved)	µg/L	854	1520	22	538	9	10
	Arsenic	(total)	µg/L	36	36	36		1	2
	Cadmium	(dissolved)	µg/L	5	5	5		2	14
	Calcium	(dissolved)	µg/L	32986	52600	18800	11837	14	14
	Calcium	(total)	µg/L	39500	39500	39500		1	1
	Chromium	(dissolved)	µg/L	10	10	10		3	14
	Iron	(dissolved)	µg/L	32007	43400	22400	7690	14	14
	Iron	(total)	µg/L	29250	29600	28900	495	2	2
	Magnesium	(dissolved)	µg/L	13895	21100	8000	4651	14	14
	Magnesium	(total)	µg/L	16600	16600	16600		1	1
	Manganese	(dissolved)	µg/L	2659	3560	1920	612	10	10
	Manganese	(total)	µg/L	2550	3010	2090	651	2	2
	Potassium	(dissolved)	µg/L	6580	8140	5780	1083	4	4
	Sodium	(dissolved)	µg/L	210143	244000	179000	22156	14	14
	Sodium	(total)	µg/L	211000	211000	211000		1	1
	Zinc	(dissolved)	µg/L	287	511	111	147	14	14
	Zinc	(total)	µg/L	280	693	72	358	3	4
	(HPMO) Oxazolidinone		µg/L	1138	2200	154	499	23	23
	(OPMO) Oxazolidinone		µg/L	4135	7530	2500	1148	23	23
	bis(2-Ethylhexyl)phthalate		µg/L	12	12	12		1	3
	1,1,1-Trichloroethane		µg/L	10	13	6	2	8	44
	1,1-Dichloroethane		µg/L	17	35	5	10	26	44
	1,1-Dichloroethene		µg/L	13	24	5	6	20	44
	1,3,5-Trichlorobenzene		µg/L	6	6	6		1	43
	Chloromethane		µg/L	14	14	14		1	43
	cis 1,2-Dichloroethene		µg/L	940	3150	6	936	38	44
	Tetrachloroethene		µg/L	17	32	5	10	18	44
	Toluene		µg/L	5	5	5		1	44
	trans 1,2-Dichloroethene		µg/L	21	42	5	12	20	44
	Trichloroethene		µg/L	356	1320	7	345	30	44
	Chloroethene		µg/L	389	2000	2	401	44	44
U2	Bicarbonates		mg/L	296	424	253	65	6	6
	Chloride		mg/L	181	181	181		1	1
	Conductivity	(avg)	µmhos/cm	849	1240	259	200	43	43

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
U2	Dissolved Oxygen (avg)		mg/L	1	6	0	2	12	12
	Hardness		mg/L	148	224	102	45	7	7
	pH	(avg)		7	7	7	0	43	43
	Sulfate		mg/L	14	14	14		1	1
	Suspended	Solids	mg/L	89	152	24	47	8	8
	Temperature	(avg)	° F	59	86	43	8	43	43
	Turbidity		NTU	25	174	0	53	11	11
	Aluminum	(total)	µg/L	843	843	843		1	1
	Arsenic	(dissolved)	µg/L	1661	2660	1000	614	7	10
	Cadmium	(dissolved)	µg/L	6	6	5	1	2	14
	Calcium	(dissolved)	µg/L	39843	53300	31200	7246	14	14
	Calcium	(total)	µg/L	36400	36400	36400		1	1
	Iron	(dissolved)	µg/L	56157	73600	44700	9426	14	14
	Iron	(total)	µg/L	41750	41900	41600	212	2	2
	Magnesium	(dissolved)	µg/L	20121	29300	14700	4448	14	14
	Magnesium	(total)	µg/L	25100	25100	25100		1	1
	Manganese	(dissolved)	µg/L	3045	3640	2490	387	10	10
	Manganese	(total)	µg/L	2325	2500	2150	247	2	2
	Potassium	(dissolved)	µg/L	5768	6970	5040	841	4	4
	Sodium	(dissolved)	µg/L	133286	205000	105000	27028	14	14
	Sodium	(total)	µg/L	166000	166000	166000		1	1
	Zinc	(dissolved)	µg/L	28	34	20	6	4	14
	Zinc	(total)	µg/L	30	34	25	6	2	4
	(HPMO) Oxazolidinone		µg/L	639	2100	104	449	23	23
	(OPMO) Oxazolidinone		µg/L	855	2990	126	586	23	23
	bis(2-Ethylhexyl)phthalate		µg/L	10	10	10		1	3
	1,1-Dichloroethane		µg/L	36	130	9	29	36	43
	1,1-Dichloroethene		µg/L	19	42	5	12	17	43
	Chloromethane		µg/L	13	13	13		1	42
	cis 1,2-Dichloroethene		µg/L	2052	6410	9	2351	35	43
	Methylene chloride		µg/L	6	6	6		1	43
	trans 1,2-Dichloroethene		µg/L	33	74	6	23	21	43
	Trichloroethene		µg/L	68	323	5	93	24	43
	Chloroethene		µg/L	730	1510	5	503	37	43
Sector 4									
S16	Bicarbonates		mg/L	246	356	126	92	6	6
	Chloride		mg/L	315	320	310	7	2	2
	Conductivity	(avg)	µmhos/cm	1199	1890	264	350	24	24
	Dissolved Oxygen (avg)		mg/L	2	7	0	2	15	15
	Hardness		mg/L	162	257	128	48	6	6
	pH	(avg)		7	7	6	0	24	24
	Sulfate		mg/L	9	12	7	4	2	2
	Suspended	Solids	mg/L	99	124	80	19	5	6
	Temperature	(avg)	° F	59	70	52	5	23	23
	Total Dissolved Solids		mg/L	886	1020	752	190	2	2
	Turbidity		NTU	22	110	1	33	13	13
	Arsenic	(total)	µg/L	14	14	14		1	8
	Calcium	(total)	µg/L	57500	59000	56000	2121	2	2
	Chromium	(total)	µg/L	17	26	10	7	5	22
	Iron	(total)	µg/L	46698	76200	285	24911	8	8
	Magnesium	(total)	µg/L	43500	44200	42800	990	2	2
	Manganese	(total)	µg/L	2193	4420	37	1421	8	8
	Mercury	(total)	µg/L	1	1	1		1	2
	Sodium	(total)	µg/L	112500	117000	108000	6364	2	2
	Zinc	(total)	µg/L	89	162	34	55	4	22
	(HPMO) Oxazolidinone		µg/L	158	250	28	96	7	9

Well	Constituent		Units	Mean	Maximum	Minimum	Standard Deviation	Number Detects	Number Samples
				Cumulative Results 1996-2007					
S16	(OPMO) Oxazolidinone		µg/L	654	1050	43	349	6	9
	1,1-Dichloroethane		µg/L	42	54	29	10	6	24
	Acetone		µg/L	95	95	95		1	23
	cis 1,2-Dichloroethene		µg/L	35	62	6	22	6	24
	Methyl ethyl ketone		µg/L	110	110	110		1	23
	Chloroethene		µg/L	227	360	110	103	6	24
S17	Bicarbonates		mg/L	240	357	106	104	6	6
	Chloride		mg/L	425	460	390	49	2	2
	Conductivity	(avg)	µmhos/cm	1061	1897	152	499	32	32
	Dissolved Oxygen	(avg)	mg/L	2	7	0	2	23	23
	Hardness		mg/L	149	237	73	56	6	6
	pH	(avg)		7	7	6	0	33	33
	Sulfate		mg/L	38	42	33	6	2	2
	Suspended	Solids	mg/L	111	282	7	102	6	6
	Temperature	(avg)	° F	60	70	52	5	32	32
	Total Dissolved Solids		mg/L	1049	1110	988	86	2	2
	Turbidity		NTU	77	368	2	117	20	20
	Arsenic	(total)	µg/L	13	16	11	3	3	8
	Calcium	(total)	µg/L	67400	70100	64700	3818	2	2
	Chromium	(total)	µg/L	21	35	12	7	9	30
	Iron	(total)	µg/L	66441	112000	3030	35534	8	8
	Magnesium	(total)	µg/L	41500	41700	41300	283	2	2
	Manganese	(total)	µg/L	2576	5250	110	1823	8	8
	Sodium	(total)	µg/L	195500	199000	192000	4950	2	2
	Zinc	(total)	µg/L	222	794	26	229	13	30
	(HPMO) Oxazolidinone		µg/L	170	289	74	100	4	8
	(OPMO) Oxazolidinone		µg/L	639	1210	162	442	4	9
	1,1-Dichloroethane		µg/L	30	56	5	22	5	32
	Acetone		µg/L	66	66	66		1	28
	cis 1,2-Dichloroethene		µg/L	18	53	5	17	7	32
	Methyl ethyl ketone		µg/L	61	61	61		1	28
	Tetrachloroethene		µg/L	10	10	10		1	32
	Chloroethene		µg/L	118	410	2	148	8	32

Table 5 is originally from the *2007 Annual Evaluation Western Processing*, Landau Associates.

APPENDICES

A1: Community Notification

A2: Site Inspection Report

A3: Interview Records

A4: Site Photographs

A1: Community Notification

Kent Reporter

January 30, 2008 • Kent Reporter

EPA to Review Cleanup at Western Processing Superfund Site Your Comments Invited Through April 30, 2008

The U.S. Environmental Protection Agency (EPA) is doing the fourth Five-Year Review of the Western Processing Superfund Site in Kent, Washington. EPA reviews cleanups at Superfund sites every five years, to make sure the remedy continues to protect people and the environment. In 1983, the Western Processing site was listed on EPA's National Priorities List of the nation's most contaminated hazardous waste sites. The 13-acre site is in the highly industrialized Kent Valley. Wastes from past electroplating and steel mill operations, among other activities, contaminated the site. Contaminants include volatile organic compounds, phenols, and heavy metals.

The cleanup at Western Processing was a combination of removing contaminated soil and sediment, controlling storm water, extracting and treating groundwater, and capping contaminated areas left in place. A slurry wall was built around the site to keep contaminants from moving from the more contaminated area of the site to the cleaner area. In the mid 1990s, a new extraction system was built within the slurry wall. The system is operated by a computer-controlled treatment facility.

EPA welcomes your participation. If you have information that may help with the review, or any concerns you would like to share about the site, call Chris Bellovary, EPA Project Manager **by April 30, 2008** at 800-424-4372, x2723, or e-mail: bellovary.chris@epa.gov. To learn more, visit www.epa.gov/r10earth/, click on *A to Z Subject Index*, then *W*, then *Western Processing*. *TTY users may call the Federal Relay Service at 800-877-8339 and give the operator Chris Bellovary's phone number.*

Postcard Notification

EPA to Review Cleanup at Western Processing Superfund Site Your Comments Invited Through April 30, 2008

The U.S. Environmental Protection Agency (EPA) is doing the fourth Five-Year Review of the Western Processing Superfund Site in Kent, Washington. EPA reviews cleanups at Superfund sites every five years, to make sure the remedy continues to protect people and the environment. In 1983, the Western Processing site was listed on EPA's National Priorities List of the nation's most contaminated hazardous waste sites. The 13-acre site is in the highly industrialized Kent Valley. Wastes from past electroplating and steel mill operations, among other activities, contaminated the site. Contaminants include volatile organic compounds, phenols, and heavy metals.

The cleanup at Western Processing was a combination of removing contaminated soil and sediment, controlling storm water, extracting and treating groundwater, and capping contaminated areas left in place. A slurry wall was built around the site to keep contaminants from moving from the more contaminated area of the site to the cleaner area. In the mid 1990s, a new extraction system was built within the slurry wall. The system is operated by a computer-controlled treatment facility.

EPA welcomes your participation. If you have any information that may help with the review, or concerns you would like to share about the site, call Chris Bellovary, EPA Project Manager **by April 30, 2008** at 800-424-4372, x2723, or e-mail: *bellovary.chris@epa.gov*

To learn more, visit ***http://www.epa.gov/r10earth/*** click on *A to Z Subject Index*, then *W*, then *Western Processing*.

TTY users may call the Federal Relay Service at 800-877-8339 and give the operator Chris Bellovary's phone number.

A2: **Site Inspection Checklist**

I. SITE INFORMATION	
Site name: Western Processing	**Date of inspection:** April 3, 2008
Location and Region: Kent, WA; R10	**EPA ID:** WAD0009487513
Agency, office, or company leading the five-year review: EPA Region 10	**Weather/temperature:** 47°F, 4 mph wind, Slightly overcast; shadows were distinct & visible.

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) April 3, 2008 (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) April 3, 2008 (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.

Agency City of Kent
Contact Mike Mactutis (Name) Environmental Engineering Manager (Title) Jan. 8, 2008 (Date)

Our discussion was in regards to a well that the City of Kent has that is located to the south of the site. This is a flow augmentation well for Mill Creek, but hasn't been used since the mid-1990s. Mr. Mactutis was familiar with the Western Processing site, and actively involved in meetings with the site when the 196th Street overpass was being constructed.

I provided Mr. Mactutis an overview of the current site status

Inspection Team:

Chris Bellovary	EPA Region 10, Remedial Project Manager	206-553-2723
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: A review of the maintenance log and inspection notebook displayed that maintenance logs are being maintained and that the inspections are being performed. The latest inspection data had not been transferred from the inspection book onto the official recording forms yet, but it was within the inspection book.

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: HAZWOPER 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 that I viewed were padlocked. None of the waste material remains on the 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.

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: Due to soil settling or other reasons, some of the fencing leans up to 15° off of vertical, but is intact and in place. There is a coyote hole dug under one spot on the fenceline, but it is too small for a person to use for access. I did note one area where there is a gap under the fence in which a person might be able to enter. (See § A4.) One of the gates at the detention pond would not open.

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) April 3, 2008 (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: Title to the property has not passed on to any heirs or successors of the estate at 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: During the period since the last five year review, there was one unsuccessful attempt to break into a truck. That is the only known incident of trespassing.	
2.	**Land use changes on site** ☒ N/A	
3.	**Land use changes off site** ☒ N/A Remarks: The City of Kent continues to evaluate the possibility of extending 72nd Avenue across the Western Processing site, but at this time there have not been any significant 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 viewed the many of the storm grates in Sector 1, a few discharge lines from the Sector 1 cap into East Drain (of which there are approximately 20-30, each of which was approximately 8" in diameter), overflow area from the detention pond, and the discharge line from the detention pond into Mill Creek. These were all clear of obstruction. There was a good amount of vegetative growth in the detention pond. Mr. Brown stated that he had recently cut back that area, and was amazed at how quickly it grows back in the spring months. Based on the color and thickness of this vegetation, it appeared reasonable that this was new growth as stated.	

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. There is a low area in Sector 4 which may indicate some settlement, as the area was graded back in 1999 to enhance drainage. However, if that is correct, the groundwater sampling in Sector 4 has not shown an adverse effect.
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: One small animal hole was noted in the surface soils. Ken Brown pointed this out and stated that he would take care of it. Only dirt was visible; no cobble was seen.

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: The ground east of S17 in Sector 4 appeared to be waterlogged, but not to a problematic amount. An estimate of that sector is approximately 200 square feet.

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 ☐ Evidence of leakage at penetration	☒ Functioning	☒ Routinely sampled ☐ Needs Maintenance	☒ Good condition ☐ 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 ☒ Vegetation does not impede flow	☐ N/A		
Areal extent_____	Type_____			
Remarks:	Vegetation was encroaching on some of the drainage grates, but upon viewing these, it appears this was relatively recent growth and that the sector 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 was kept clean, instruments and flow lines were properly labeled, walkways were kept clear. The control system, as explained by Wayne Schlappi and Ken Brown, appears to contain redundant safety mechanisms, including a battery backup to send an alarm via pager if the power is ever lost.

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: See note J.2 "Electrical Enclosures and Panels".

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

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

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. The remedy also calls for a pump and treat system to contain the trans plume. After a study showed the area to be an ideal site for monitored natural attenuation, the pump and treat system was turned off.

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, but none of these issues had the appearance of any sort of a long-term or recurring problem. Trust staff stated that they would take care of the 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 on site 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 data does not appear to contain indicators of a potential remedy problem.
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.

A3: Interview Records

Site Interviews
I spoke with Mr. Wayne Schlappi (Western Processing Trust Fund), Mr. Ken Brown (Shaw Environmental), Mr. Bill Enkeboll (Laundau Associates) and Ms. Christine Kimmel (Laundau Associates) on April 3, 2008 at the Western Processing Superfund site.

Water Issues
I stated that I had recently looked at flood plain maps in the area, and although most of the site is in the 500 year flood plain, some areas of the site fell within the 100 year flood plain. I asked if the site has ever had any problems with flooding, and if so, what occurred. Mr. Schlappi stated that although the water level in Mill Creek has gotten very high during the spring of some years to the point of almost filling the culvert that the creek flows through, they have not experienced any problems with flooding on site. Mr. Brown stated that in the beginning (of their management of the site), the detention basin used to fill to the overflow spillway, but that has not happened in a long time.

I asked if they have ever had a situation where heavy rainfall has overwhelmed the drainage system for the cap. Mr. Schlappi stated that they have not. He stated that they inspect the drains from the cap regularly, that Ken Brown removes any Scotch Broom that appears, and that neither of them have seen any erosion control issues. Mr. Schlappi stated that of the stormwater off the cap, some is discharged to Mill Creek, some is discharged to East Drain, but the majority is discharged into the detention pond to the north of Sector 4. I did observe some Scotch Broom that was present in Sector 4; it was several feet high but the base was not very thick in diameter, which indicates that it was probably relatively new growth.

I stated that I understood that water discharged from the water treatment building lead to the local sewer system; Mr. Schlappi confirmed that was correct. I asked where water discharges from the office building lead, and Mr. Schlappi confirmed that those discharges also go to the sewer system.

Treatment Center
I asked to see the operating permits to ensure that they were kept on site. Mr. Schlappi provided me with a binder that contained the operating permits, which I looked through to verify. Mr. Schlappi stated that they are inspected once a year by the Clean Air Agency to ensure they are in compliance with their operating permit.

Site Security
I asked Mr. Schlappi if they kept a log of people who access the site. Mr. Schlappi stated that they do not, but that the fence requires either one of their electronic openers or a key code to enter, and they maintain access control over the site using those methods.

Operations and Maintenance
At the time of the inspection, one of the Trust's electrical contractors showed up at the control room. Messrs. Schlappi and Brown described how the electrical connections are checked for faults using an IR camera, because heat will be generated where there is a problem with the connection. According to Mr. Schlappi, this allows them to detect problems before they would otherwise be visible.

I asked to see a copy of their on site daily O&M log. Mr. Brown showed me a copy of the official records. He stated that they copy the data from their field inspection notebook onto the official record forms, that the latest inspections were not in the official record book yet, but that it was possible that he had submitted those for review and merely not received them back to place in the binder yet. I asked to see the field inspection notebook, and this was present right next to the O&M binder. I did not perform an in depth verification at that time, but I did review some records from each book. It appears that between the two books, all of the inspection data is present, and that it is also possible to verify the official records against the field inspection notebook.

Mr. Brown stated that for the water treatment center, they log the instrumentation, chemical use, and carbon use; he also stated that after the 2001 earthquake, they pressure tested the entire system. Mr. Brown stated that they have alarms, both local and remove, for smoke, building access, high level sump (both for the building and for the vaults), chemical feed system, and for the blower. Mr. Brown stated that they have dual pumps (one online, one as a full spare) and that they compare the total flow rates of what leaves all of the individual pumps with what arrives at the building as another method of verifying that they have no leaks in the system.

Mr. Brown stated that on their discharge, they get an alarm, both local and remote; if the pH ever drops below 6.0 and that the system shuts down if the effluent pH drops to 5.2. That shutdown point is to ensure that they do not violate their King County discharge authorization. Mr. Brown stated that they have a battery backup for the entire system, including the paging system, in case of power loss; he also showed me the containment sump to collect any spilled liquids. Mr. Brown stated that they currently change out the trays on the stripper around every eight weeks: it takes around 2 hours to change out a tray, 2 hours for flush the line and adjust the belt tension, and that the system is down for a total of 3 hours during each changeout.

Ms. Kimmel stated that they test the carbon filters once a month using a Summa canister, and they cycle these when they are seeing a 25% breakthrough from the lead carbon filter.

Mr. Brown showed us the Pig that he stated they use to shoot through the line to remove iron and scale. They have a Y in a well header within the building to inject the pig, and they collect it on the exit side outside.

Mr. Schlappi stated that they now only use wells 16 and 17 for sampling; those were only used for a few years, and Wayne stated that they received permission from the governments to stop using those wells for extraction because they were continuously becoming fouled with iron. Mr. Schlappi stated that they manually check the piezometers, on a monthly basis for the variable ones and on a quarterly basis for the stable ones.

Other Issues
When we were crossing under the bridge, moving from Sector 1 to Sector 4, Mr. Enkeboll described some of the work that was done when the 196th St. overpass was put in place. He stated that it was an interesting design, because in order to ensure the contaminants did not migrate, the bridge foundations were not allowed to breach the aquitard.

<u>Telephone Interviews</u>
I spoke with Mr. Mactutis, the Environmental Engineering Manager for the City of Kent, over the telephone on January 7 and February 25 of 2008. The main purpose for our conversation was because during a review of well logs around the Western Processing Superfund site, I noticed that the City of Kent owned a well around 1 half mile south of the site and I wanted to find out more information about this well. Mr. Mactutis informed me that in the mid to late 1990s, the city drilled a number of wells to be able to provide flow augmentation for Mill Creek. This well has not been used since the late 1990s and that the City has no current plans to use that particular well again in the future.

Mr. Mactutis was knowledgeable about the Western Processing Superfund site, and used to attend weekly meetings for the site at the time that the South 196th Street overpass was being constructed. I gave him a summary of the site, and answered some of his questions in regards to the slurry wall breach in Sector 4 and the upset condition that occurred in March 2007. I also informed Mr. Mactutis about the upcoming Five Year Review for the Western Processing site.

A4: Site Photographs

Photo 1: The entrance sign at the approach to the site.[38]

Photo 2: Immediately outside of the entrance. The gate was opened just prior to taking this photo to provide a better view of the road and the water treatment building. Sector 1 is behind the fence.

[38] The phone numbers on the Regulating Authorities sign were for previous EPA and WDOE project managers. The Trust was notified of this and the sign was corrected before the June 26, 2008 meeting at the Western Processing site. The correct contact numbers are 206-553-0247 for EPA and 360-407-7223 for WDOE.

Photo 3: This photo was taken on top of the RCRA cap, looking north. One of the storm drains for the RCRA cap (center) is visible as is one of the extraction vaults (right center). The storm drain was kept clear of overgrowth. The water treatment building and the South 196th Street bridge are both visible in the background.

Photo 4: A view inside one of the extraction vaults.

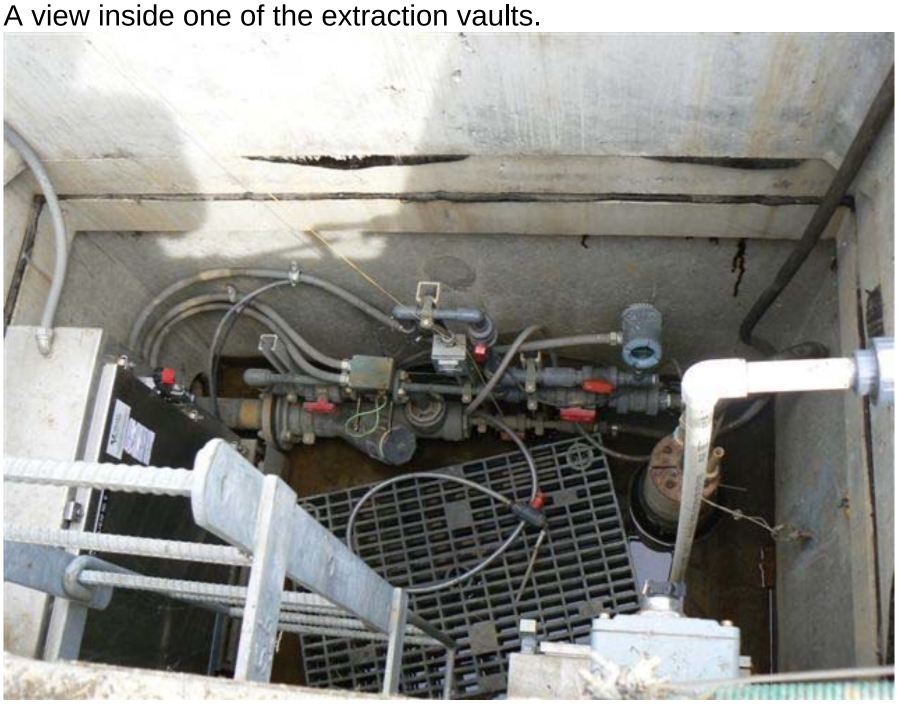


Photo 5: The water treatment plant (manifold, air striper, blower).

Photo 6: VOCs are removed from the stripper air by carbon filters (shown in blue). The carbon in the carbon filters is eventually disposed of in a hazardous waste landfill.

Photo 7: The SCADA system has a number of graphic display screens to enable real-time monitoring and control of the extraction and treatment systems. Shown below is the water treatment system display screen.

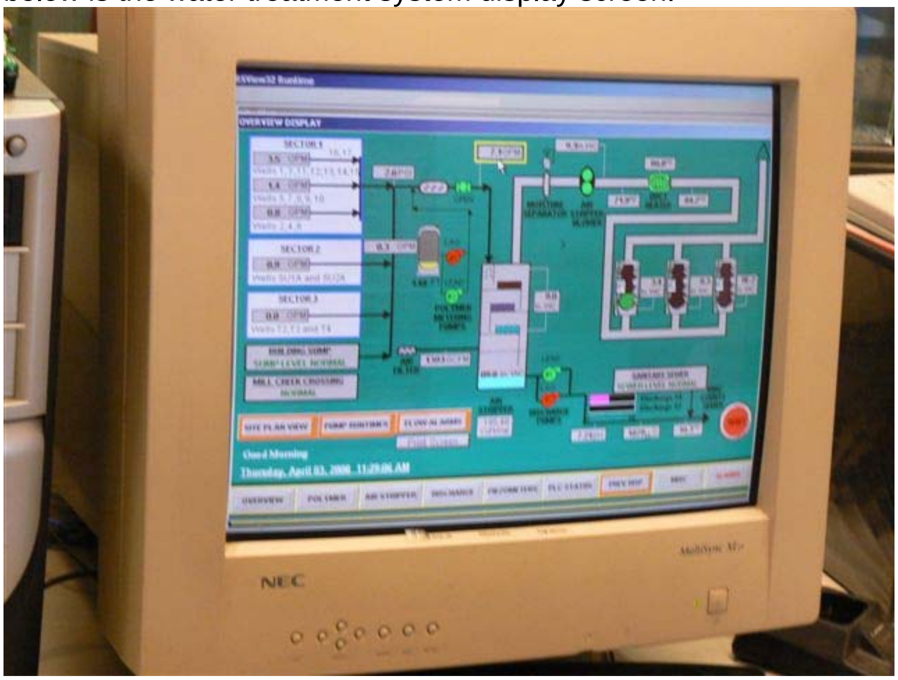


Photo 8: A view of the Sector 1 RCRA cap from the water treatment building.

Photo 9: Interurban trail and the 196th Street overpass. This view is towards the north. Sector 1 is on the left side of the fence line.

Photo 10: A storm drain in Sector 1 for the RCRA cap. The vegetation seen in this photo is in the foreground; the drain was clear of any overgrowth. The fence does not reach the ground at this location, but the reinforcement line near the bottom would still make access to the site rather difficult.

Photos 11: A view of the detention area, facing north from Sector 4.

Photos 12: A view of the detention area, from within the fence.

Photo 13: The design overflow from the detention area leads to Mill Creek.

Photo 14: Mill Creek, looking north from the edge of Sector 4.

Photo 15: Mill Creek, west of the detention area. A depth gauge is visible in the center.

Photo 16: A view of East Drain, facing south-southeast.