Five-Year Review Report

Second Five-Year Review Report

for

Tacoma Tar Pits Operable Unit (Operable Unit 23)

Commencement Bay Nearshore/Tideflats Superfund Site

EPA ID: WAD980723795

Tacoma

Pierce County, Washington

September 2003

PREPARED BY:

United States Environmental Protection Agency
Region 10
Seattle, Washington

Approved by: Date:

__________/s/_________________ ____________________________

Michael F. Gearheard
Director, Environmental Cleanup Office
U.S. EPA, Region 10

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Tacoma Tar Pits		
EPA ID *(from WasteLAN)*: WAD980723795		
Region: 10	**State:** WA	**City/County:** Tacoma/Pierce
SITE STATUS		
NPL status: Site is Part of NPL Site		
Remediation status (choose all that apply): ☐Under Construction ☑ Operating ☐Complete		
Multiple OUs?* ☐YES ☑NO	**Construction completion date:** 7/26/1995	
Has site been put into reuse? ☑YES ☐NO (Partial reuse)		
REVIEW STATUS		
Lead agency: : ☑EPA ☐State ☐Tribe ☐Other Federal Agency		
Author name: Lee Marshall		
Author title: Remedial Project Manager	**Author affiliation:** U.S. EPA, Region 10	
Review period: 07/01/2003 to 9/15/2003		
Date(s) of site inspection: July 24, 2003		
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 (specify)		
Triggering action: ☐Actual RA On-site Construction at OU #___ ☐Actual RA Start at OU# NA ☐Construction Completion ☑Previous Five-Year Review Report ☐Other (specify)		
Triggering action date *(from WasteLAN)*: 09/1998		
Due date *(five years after triggering action date)*: 09/2003		

Five-Year Review Summary Form, cont'd.

Issues:
1) Effectiveness of groundwater extraction and treatment system remains unproven.
2) Benzene concentrations in offsite well TTP-14M (TTP-18M Area) are on an increasing trend.
3) A small pavement failure has occurred in the road accessing the top of the stabilized waste pile.
4) Vegetation is growing in surface water drainage channels.

Recommendations and Follow-up Actions:
1) Effectiveness of the groundwater extraction and treatment system: Continue (a) operating and optimizing groundwater treatment/extraction system and (b) monitoring groundwater and hydraulic capture on quarterly basis.
2) Increasing benzene concentrations at well TTP-14M: Continue monitoring. Additional investigations and/or groundwater extraction should be initiated by 6/30/04 if the increase in benzene concentrations continues.
3) Pavement failure: Repair before the rainy season begins (e.g., November 2003).
4) Vegetation is growing in the surface water drainage channels: Assess during the next annual inspection and follow-up with maintenance if needed.

Protectiveness Statement(s):
The remedy for the Tacoma Tar Pits site protects human health and the environment in the short term. Groundwater contaminated with benzene continues to extend offsite as identified in the previous five-year review report. Groundwater contamination does not currently present a threat to human health and the environment because shallow groundwater is not (1) used for any purpose in the vicinity of the site or (2) discharging into local surface water bodies (e.g., Puyallup River) where it could potentially impact ecological receptors. Operation and maintenance of the initial remedy components, plus continued operation and optimization of the groundwater extraction and treatment system for an undetermined period of time, will be required in order for the remedy to be protective in the long term.

Other Comments:
The groundwater extraction and treatment system has only been operating since late 2002. As such, it is premature to come to a conclusion about the effectiveness of the system. Groundwater quality and hydraulic capture in the extraction areas need to be monitored closely and the system optimized as appropriate.

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Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criteria
BCIS	U.S. Bureau of Citizenship and Immigration Services
BMP	Batch Mix Plant
BNSF	Burlington Northern Santa Fe Railroad
BTEX	benzene, toluene, ethylbenzene, and xylenes
CBNT	Commencement Bay Nearshore/Tideflats
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act
DOF	Dalton, Olmsted & Fuglevand, Inc.
EPA	U.S. Environmental Protection Agency
Ecology	Washington State Department of Ecology
EHW	Extremely Hazardous Waste
ESD	Explanation of Significant Difference
GCL	Geosynthetic Clay Liner
gpm	gallons per minute
HDPE	High-Density Polyethylene
JS&S	Joseph Simon & Sons
MCL	Maximum Contaminant Level
MGP	Manufactured Gas Plant
MTCA	Model Toxics Control Act
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit

PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
POTW	Publicly Operated Treatment Works
PSE	Puget Sound Energy
PRP	Potentially Responsible Party
PVC	Polyvinyl Chloride
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SDWA	Safe Drinking Water Act
UPRR	Union Pacific Railroad
WNG	Washington Natural Gas Company

Executive Summary

This report presents the findings of the second five-year review performed for the Tacoma Tar Pits Operable Unit of the Commencement Bay Nearshore/Tideflats Superfund Site in Tacoma, Washington. The five-year review was conducted to determine if threats to human health and the environment are being addressed through implementation of the selected remedy.

The five-year review was conducted in accordance with the U.S. Environmental Protection Agency (EPA) *Comprehensive Five-Year Review Guidance* (U.S. EPA, 2001) and included the following:

- Review of site data to evaluate compliance with the performance standards specified by the Record of Decision (ROD).
- A site inspection to confirm that the remedy is operating and being maintained consistent with the ROD and RD objectives.
- Interviews with site stakeholders to obtain their appraisal of how the remedy is performing and to identify concerns or suggestions that EPA may not otherwise be aware of.
- Review of federal and state regulations promulgated since the last five-year review that could affect the remedy's overall protectiveness with respect to performance standards specified in the ROD.

The initial remedial action (RA) for the site was completed in 1995 and included stabilization and capping of contaminated soils and institutional controls. The possibility of a remedy component specific to groundwater was anticipated by the ROD in the event that the initial RA did not adequately control the migration of contaminated groundwater. The need for active groundwater remediation was identified in the previous five-year review completed in 1998. As a result, a groundwater extraction and treatment system was subsequently designed and became fully operational in late 2002.

The results of this five-year review indicate that the remedy for the Tacoma Tar Pits site protects human health and the environment in the short-term. Groundwater contaminated with benzene continues to extend offsite, as identified in the previous five-year review. Currently, groundwater contamination does not present a threat to human health and the environment because shallow groundwater is not (1) used for any purpose in the vicinity of the site or (2) discharging into local surface water bodies (e.g., Puyallup River) where it could potentially impact ecological receptors. Operation and maintenance of the initial remedy components, plus continued operation and optimization of the groundwater extraction and treatment system for an undetermined period of time, will be required in order for the remedy to be protective in the long term.

The next five-year review will be completed by September 2008.

1. Introduction

The U.S. Environmental Projection Agency (EPA) has conducted a five-year review addressing the effectiveness of the remedial actions (RAs) that have been completed for, and are in progress at, the Tacoma Tar Pits site. The Tacoma Tar Pits site is Operable Unit (OU) 23 of the Commencement Bay Nearshore/Tideflats Superfund Site in Tacoma, Washington. The EPA site ID No. for the Tacoma Tar Pits site is WAD980723795. The Tacoma Tar Pits site has been treated as a separate site throughout the overall remedial process for the Commencement Bay Nearshore/Tideflats Superfund Site. Therefore, a separate five-year report has been prepared for this OU. The five-year review was conducted in accordance with § 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP), 40 CFR § 300.430(f)(4)(ii).

The five-year review is required by CERCLA and the NCP because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. The purpose of this five-year review is to assess if the completed and ongoing RAs are protective of human health and the environment and are functioning as designed.

This is the second five-year review for the Tacoma Tar Pits site. The first five-year review report was completed on September 27, 1998.

This five-year review was conducted by EPA Region 10 staff with the assistance of CH2M HILL under EPA Contract No. 69-W-98-228.

2. Site Chronology

Table 2-1 summarizes the chronology of the events for the Tacoma Tar Pits site.

TABLE 2-1
Site Chronology
Tacoma Tar Pits Site, Tacoma, WA

Activity/Event	Date
Coal gasification plant operating at the site[a]	1924 to 1956
Meat packing plant operating at the site[b]	Early 1900s to 1980s (?)
Coal gasification plant facilities dismantled	1965 to 1966
Metal recycling company operating at the site[c]	1967 to present
An evaluation of the Commencement Bay Nearshore/Tideflats (CBNT) area by EPA and a site inspection by the Washington State Department of Ecology (Ecology) identifies oil runoff and waste ponds	1981
EPA Field Investigation Team performs a Potential Hazardous Waste Preliminary Assessment	1981
CBNT site placed on the National Priorities List (NPL); the Tacoma Tar Pits site is an operable unit of the CBNT site	09/08/1983
A group of potentially responsible parties (PRPs) conduct a preliminary investigation	1983
EPA contractor prepares a Remedial Investigation/Feasibility Study (RI/FS) work plan	1983
EPA contractor initiates a RI	1984
PRPs agree to conduct a RI/FS	1984
RI/FS and risk assessment completed by the PRPs	1987
EPA issues a Record of Decision (ROD) for the site calling for excavation and stabilization of site wastes	12/30/1987
Administrative Order (EPA Docket No. 1088-09-35-106) issued by EPA to Washington Natural Gas Company (WNG) and Joseph Simon & Sons (JS&S) for implementation of response actions at the Tacoma Tar Pits site, including treatability studies, remedial design (RD), and remedial action (RA)[d]	09/1988
WNG contractors complete post-RI "extent of contamination" study and bench- and pilot-scale treatability studies	1988 to 1991
Consent Decree (No. C89-155TB) between EPA and WNG provides for WNG to take responsibility for the RD and implement the RA[e]	10/1991
EPA issues an Explanation of Significant Difference (ESD) reflecting an expansion of the remediation area and volume of material compared to what the 1987 ROD had anticipated	11/01/1991
WNG contractors conducts a multiphase RD (some RD work overlaps with the RA initiated in 1992 as described below)	1991 to 1994

TABLE 2-1
Site Chronology
Tacoma Tar Pits Site, Tacoma, WA

Activity/Event	Date
RA activities initiated	05/1992
EPA issues a second ESD addressing remedy revisions triggered by field conditions encountered during remediation (the ESD addressed modifications to treatability mixes, covers, schedule, and an increase in the volume of waste material to be excavated and treated)	05/09/1995
RA substantially complete	12/1994
Final RA inspection	07/26/1995
Post-RA water quality monitoring and operation/maintenance activities	1995 to present
EPA issues the first five-year review report	09/27/1998
EPA directs Puget Sound Energy (PSE) to design and install a groundwater extraction and treatment system to address benzene concentrations in groundwater that continue to exceed the ROD cleanup criteria[f]	10/02/1998
PSE prepares conceptual and final designs for a groundwater extraction and treatment system to be installed at the south and northwest sides of the site	2000 to 2001
PSE constructs and tests the groundwater extraction and treatment system	2001 to 2002
Groundwater extraction and treatment system operational	09/2002
EPA issues the second five-year review report (this document)	09/2003

[a]Operators included Washington Gas and Electric Company and WNG.

[b]Operators included Carstens Packing and Hygrade.

[c]Operated by JS&S.

[d]Amendments to this Administrative Order were issued by EPA in October 1998, December 1988, and June 1989.

[e]The 1991 Consent Decree included a document titled *Framework for Remediation* (Dalton, Olmsted & Fuglevand, Inc. [DOF], 1991) that formed the basis for the Statement of Work that WNG was required to implement. The document outlined the performance criteria and other information used to prepare and implement the RD.

[f]PSE was created in February 1997 through a merger of Washington Energy Company (parent of WNG) and Puget Sound Power & Light Company. The implementation of a groundwater extraction and treatment system was specifically anticipated by the 1987 ROD in the event that groundwater cleanup levels were not achieved at the site boundary within 2 years after completion of the RA.

3. Background

Section 3 presents a brief overview of the Tacoma Tar Pits site including a physical description, discovery and contamination history, and investigations leading up to the remedy selection. Information related to selection and implementation of the remedy, including subsequent operations and maintenance, is provided in Section 4. Information related to the current remedy functionality and overall protectiveness is addressed in Sections 7 and 10, respectively.

3.1 Physical Characteristics

This section describes the Tacoma Tar Pits site's physical characteristics including geographic information and a description of the hydrogeologic and hydrologic conditions at the site.

3.1.1 Site Location

The Tacoma Tar Pits site is an OU of the Commencement Bay-Nearshore/Tideflats Superfund site in Tacoma, Washington. The site is located within the Tacoma Tideflats industrial area near Commencement Bay. Specifically the site is located between the Puyallup River and the Thea Foss Waterway, approximately three-quarters of a mile north of Interstate 5 (see Figure 3-1). The site comprises approximately 52 acres and is bounded by the Union Pacific and Burlington Northern/Santa Fe (BNSF) railroad tracks on the northeast and southwest, respectively; the site of a former meat packing plant on the north; and a natural gas regulating station and cardlock service station on the southeast.

An active metal recycling business (Joseph Simon & Sons or JS&S) currently occupies approximately 9 acres of the southeast area of the site. The remainder of the site is occupied by an engineered and covered waste pile containing stabilized soils and wastes from the RA, two lined detention ponds, and light industrial buildings. Figure 3-2 shows these onsite buildings and features.

3.1.2 Hydrogeology

The Tacoma Tar Pits site is located in the Puyallup River delta. The site is underlain by a layered sequence of unconsolidated silts and sands. Of these materials, the upper several feet represents hydraulic fill material from past dredging of nearby waterways. With the exception of the 30- to 40-foot-high waste pile that holds stabilized waste material excavated from the site during the RA, the onsite topographic relief is nearly flat.

The Fill Aquifer is the uppermost aquifer at the site and consists predominantly of hydraulic fill materials placed during historical dredging of nearby waterways. The Fill Aquifer is typically just a few feet thick. Fine-grained native deltaic deposits are present below the Fill Aquifer and act as an aquitard that separates the Fill Aquifer from the lower Sand Aquifer. The Sand Aquifer consists of native fine- to medium-grained sand

and is typically in the range of 5 to 10 feet thick. The Sand Aquifer is underlain by a discontinuous fine-grained unit known as the Lower Aquitard. The Lower Aquitard is underlain by the Lower Aquifer. The Lower Aquifer is composed of interbedded sand and sand with gravel with discontinuous zones of silt, clay, and silty sand.

Groundwater occurs several feet below ground surface at the Tacoma Tar Pits site. The groundwater levels at the site vary in response to the tidal action in Commencement Bay and adjacent waterways. In addition, groundwater levels vary seasonally. Groundwater levels are highest in the wet winter months and lowest in the drier summer months. Groundwater flow directions vary depending on location, season, and tide stage. In general however, groundwater typically flows east (northwest and central potions of the site) and south (southeast portion of the site). A groundwater extraction system installed at the site in 2002 provides localized control over groundwater flow (see Section 4 for additional discussion on the groundwater extraction system).

A deep aquifer (greater than 400 feet deep) is know to exist below the site. Previous studies conducted at the site indicate that upward vertical hydraulic gradients between the deeper and above-referenced shallow aquifers inhibit downward migration of contaminants from the shallow aquifers to the deep aquifer.

3.1.3 Surface Water Hydrology

Two stormwater drainage systems were installed as part of the remedial activities at the Tacoma Tar Pits site. One system drains the waste pile and surrounding areas and the other drains the JS&S metal recycling facility. These systems consist of a series of collection facilities, which ultimately route water through detention basins and into a ditch that parallels the BNSF rail tracks on the southwest side of the site (see "Burlington Northern Ditch" on Figure 3-2). Restricting orifices and detention basins were installed during the RA to manage stormwater discharge to offsite areas. The detention basins were designed to handle a 25-year return period storm. Additional details regarding the two stormwater systems are provided below.

Waste Pile Drainage System

The waste pile drainage system collects stormwater originating from the covered stabilized waste pile. Drainage from the pile is collected by box culverts placed at the toe of the pile slopes. The bottoms of the box culverts are sloped to direct stormwater flow to Detention Basin No. 1 via a buried culvert (north side) and asphalt-lined ditch (south side). Water that collects in Detention Basin No. 1 (see Figure 3-2) flows into the Burlington Northern ditch via a control manhole equipped with a restricting orifice (maximum 0.5 cubic feet per second).

Metal Recycling Drainage System

The metal recycling drainage system is separate from the waste pile drainage system. It was installed specifically to accommodate stormwater runoff from the JS&S metal recycling facility. The system consists of a series of catch basins and buried pipes that direct flow to a control manhole located near the southeast corner of detention basin No. 2 (see Figure 3-2). The flow is controlled by a restricting orifice (maximum 1.0 cubic feet per second) and ultimately directed into the Burlington Northern ditch.

Stormwater Treatment and Discharge

In August 1992, a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Substantive Requirements permit for offsite discharge of construction-related stormwater collected during remedial construction activities was issued by Ecology. A temporary treatment plant was constructed and operated to treat stormwater runoff during the RA time-frame. Testing of the plant occurred in March 1993 and the first discharge of treated water occurred in June after approval was received from the City of Tacoma. For most of the remedial construction period, water was treated in batches and stored in a detention basin or modular tank. Water was discharged to the Burlington Northern ditch after an analysis of a sample of the treated water indicated that the permit discharge limits had been met.

In August 1994 when the RA construction activities were nearly complete, EPA approved direct discharge of treated construction-related water to the Burlington Northern ditch. This change was made based on operational experience and the reduced strength of the water being treated (water was generally from paved or covered areas that had been remediated).

Direct discharge of stormwater from the detention ponds to the Burlington Northern ditch has continued to the present. Stormwater collected from the JS&S site is currently treated by an oil/water separator before being discharged through Detention Basin No. 2. Stormwater runoff from the paved surfaces outside of the JS&S area is not treated and is discharged to the Burlington Northern ditch through Detention Basin No. 1. Surface water samples, representing water discharged through both detention basins, are collected quarterly from the Burlington Northern ditch by PSE (see Section 4.4.1).

3.2 Land and Resource Use

The Tacoma Tar Pits site and surrounding area is located within the city limits of Tacoma, Washington, in the industrialized tideflats area where the Puyallup River discharges into Commencement Bay on Puget Sound. The site and adjacent properties are zoned as "PMI - Port Maritime Industrial." Other zoning in the immediate area includes "M2 - Heavy Industrial" and various shoreline zoning designations (e.g., properties adjacent to the Puyallup River and Thea Foss Waterway.

The Tacoma Tar Pits site is currently occupied by the businesses or features listed below. Figure 3-3 shows their locations.

- JS&S metal recycling business—JS&S operates a metal recycling business on approximately 9 acres in the southeast portion of the site.
- Former Hygrade meat packing plant—A former meat packing plant operated by Hygrade was present in the northwestern portion of the property until the late 1990s. The plant was demolished several years ago and the site was vacant until recently. In mid-2003, work began on a U.S. Bureau of Citizenship and Immigration

Services (BCIS)[1] detention facility. Additional information on this facility is provided in Section 5.3.

- KML Corporation—KML Corporation occupies a structure at the north end of the site in an area that did not require remediation. The structure fronts to St. Paul Avenue.
- BNSF and Union Pacific Railroad (UPRR) rail lines—BNSF and UPRR operate rail tracks and facilities on the southwest and northeast sides of the site, respectively.
- Cardlock fueling station—A cardlock fueling station is present east of River Street at the extreme southeast end of the site.
- PSE natural gas regulating station—PSE operates a small natural gas regulating station in the southeast end of the site.
- Groundwater treatment plant—A small groundwater treatment plant is located immediately northwest of Detention Basin No. 1 (groundwater extraction and treatment operations are discussed in Section 4).
- Stabilized waste pile and stormwater drainage features—A 30- to 40-foot-high waste pile with a footprint of approximately 8 acres is located in the center of the site. The pile contains waste that was chemically and physically stabilized during the RA. The pile is covered with synthetic and vegetative covers to minimize infiltration. Stormwater features include various ditches and culverts that drain into detention basins Nos. 1 and 2. Each of these detention basis are approximately 1 acre in size.

Shallow groundwater in the vicinity of the site is not used for drinking water purposes and it is unlikely that wells will be installed in the future because of the industrial nature of the area and the availability of municipal water. The deep aquifer (deeper than 400 feet) addressed in Section 3.1.2 is tapped by a well on the former Hygrade property. Groundwater from this well is tested annually and does not indicate the presence of contamination. As discussed in Section 3.1.2, upward hydraulic vertical gradients between this deep aquifer and the shallow aquifers at the site inhibit downward migration of contaminants.

3.3 History of Contamination

Imported or dredge fills were placed in the vicinity of the site in the early 1900s to provide foundation support for structures associated with a meat packing plant, a bulk fuel storage facility, and railroad tracks. Starting in 1924, a manufactured coal gasification plant (manufactured gas plant [MGP]) operated on the eastern portion of the site. The MGP operated on the site through 1956 and the facilities were demolished in 1966. Waste materials remaining onsite from MGP operations included waste materials such as coal ash, coal tar liquor, and coal tar solids and semisolids. These waste material were either buried at shallow depths or disposed of in onsite ponds.

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[1] BCIS, formerly known as the U.S. Immigration and Naturalization Service or INS, became part of the U.S. Department of Homeland Security in March 2003.

Starting in 1967, the site was used for metal recycling operations by JS&S. As part of construction and operation of the metal recycling facilities, a variety of new fills were placed in a generally southerly and westerly direction. The fill materials included metal debris, soil, and shredded car interiors ("auto fluff"). During the early operational history of the recycling facility, metals predominantly from automobiles and electrical transformers were recycled. Recycling of transformers led to the release of oils containing polychlorinated biphenyls (PCBs). The auto fluff used as fill also contained PCBs as well as heavy metals. The metal recycling operations are still ongoing at the site, but auto fluff and other materials containing PCBs are no longer being recycled or handled at the site.

3.4 Initial Response

EPA analyzed aerial photographs in 1981 as part of an overall evaluation of the Commencement Bay-Tideflats area. This analysis indicated the presence of ponds at the Tacoma Tar Pits site that potentially contained waste materials from the MGP. Also in 1981, Ecology conducted a site inspection and noted oil runoff into one of the onsite ponds and the presence of auto fluff in onsite fills.

As a follow-up to the work completed by EPA and Ecology in 1981, an EPA Field Investigation Team conducted a perimeter inspection of the Tacoma Tar Pits site. Based on information collected during the inspection and other background data, a Potential Hazardous Waste Preliminary Assessment concluded that the site represented a potential hazard to the environment through contamination of surface water.

At the request of EPA, the property owners (Burlington Northern Railroad Company; JS&S, Inc.; and the Hygrade Food Products Corporation) conducted a preliminary investigation. A draft report was issued in May 1983. The reported indicated that tar (a by-product of the coal gasification process), PCBs, and lead were present on the site.

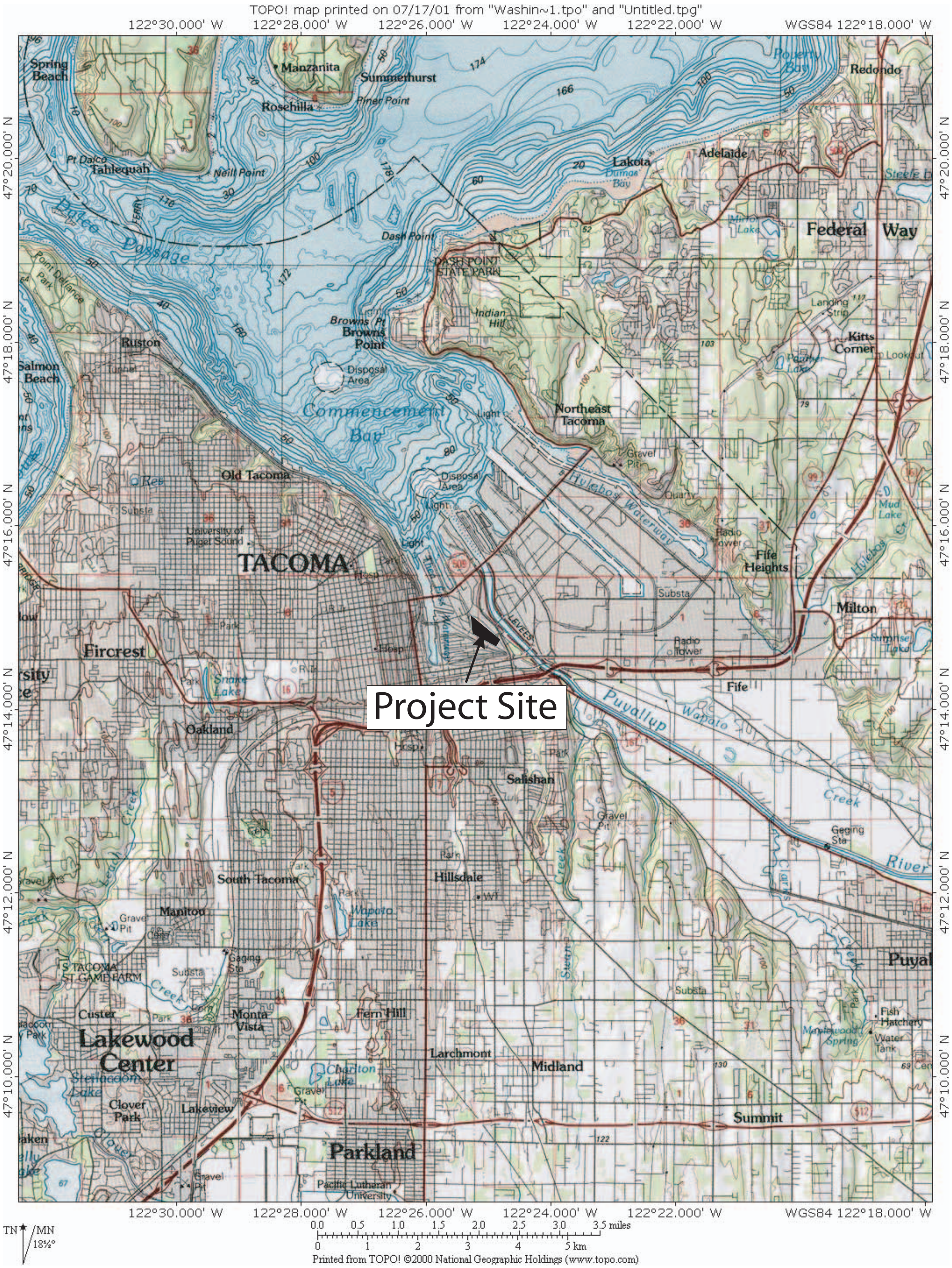
An EPA contractor mobilized to the site in September 1984 to begin an RI. Subsequent to initiation of the RI field work, EPA reached agreement with the Potentially Responsible Parties (PRPs) allowing them to conduct their own RI/FS. Four companies joined in commissioning the RI/FS: WNG, JS&S, Hygrade Food Products Corporation, and Burlington Northern Railroad Company. These companies selected Applied Geotechnology Inc. to complete the RI. Applied Geotechnology mobilized to the site and commenced field operations in November 1984. The PRP group later contracted with the Envirosphere Company (later known as Ebasco and Foster Wheeler Environmental Corporation due to mergers/acquisitions) to complete a FS and Risk Assessment.

3.5 Basis for Taking Action

The results of the RI/FS indicated that soil and groundwater at the site were contaminated with organic and inorganic contaminants related to the onsite coal gasification wastes, auto fluff, and oil released from the electrical transformers recycled at the site. The primary contaminants present in soil, groundwater, and surface water at the site included metals, polynuclear aromatic hydrocarbons (PAHs), PCBs, and various volatile organic compounds including benzene.

A Risk Assessment was performed that considered the risk to onsite workers because the Tacoma Tar Pits site is located in a heavily industrialized area. Three organic constituents and one trace metal were selected as indicator chemicals representing the overall level of site contamination. Avian receptors were also considered because of an avian population that occasionally uses the ponds at the site. Maximum allowable concentrations for onsite soils, groundwater, and surface water were calculated as part of the Risk Assessment.

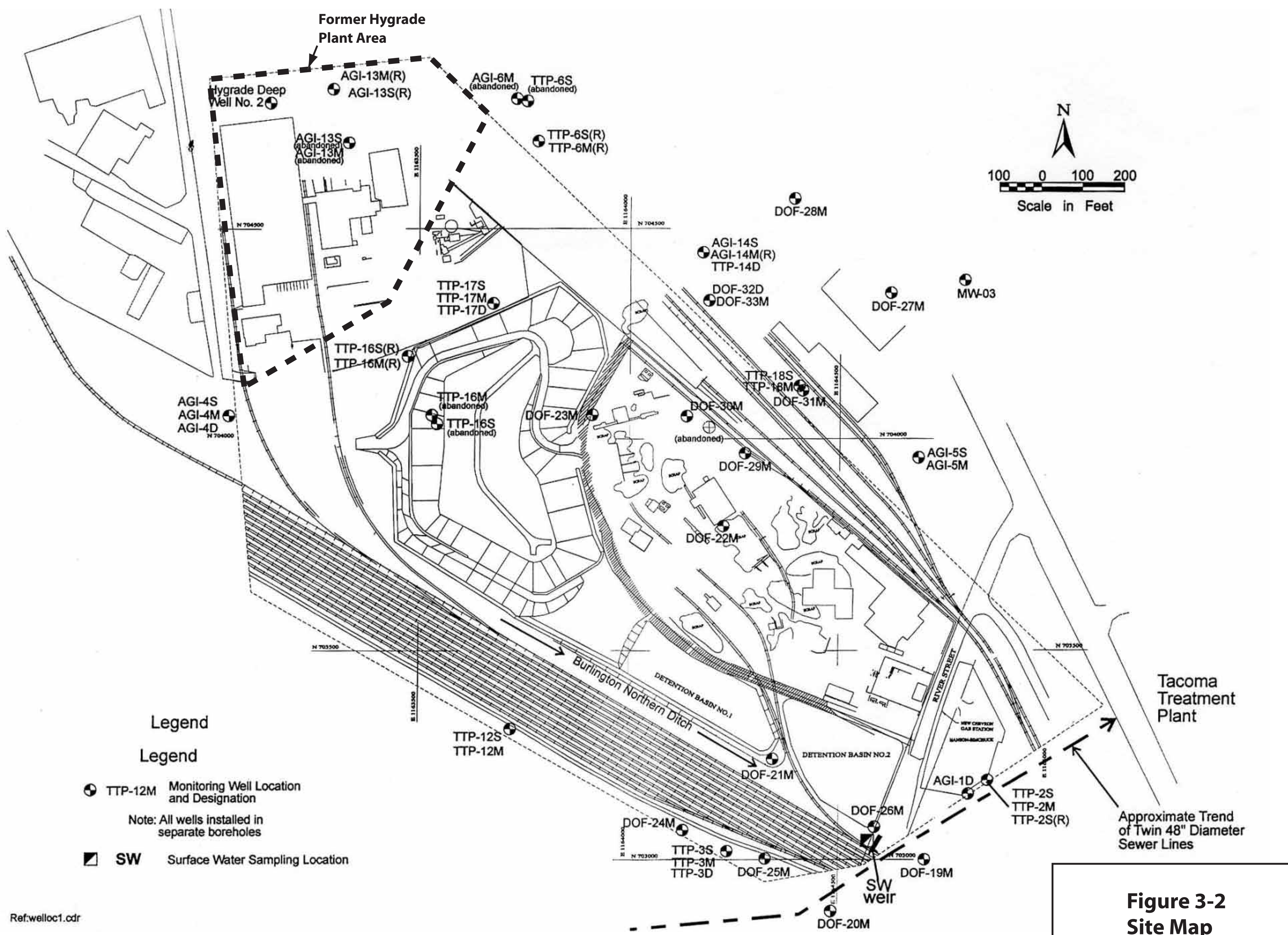
A ROD was issued for the Tacoma Tar Pits site in December 1987. The selected remedy called for excavation and stabilization of approximately 45,000 cubic yards of materials, including onsite wastes and the most severely contaminated soils, and placement of the stabilized material in an engineered waste pile covered by a low permeability cap. The remedy also called for surface water controls to (1) manage stormwater runoff from the waste pile and metal recycling operation and (2) limit infiltration of surface water into the subsurface. The remedy is discussed further in Section 4.



Source: Topo , 2000, National Geographic Holdings, Inc.

Figure from Dalton, Olmsted & Fuglevand, Inc., 2003.

Figure 3-1
Site Location



Legend

TTP-12M Monitoring Well Location and Designation

Note: All wells installed in separate boreholes

SW Surface Water Sampling Location

Ref:welloc1.cdr

Figure from Dalton, Olmsted & Fuglevand, Inc., 1995.

Figure 3-2
Site Map

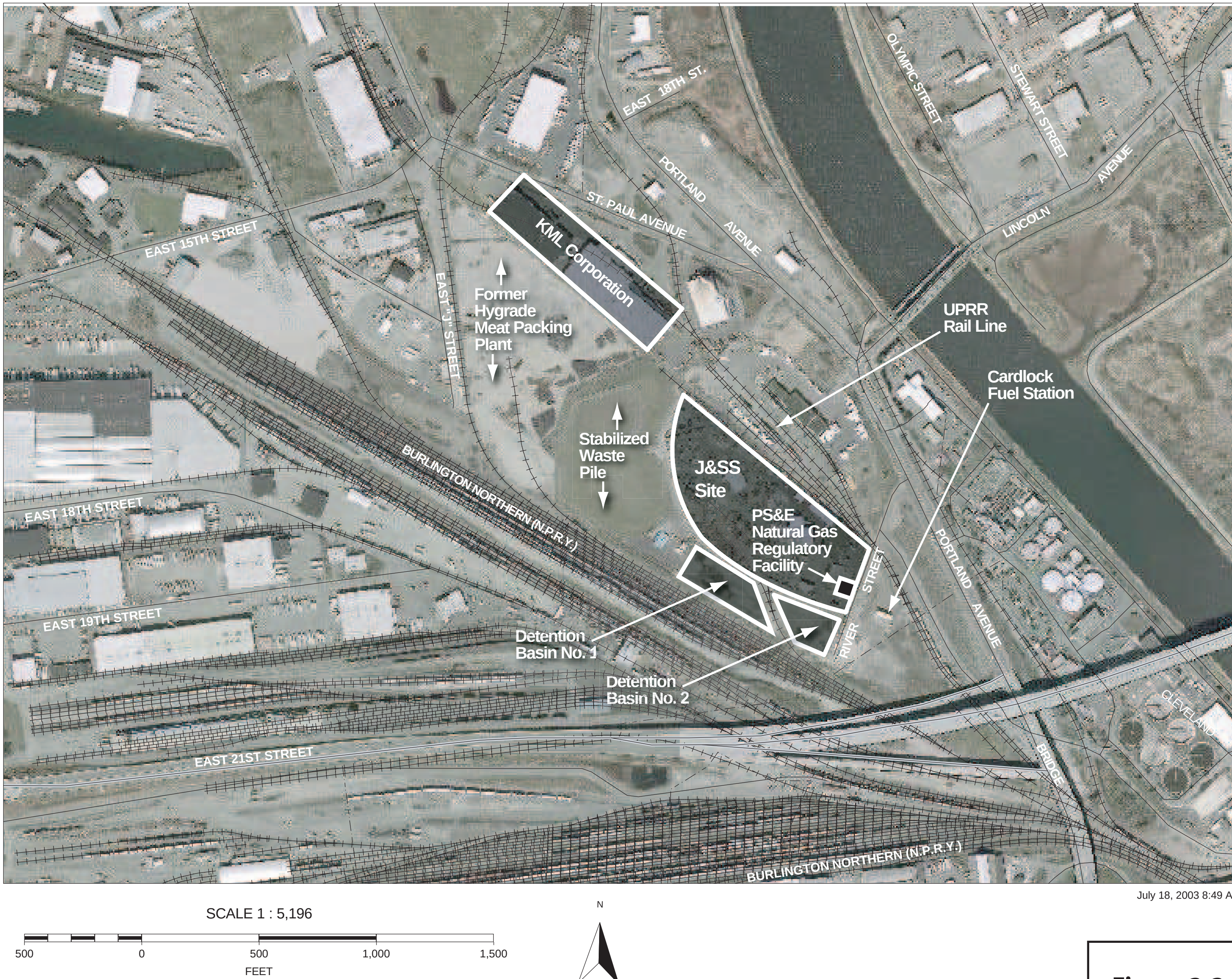


Figure 3-3
Current Site Use Map

4. Remedial Actions

Section 4 addresses implementation of the remedy at the Tacoma Tar Pits site, beginning with a summary of the ROD and continuing through all RAs conducted to date.

4.1 Remedy Selection

A ROD was issued for the Tacoma Tar Pits site in December 1987. The selected remedy called for the following:

- Excavation and treatment of contaminated soils characterized as Extremely Hazardous Wastes (EHW) due to a total PAH content exceeding 1 percent (based on State of Washington Dangerous Waste Regulations, WAC 173-303-100).
- Excavation and stabilization of all surface soils (less than 3 feet deep) containing contaminants that exceed a 1×10^{-6} lifetime cancer risk level.
- Capping of the stabilized materials with a low permeability cover system to reduce surface water infiltration and human exposure.
- Reduction of surface water transport of contaminants by channeling and managing surface water run-on and run-off.
- Removal and treatment of ponded water to achieve cleanup goals.
- Provisions for institutional controls to assure integrity of the waste pile cap and prevent future use of onsite groundwater.
- Provisions for post-RA groundwater monitoring to evaluate the effectiveness of the RA with respect to groundwater quality and to evaluate the need for groundwater extraction and treatment in the event that groundwater quality goals are not achieved by soil excavation, stabilization, and capping.

The ROD identified cleanup levels for soil, groundwater, and surface water based on the results of the Risk Assessment. These cleanup levels are presented by media in Table 4-1.

4.2 Remedy Implementation

This section addresses implementation of the remedy. A summary of the original RD and RA activities, largely completed in the early- to mid-1990s, are provided under Sections 4.2.1 and 4.2.2, respectively. Section 4.2.3 addresses a groundwater extraction and treatment system that became operational in 2002.

4.2.1 Design

Post-RI/FS Work Activities Affecting the Design

After release of the ROD, EPA issued an Administrative Order (EPA Docket No. 1088-09-35-106) to WNG and JS&S in September 1988 for implementation of certain response actions at the Tacoma Tar Pits site. The Administrative Order required the PRPs to conduct treatability studies to support a RD/RA. Amendments to the order, largely associated with schedule modifications and the requirement to conduct post-RI "extent of contamination studies," were issued by EPA in October and December 1988 and June 1989.

During 1988 and 1989, schedule and cost allocation issues arose between EPA, the PRPs named in the Administrative Order (WNG and JS&S), and other PRPs who were not covered by the order. Settlement discussions were conducted. The issues were ultimately resolved and EPA entered into a Consent Decree (No. C89-155TB) with WNG in October 1991. Among other provisions, the Consent Decree provided for WNG to be responsible for implementing the RD/RA.

As part of settlement discussions between EPA and WNG, a document titled *Framework for Remediation* (DOF, 1991) was prepared. Along with the ROD, this document formed the basis for the Statement of Work that was attached to the October 1991 Consent Decree. The Statement of Work contained the performance criteria and other information guiding the preparation and implementation of the RD.

The Framework for Remediation and the Statement of Work included as part of the Consent Decree, required that a number of significant but not fundamental changes be made to the remedy identified in the original ROD. These changes were documented in an ESD document prepared by EPA in November 1991. The changes included an increase in the volume of material to be excavated and stabilized to approximately 79,000 cubic yards (from the original estimate of 45,000 cubic yards) and an expansion of the remediation area. The October 1991 ESD added more specificity to the remedy requirements by providing area- and contaminant-specific criteria for excavation and treatment of waste materials. The October 1991 ESD outlined the remedy approaches for specific areas and contaminants as follows (see Figure 4-1 for location of the site areas referenced below):

- Ponds and Tar Pit/Boil Areas—Soils, sediments, and tarry materials to be excavated to a depth of 3 feet.
- Fluff Area—Fluff (auto fluff) to be excavated to a depth of 3 feet.
- Operating Area West—Soils exceeding the ROD criteria in Operating Area West of the JS&S metal recycling facility to be excavated to a depth of 3 feet.
- Peripheral Areas (adjacent to site boundaries; divided into subareas A, B, C, and D)—Surface soils and soils within a depth of 3 feet not to exceed the ROD criteria based on the geometric mean for lead and arithmetic average for PCBs, ROD-PAHs, and benzene. The maximum concentration (of ROD parameters) was not to exceed two times the Method A Soil Cleanup Levels for Industrial Soil as listed in WAC 173-340-745(2)(a)(i) of the Washington State Model Toxics Control Act (MTCA)

regulation in place at the time. The maximum Peripheral Area concentrations identified by the ESD are listed below:

– Lead - 2,000 mg/kg
– ROD-PAHs - 40 mg/kg
– PCBs - 20 mg/kg
– Benzene - 1 mg/kg

- Operating Area East (also identified as Area C in the Statement of Work)—Soils exceeding the hot spot soil criteria described in the Framework for Remediation to be excavated to a depth of 3 feet. Hot spots were defined as soils exceeding the following concentrations:

  – Lead - 4,000 mg/kg
  – ROD-PAHs - 50 mg/kg
  – PCBs - 50 mg/kg

  A hot spot action level for benzene was not developed for Operating Area East because benzene was not detected during the extent of contamination field study.

- Excavation of EHW—For all areas of the site, including soil depths greater than 3 feet, the requirement to excavate any material designated as EHW was not modified by the ESD. The target of the EHW criterion was tarry materials from the historic coal gasification plant. EHW was defined as materials that included more than 1 percent total 4-, 5-, and 6-ringed PAHs based on Washington State Dangerous Waste Regulations (WAC 173-303-102).

Design Process

The RD was initiated in 1991 using the above-referenced Statement of Work and Framework for Remediation as the basis for design. The design packages generally include the following:

- Package 1, completed in 1992—Addressed excavation and stabilization of non-tarry materials, excavation (but not stabilization) of tarry materials and auto fluff, and Detention Basin No. 1.

- Package 2, completed in 1993—Addressed the balance of remedial activities not addressed in Package 1, including stabilization of tarry materials and auto fluff, Detention Basin No. 2, onsite pavement, and the waste pile cover and drainage system.

During execution of the RA, several significant but not fundamental changes were made to the design based on the actual field conditions encountered. A second ESD was issued in May 1995 to address post-RD modifications to the treatability mixes, covers, and project schedule; the increase of the excavation volume to approximately 185,000 cubic yards; and related changes to the overall remediation cost estimate.

4.2.2 Initial Remedial Action

The major components of the RA are described below.

Excavation

The RA included excavation of soil, auto fluff, and tarry materials containing ROD indicator contaminants above cleanup levels. Within the area of the site designated for capping as identified in the ROD, all materials within 3 feet of the ground surface were excavated. Excavation depths varied in other areas in accordance with the applicable criteria. For example, hot spots were excavated from depths of 0.5 feet to 3 feet in the JS&S Operating Area and Peripheral Areas (Figure 4-1). In some areas where potential EHW was encountered, excavation extended below a depth of 3 feet.

To facilitate excavation of the North and South Ponds, sheet piling was installed around each pond. The sheet piles provided a contained area to accomplish the excavations and, in the case of the North Pond, provided temporary storage for excavated tarry materials from the South Pond and other areas of the site.

Excavations were generally backfilled to design grades using clean imported fill material.

Screening and Stockpiling

As material was excavated, it was stockpiled to facilitate further characterization for benzene and moisture content to determine stabilization requirements. Oversize debris (wire, metal, concrete, wood, etc.) was encountered beneath much of the site. This material was screened or manually removed prior to treatment of the materials. The oversize material was stored in separate stockpiles.

Stabilization and Placement of Excavated Materials

According to the ROD, an estimated 45,000 cubic yards of material was to be excavated and stabilized at the site. This estimate assumed that not all soil in the area designated for capping would require excavation. Further, this estimate did not account for additional contaminated materials encountered in the Peripheral or JS&S Operating Areas. As part of design, the volume was increased to an estimated 79,000 cubic yards based on sampling completed after the ROD was issued. The need to excavate and process this additional volume was addressed by the November 1991 ESD, which is discussed in Section 4.2.1.

A total of 185,170 cubic yards of non-tarry soil, tarry material, and auto fluff were ultimately excavated and stabilized during the remediation. The additional volume of material that was excavated and processed was primarily due to the expansion of hot spot excavations (e.g., Burlington Northern ditch) and the fact that more EHW tarry material was ultimately identified than originally anticipated. In addition to the 185,170 cubic yards of material stabilized, an additional 14,870 tons (11,336 and 3,530 tons of hazardous and nonhazardous, respectively) of oversize debris and residual soil was generated during the RA contractor's final demobilization efforts.

Excavated materials were stabilized using either a pug mill or a custom designed and built batch mix plant (BMP) equipped with a Nikko high intensity mixer. The pug mill was used to stabilize non-tarry auto fluff and non-tarry soil excavated through June 1993. The material was stabilized using a 7.5 to 10 percent Portland cement mix to produce a roller compactable material (the cement mix ratio varied depending on the moisture content of the material). After mixing, the material was transported, spread, and compacted in the waste pile footprint.

Tarry materials were stabilized in the BMP using a mixture of Portland cement and the proprietary ingredient "P-27" manufactured by the Silicate Technology Company. After June 1993, non-tarry materials were also treated in the BMP. As with the material processed in the pug mill, the BMP produced a roller compactable material. The processed material was transported, spread, and compacted in the waste pile footprint in a manner similar to that used to place the non-tarry material and auto fluff processed by the pug mill.

During material handling, oversize debris consisting of metal, wire, wood, and concrete was separated from the materials to be stabilized by screening and picking. These oversize materials were disposed of in the manner described below.

Oversize non-tarry material (except wood) separated from the auto fluff was buried in the waste pile. This was accomplished by creating a bermed area with stabilized material, placing the oversize material in approximately a 1-foot lift, and mechanically mixing the metal with a castable grout using a backhoe. After the grout setup, several lifts of roller compactable materials were placed over the bermed area holding the oversize material.

Some non-tarry oversize debris consisting of metal, rock, and asphalt separated from soil was also entombed in the pile by placing the material in thin lifts and placing roller-compactable material around and above the layer.

The remaining non-tarry oversize debris (e.g., wood) and tarry oversize debris was disposed of offsite. Non-tarry material was disposed of at the permitted Regional Disposal Company's facility located in Roosevelt, Washington. The tarry oversize materials were disposed of at the Chemical Waste Management facility in Arlington, Oregon.

Cover Materials

Most of the remediated areas of the site were capped with low permeability surfaces to minimize infiltration and control surface water runoff. Cap materials varied by location. The ROD specified that a low permeability asphalt cap be installed over the stabilized waste. However, during design there were concerns about the long-term durability of an asphalt surface and the ability of asphalt achieve the Statement of Work permeability requirement limiting cap permeability to no more than 1×10^{-7} centimeters per second (cm/sec). Similarly, concerns were also raised about the long-term durability of an asphalt pavement in parts of the JS&S metal recycling area. Based on these concerns, different cap designs were developed for different areas of the site, including the waste pile, metal recycling facility, detention basins, and peripheral areas (generally the less contaminated areas adjacent to the site boundary). Future site use was considered in designing the cap for each area of the site.

The cover materials used at the site are summarized below by area:

- Waste Pile—The cap over the stabilized waste pile is composed of two low permeability geosynthetic layers. Two layers of 60-mil high-density polyethylene

(HDPE) were used for the top of the pile and a 60-mil HDPE liner over a geosynthetic clay liner (GCL) was used on the side slopes of the pile. The cover system also includes geosynthetic drainage layers covered by soil and turf.

- JS&S Metal Recycling Facility—Asphalt or concrete paving was placed to cover the JS&S metal recycling facility. The asphalt paving consists of a minimum of 1.5 inches of low permeability asphalt protected by a minimum of 1.5 inches of an asphalt wear surface. Reinforced concrete slabs, generally 8 inches thick, were used in high traffic and wear areas.
- Detention Basins—Two detention basins were built as part of the remediation (see Detention Basins No. 1 and No. 2 in Figure 3-2). The detention basins are lined with low permeability asphalt (permeability less than 1×10^{-7} cm/sec). The asphalt has a minimum thickness of 3 inches.
- Peripheral Areas—Hot spots in the Peripheral Areas (see Figure 4-1) were excavated and generally backfilled with imported uncontaminated sand and gravel and left unpaved. Portions of Peripheral Areas A-1 and D-1, located at the southeast end of the site, are covered by either asphalt or concrete installed as part of construction of the cardlock fuel station.
- Burlington Northern Ditch—The Burlington Northern ditch, located along the southwest side of the site, was excavated to a depth of 3 feet and reconstructed with filter fabric, imported sand, gravel, and rip-rap.

Stormwater Drainage System

Two stormwater drainage systems were installed as part of the remediation—the waste pile drainage system and the JS&S metal recycling drainage system. The systems consist of a series of collection facilities that ultimately route water to the Burlington Northern ditch. Restricting orifices and detention basins were installed based on City of Tacoma requirements. The detention basins were designed to handle a 25-year return period storm. Each system is summarized below.

- Waste Pile Drainage System—This system collects stormwater originating from the cover of the stabilized waste pile. Drainage from the pile is collected by box culverts placed at the toe of the pile slopes. The bottoms of the box culverts are sloped to direct stormwater flow to Detention Basin No. 1 via a buried culvert (north side) and asphalt-lined ditch (south side). Water collected in Detention Basin No. 1 flows into the Burlington Northern ditch via a control manhole equipped with a restricting orifice (maximum 0.5 cubic feet per second).
- JS&S Metal Recycling Drainage System—A separate drainage system was installed for the JS&S metal recycling facility. This system consists of a series of catch basins and buried pipes that direct flow to a control manhole located near the southeast corner of Detention Basin No. 2. The system was originally designed to allow stormwater to flow directly from the detention basin into the Burlington Northern ditch through a restricting orifice (maximum 1.0 cubic feet per second). If stormwater volumes exceed the flow allowed through the orifice, water backs up into detention basin No. 2.

Stormwater Treatment and Discharge

In August 1992, a NPDES Construction Stormwater Substantive Requirements permit for offsite discharge of stormwater during remedial construction activities was issued by Ecology. A temporary onsite treatment plant was installed to treat water generated during the remedial construction activities. After a successful test demonstrating that the NPDES discharge criteria had been met, treated water was initially discharged in March 1993.

For most of the remainder of the RA, water was treated in batches and stored in a detention basin or modular tank. Water was discharged after an analysis of a sample of the treated water indicated that the permit discharge limits had been met.

In August 1994 after most intrusive construction work was complete and most of the site had been capped, EPA approved direct discharge of treated water. This change was made based on operational experience and the reduced strength of the water being treated (much of the water was run-off from newly paved or covered areas).

Summary of Remedial Quantities

A summary of final remedial quantities is provided below.

- Excavation and Stabilization Quantities ....185,170 yd^3
- Waste Pile Cover Area ....295,000 ft^2
- Area Covered by Low Permeability Asphalt ....118,900 ft^2
- Area Covered by Concrete ....191,900 ft^2
- Volume of Water Treated ....7,000,000 gallons
- Offsite Disposal, Non-tarry Oversize Debris and Tarry Oversize Debris (Chemical Waste Management, Arlington, OR) ....11,336 tons
- Offsite Disposal, Tarry Oversize Material (Regional Disposal Company, Roosevelt, WA) ....3,530 tons

Pre-Certification Inspection

A pre-certification inspection was completed on June 14, 1995, as required by the Consent Decree. The inspection was attended by representatives of EPA; CH2M HILL (an EPA contractor); Ecology; and DOF representing WNG.

Based on observations made during the inspection, it was concluded that the major elements of the RA were complete. However, a few minor construction activities were identified as incomplete. These items were identified for completion prior to the final inspection.

Final Inspection

The final inspection for the site was conducted on July 26, 1995. Based on the inspection, EPA accepted the RA construction as complete and WNG was instructed to proceed with preparation of the Remedial Action Report.

Remedial Action Report

A *Remedial Action Report* (DOF, 1995b) was submitted to EPA documenting the completed response actions at the site. The report included as-built drawings for the major elements of the remedy and a certification by the PRPs and the PRPs' contractors that the remedy was operational and functional.

4.2.3 Groundwater Extraction and Treatment System

Background

As indicated in Section 4.1, the ROD anticipated the need for groundwater remediation if it was found that the initial RA did not achieve ROD groundwater quality criteria at the site boundary in a timely manner. In an October 2, 1998, notification to PSE (formerly known as WNG), EPA directed that a groundwater remedy be implemented at two locations where benzene concentrations continued to exceed ROD criteria. These locations, known as "TTP-3M" and "TTP-18M," were named after monitoring wells near the center of the two benzene plumes (see well locations in Figure 3-2). The TTP-3M Area is located in the south corner of the site. The TTP-18M Area is located in the central portion of the northeast site boundary.

Design

WNG initiated a remedial alternative screening evaluation in 1999 to identify technologies available to address the benzene contaminants present in groundwater (DOF, 1999). In consultation with EPA, WNG determined that groundwater extraction coupled with ex-situ groundwater treatment was the best approach for preventing benzene-contaminated groundwater from migrating off-site and potentially impacting the Puyallup River. WNG initiated the design of the system and issued several design memoranda and reports in 2000 and 2001 (DOF, 2000, 2001; Alta Geosciences, 2001a, 2001b).

The final design for the groundwater extraction and treatment system included the installation of four pumping wells in the Sand Aquifer. Two wells were identified for the TTP-3M area and two for the TTP-18M area.

The groundwater extraction and treatment system that was ultimately designed included the following components:

- The treatment plant with a 2,000-gallon equalization tank, tanks, and mixing units for biological treatment agents, pumps and meters, a tray air stripper, and carbon absorption units to treat exhaust vapors from the stripper. The system is designed to treat up to 25 gallons per minute (gpm) of contaminated groundwater. An air discharge permit was not required because all emissions are treated by the activated carbon absorption system.

- Four groundwater extraction wells. The extraction wells operate in pairs (i.e., two wells each in the TTP-3M and TTP-18M areas).
- Four extraction well pumps and wellhead vaults along with two field control panels for pump controls, electrical and instrument junctions, and approximately 2,000 feet of buried power line in conduits to supply the field panels.
- Approximately 2,440 feet of primary water (in-flow) line (1-1/4-inch-diameter polyvinyl chloride [PVC]) inside a secondary containment line (3-inch-diameter PVC) to direct contaminated water to the treatment plant.
- Multiple utility vault installations for leak detection, electrical pullboxes, and waterline cleanouts.
- Water flow meters, pressure transducers, and leak detection sensors, lines, and monitoring instruments.
- 1,200 feet of a 1-1/2-inch-diameter PVC pipeline between the treatment plant and City of Tacoma sanitary sewer via a City-approved water meter and manhole.

Figure 4-2 shows the treatment plant location and an overview of the extraction wells and pipelines. Figure 4-3 shows the process flow diagram for the plant. Appendix A includes photographs of the treatment plant.

Operations

The extraction well pumps, piping, and treatment plant were substantially complete in May 2002. The plant was operated intermittently through the summer of 2002 as part of the startup testing process. Technical issues and optimization opportunities were identified and addressed during this time. By September 2002, the extraction and treatment systems were operating full time.

The system is currently extracting groundwater from the site at an approximate rate of 14 gpm. Approximately 12 gpm are extracted from the two extraction wells in the TTP-18M Area and 2 gpm from the two wells in the TTP-3M Area. Figure 4-4 shows the inferred capture zone in the Sand Aquifer in each area as reported by PSE's consultant (DOF, 2003b).

Benzene is the primary groundwater contaminant of concern at the treatment plant. Data provided to EPA indicate that plant removal efficiency is 100 percent for benzene. Effluent from the treatment plant is discharged to the City of Tacoma publicly operated treatment works (POTW) under Permit No. 001-636-456. PSE monitors treatment plant influent and effluent quarterly and submits the data to the City of Tacoma. Table 4-2 presents the monitoring results compared to the permit limits for the quarter ending December 31, 2002 (the most recent data available to EPA). As indicated by the table, all permit criteria were achieved for the reporting period ending December 31, 2002.

4.3 Operations and Maintenance

Operations and maintenance (O&M) of the remedy occurs in accordance with preestablished plans. The O&M program encompasses two main remedy elements:

- Original remedy consisting of low permeability covers, stormwater drainage systems, etc. completed in 1995
- Groundwater extraction and treatment system completed in 2002

Each remedy element has its own O&M requirements, as discussed below.

4.3.1 Original Remedy

Consistent with the 1991 Consent Decree and Statement of Work, an *Inspection and Maintenance Manual* (Ebasco, 1995) was prepared for the Tacoma Tar Pits site. The manual identifies the framework for carrying out the inspection and maintenance program related to the original remedy (e.g., the low permeability covers and stormwater drainage systems completed in 1995). Included are schedules for recurring inspection items, procedures for inspections and repairs, recordkeeping requirements, testing specifications, and requirements for evaluation of inspection results. A summary of the inspection items with their associated schedules is provided in Table 4-3.

According to DOF, the site operations representatives for PSE, inspection and maintenance of the original remedy elements have been carried out annually as specified in the Inspection and Maintenance Manual. Since the last five-year review in 1998, the following inspections have occurred:

- 1998
  - July 24, September 22, and October 21—Routine site inspections including an inspection to examine the waste pile after annual mowing
  - November 27—Site inspection after a heavy rain fall
- 1999
  - September 17 and November 29—Routine site inspections
- 2000
  - January 10—Site inspection after a heavy rainfall
  - September 28 and December 20—Routine site inspections
- 2001
  - March 7—Site inspection after a magnitude 6.8 earthquake that occurred on February 28 (no site damage was observed)
  - August 30, September 10, and September 26—Routine site inspections
- 2002
  - September 11 and October 10—Routine site inspections

The 2003 annual inspection is scheduled to occur before the end of September 2003.

At this writing, annual inspection and maintenance reports have been submitted to EPA for the years through 2002. According to DOF, no significant or unexpected maintenance issues have emerged with respect to the original remedy components. Required routine maintenance includes vegetation control (e.g., mowing the waste pile), sweeping of the detention basins, and preventive cleanout of stormwater system catchbasins and piping.

Research conducted as part of the five-year review revealed that hydraulic conductivity testing of asphalt covers has never been conducted as called for by the *Inspection and Maintenance Manual* (Ebasco, 1995). The *Inspection and Maintenance Manual* indicates that hydraulic conductivity will be performed every five years. This issue is addressed further in Sections 8 and 9.

4.3.2 Groundwater Extraction and Treatment System

As discussed in Section 4.2.3, the groundwater extraction and treatment system became operational in 2002. O&M of the plant, extraction wells, and related systems is conducted in accordance with an O&M Plan (Alta Geosciences, 2003b). The plan provides the following information:

- Process and equipment description for the main elements of the system
- Copies of equipment manuals
- Operating parameters and procedures
- Maintenance schedules
- Water quality performance monitoring description
- Equipment inventory and specifications including copies of operating manuals where appropriate
- Safety precaution descriptions

The pump and treatment system is maintained on a regular basis. Typical maintenance items include the following inspections and checks:

- Weekly—General plant operations check and resupply of biofouling treatment chemicals (as needed)
- Monthly—Check of meter functions and the need for replacement of vapor phase carbon
- Quarterly—Air stripping trays and particulate filters are cleaned or replaced; equalization tank is cleaned
- Other remote system checks—System data are checked frequently via modem and SCADA unit to verify the plant is operating properly

According to DOF, no serious operational problems have been reported since the system began operating on a normal schedule in approximately September 2002. System "uptime" has reportedly been greater than 99 percent.

4.4 Water Monitoring Program

Surface water, groundwater, and treatment plant effluent/influent are monitored at the site as described below.

4.4.1 Surface Water and Groundwater Monitoring

The 1987 ROD called for a post-RA water monitoring program. During implementation of the initial remedy, monitoring was conducted to establish baseline groundwater quality conditions beneath the Tacoma Tar Pits site. This monitoring was completed quarterly from 1991 to 1994. Using the baseline monitoring data, a *Post-Remediation Water Quality Monitoring Plan* (DOF, 1995a) was developed. The first round of sampling was completed in January 1995 and monitoring has been conducted on a quarterly basis since that time.

Monitoring is currently being completed at 36 monitoring wells and one surface water location. The monitoring wells are screened in the Fill, Sand, and Lower aquifers. The surface water sampling station is located in the Burlington Northern ditch at the south corner of the property. A former water supply well located at the former Hygrade property is also sampled every other year. This well taps the deep aquifer discussed in Section 3.1.2 and is more than 500 feet deep.

The monitoring program has been optimized regularly over the years to focus on the locations and contaminants of greatest interest. Appendix B includes a map showing water quality monitoring locations and a table summarizing current monitoring parameters and schedule. The water quality monitoring program reflected by the information provided in Appendix B has been in effect since January 2002.

As shown in Appendix B, sampling and analyses of site indicator contaminants are being conducted on a quarterly, semiannual, or annual basis depending on the sampling location and monitoring constituent. Sampling is conducted in spring, summer, fall, and winter.

Samples are currently being analyzed for the following constituents:

- Field parameters (including water level, pH, electrical conductivity, temperature, and turbidity)
- BTEX (benzene, toluene, ethylbenzene, and xylenes)
- PAHs

Note that lead and PCBs have associated ROD criteria for groundwater but are not currently included in the groundwater monitoring program. Both constituents were previously eliminated from the groundwater monitoring program based on historical data indicating they are in compliance with their respective ROD criteria. Sampling for PCBs was terminated in 1997 with EPA concurrence. Likewise, sampling for lead was terminated in 2001 with EPA concurrence.

The ROD groundwater criterion for lead is 50 µg/L. As discussed above, lead was determined to be in compliance with the ROD criterion based on total (unfiltered) lead results. During the time period when lead was being monitored in groundwater on a regular basis, total lead concentrations were also lower than the recently revised maximum contaminant level (MCL) of 15 μg/L (see Section 7.2.1) with only a few exceptions. In those infrequent cases where total lead results exceeded 15 μg/L, corresponding turbidity and dissolved lead data suggest that the excursions were caused by particulates in the samples.

Surface water samples (collected from the Burlington Northern ditch) are still subject to analyses for dissolved and total lead under the current water monitoring program.

Water quality reports are prepared by DOF on a quarterly basis. Each report includes the following information:

- Narrative describing the quarterly sampling event (e.g., dates, wells sampled, deviations from the monitoring plan)
- Presentation of groundwater treatment plant operations during the quarter
- Description and illustration of groundwater flow conditions with emphasis on hydraulic influence of the extraction wells
- Description and illustration of water quality conditions and trends with focus on the TTP-3M and TTP-18M areas where groundwater is being extracted
- Laboratory data sheets and data validation information for samples collected during the quarter

The last quarterly water quality monitoring report available as of this writing addresses the sampling event occurring in September 2002. Data collected through March 2003 have been provided to EPA by DOF. Appendix B provides water quality data for March 2002 through March 2003. Earlier data are available in historical DOF reports.

Water quality trends noted since the last five-year review are discussed in Section 5.2.2.

4.4.2 Treatment Plant Effluent/Influent

Treatment plant influent and effluent are monitored quarterly and the results reported to the City of Tacoma Public Works Department (operator of the POTW receiving the treatment plan discharge). The quarterly reports include the following information:

- Operational narrative
- Effluent flow volume for the reporting period
- Influent and effluent water quality as compared to the permit criteria (see Table 4-2)
- Laboratory data sheets for samples collected during the quarter

The last operations report available is for the period ending December 2002 (DOF, 2003c). This report shows that discharge criteria are being met for all permit constituents (see Table 4-2).

4.5 Remedy Costs

Remedy costs are summarized below for the (1) initial RA, (2) design and construction of the groundwater treatment system, and (3) ongoing O&M.

4.5.1 Initial Remedy Costs

As reported in the previous 1998 *Five-Year Review* (U.S. EPA, 1998), the ROD anticipated a capital cost of $3.4 million for the initial RA. Based on additional sampling and design requirements, the estimated capital cost rose to between $15 and $18 million prior to the start of RA construction work. The major components affecting cost included increased size, quantities, or effort associated with the following:

- Unit cost of remediation and chemical additives
- Volume of material to be excavated and stabilized
- Size of the capped area
- Associated materials handling effort
- Scope of engineering and management of the project

These changes are documented in the original ESD (U.S. EPA, 1991b).

During completion of the RA, project costs rose to approximately $39 million, exceeding the interim estimate of $15 to $18 million. A general breakdown of the final costs are summarized below.

- Design, Coordination, and Management..$4,363,000
- Construction..$29,804,000
- Other Costs (pre-Consent Decree expenditures, oversight, etc.)................ $5,152,000

- Total...$39,319,000

The cost escalation was primarily the result of extra cost associated with excavation and stabilization of additional volumes of material identified during the extent of contamination studies, as addressed in the second ESD (U.S. EPA, 1995).

4.5.2 Groundwater Extraction and Treatment System Costs

The groundwater extraction and treatment system was complete in 2002 at a cost of approximately $200,000. This includes the cost of new extraction wells and associated well pumps and controls.

4.5.3 Operation and Maintenance Costs

Annual O&M costs, including all water and treatment plant monitoring costs, are estimated at $116,700, as shown in Table 4-4.

TABLE 4-1
ROD Cleanup Levels
Tacoma Tar Pits Site, Tacoma, WA

Media	Contaminant and Cleanup Level
Soil	Lead - 166 mg/kg
	PCBs - 1 mg/kg
	ROD-PAHs[a] - 1 mg/kg (individual)
	ROD-PAHs[a] - 5 mg/kg (total)
	Benzene - 56 mg/kg
Groundwater (Sand and Fill aquifers)	Lead - 50 µg/L
	PCBs - 0.2 µg/L
	ROD PAHs (total) - 30 µg/L
	ROD PAHs (individual) - 5 µg/L
	Benzene - 53 µg/L
Surface Water (at the site boundary)	Lead - 3.2 µg/L
	PCBs - 0.2 µg/L
	ROD PAHs (total) - 30 µg/L
	ROD PAHs (individual) - 5 µg/L
	Benzene - 53 µg/L

[a] ROD PAHs include benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene

TABLE 4-2
Treatment Plant Influent and Effluent Data for Quarter Ending December 31, 2002
Tacoma Tar Pits Site, Tacoma, WA

Constituent	Unit	Max. Influent	Max. Effluent	Permit Limit
Benzene	µg/L	2,450	<1	500
BTEX	µg/L	3,525	<1	10,000
Lead	mg/L	<0.150	<0.150	0.4
pH	pH units	NM	8.3	5.5 – 11.0
TPH (SGT-HEM)	mg/L	<5	<5	50
TTOs	µg/L	2,025	ND	2,000

Notes: Data from DOF (2003a).

HEM = hexane extractable material
ND = not detected at an individual reporting limit of 10 to 20 µg/L
NM = not measured
SGT = silica gel treated
TPH = total petroleum hydrocarbons
TTO = total toxic organics (excluding pesticides, PCBs, and dioxins)

TABLE 4-3
Inspection Frequency for Original Remedy Elements
Tacoma Tar Pits Site, Tacoma, WA

Maintenance Item	Inspection Frequency
JS&S Drainage System (JS&S operating areas and Detection Basin 2)	• Twice in the first year, annually thereafter • Observe for flow in manhole at end of dry season • Unscheduled inspections will be made after periods of heavy precipitation
WNG Drainage System	• Twice in the first year, annually thereafter • Unscheduled inspections will be made after periods of heavy precipitation
Waste Pile Cover Drainage and Turf	• Inspections should take place 5 days after mowing • Monthly for the first wet season, then every 6 months thereafter • Unscheduled inspections will be made after periods of heavy precipitation
JS&S Asphalt and Concrete Pavements	• Twice during the first year, annually thereafter • Hydraulic conductivity testing performed at 5-year intervals (asphalt only)
WNG Asphalt Pavement	• Twice during the first year, annually thereafter • Hydraulic conductivity testing performed at 5-year intervals

Note: Inspection frequency from Tacoma Tar Pits *Inspection and Maintenance Manual* (Ebasco, 1995).

TABLE 4-4
Estimated Annual O&M Costs
Tacoma Tar Pits Site, Tacoma, WA

O&M Item/Activity	Approximate Annual Cost
Water Quality Monitoring	
Sampling and Reporting	$37,500
Laboratory Analysis	$22,000
Data Validation	$8,000
Subtotal	$67,500
General Maintenance and Inspections	
Site Visits/Inspections	$5,000
Cover Mowing and Brush Control	$1,500
Misc. Maintenance and Repairs	$3,000
Subtotal	$9,500
Groundwater Pump and Treat System	
Contractor Maintenance	$18,000
Carbon Replacement	$25,000
Discharge Fees	$27,000
Other Utilities (phone, electric)	$3,500
Consulting/Engineering Support	$43,000
Subtotal	$116,500
Total	**$193,500**

Source: Personal communication; Email from M. Dalton/DOF to D. Holsten/CH2M HILL, July 29, 2003.

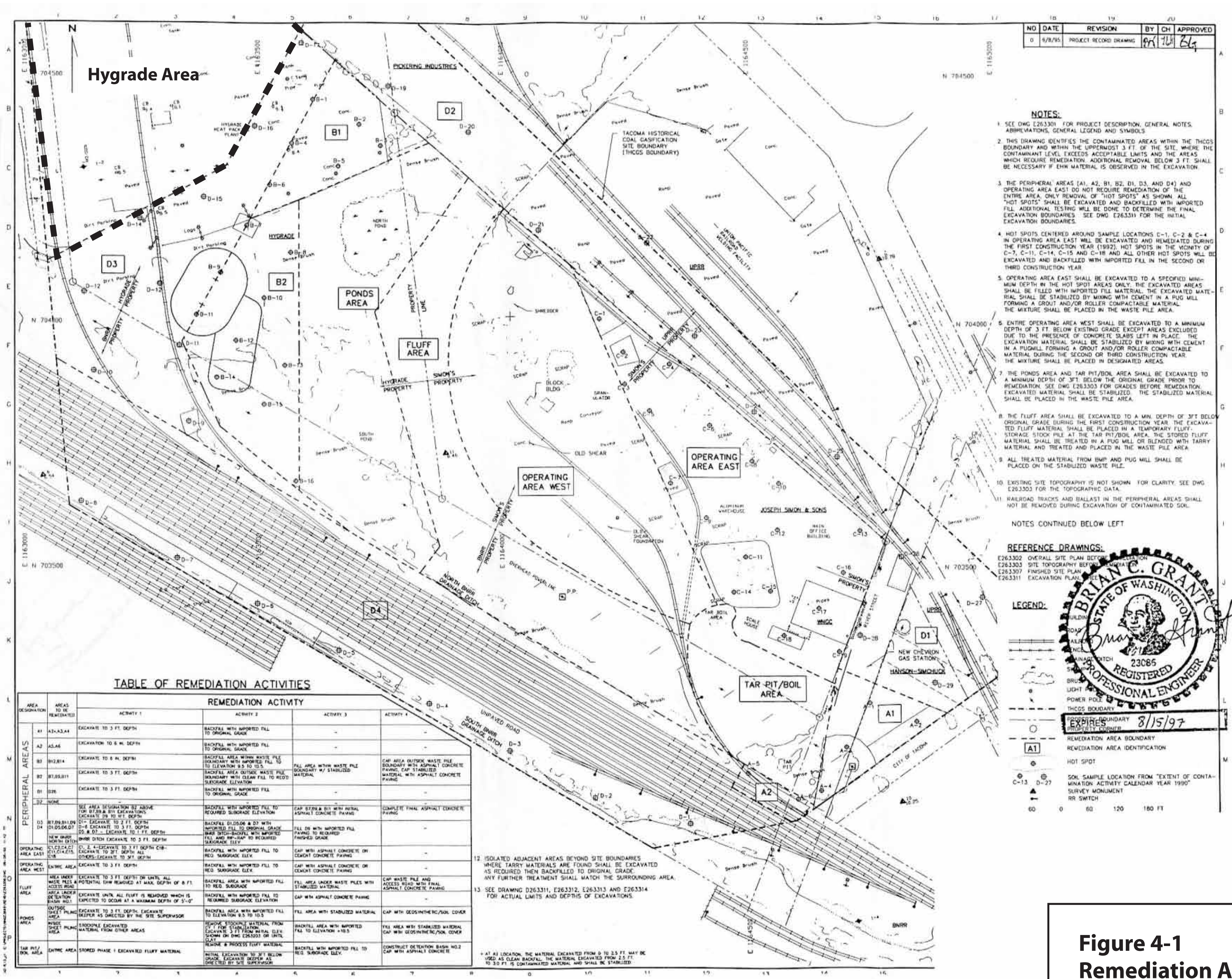


TABLE OF REMEDIATION ACTIVITIES

AREA DESIGNATION		AREAS TO BE REMEDIATED	ACTIVITY 1	ACTIVITY 2	ACTIVITY 3	ACTIVITY 4
PERIPHERAL AREAS	A1	A2*,A3,A4	EXCAVATE TO 3 FT. DEPTH	BACKFILL WITH IMPORTED FILL TO ORIGINAL GRADE	-	-
	A2	A5,A6	EXCAVATION TO 6 IN. DEPTH	BACKFILL WITH IMPORTED FILL TO ORIGINAL GRADE	-	-
	B1	B12,B14	EXCAVATE TO 6 IN. DEPTH	BACKFILL AREA WITHIN WASTE PILE BOUNDARY WITH IMPORTED FILL TO TO ELEVATION 9.5 TO 10.5	FILL AREA WITHIN WASTE PILE BOUNDARY W/ STABILIZED MATERIAL	CAP AREA OUTSIDE WASTE PILE BOUNDARY WITH ASPHALT CONCRETE PAVING, CAP STABILIZED MATERIAL WITH ASPHALT CONCRETE PAVING
	B2	B7,B9,B11	EXCAVATE TO 3 FT. DEPTH	BACKFILL AREA OUTSIDE WASTE PILE BOUNDARY WITH CLEAN FILL TO REQ'D SUBGRADE ELEVATION		
	D1	D28	EXCAVATE TO 3 FT. DEPTH	BACKFILL WITH IMPORTED FILL TO ORIGINAL GRADE	-	-
	D2	NONE	-	-	-	-
	D3 D4	B7,B9,B11,D9 D1,D5,D6,D7	SEE AREA DESIGNATION B2 ABOVE FOR B7,B9,& B11 EXCAVATIONS. EXCAVATE D9 TO 1FT. DEPTH	BACKFILL WITH IMPORTED FILL TO REQUIRED SUBGRADE ELEVATION	CAP B7,B9,& B11 WITH INITIAL ASPHALT CONCRETE PAVING	COMPLETE FINAL ASPHALT CONCRETE PAVING
			D1- EXCAVATE TO 2 FT. DEPTH D-6 EXCAVATE TO 3 FT. DEPTH D5 & D7 - EXCAVATE TO 1 FT. DEPTH	BACKFILL D1,D5,D6 & D7 WITH IMPORTED FILL TO ORIGINAL GRADE	FILL D9 WITH IMPORTED FILL PAVING TO REQUIRED FINISHED GRADE	-
		NEW BNRR NORTH DITCH	BNRR DITCH EXCAVATE TO 3 FT. DEPTH	BNRR DITCH-BACKFILL WITH IMPORTED FILL AND RIP-RAP TO REQUIRED SUBGRADE ELEV.		
OPERATING AREA EAST		C1,C2,C4,C7 C11,C14,C15, C18	C1, 2, 4-EXCAVATE TO 3 FT DEPTH C18-EXCAVATE TO 2FT. DEPTH ALL OTHERS-EXCAVATE TO 3FT. DEPTH	BACKFILL WITH IMPORTED FILL TO REQ. SUBGRADE ELEV.	CAP WITH ASPHALT CONCRETE OR CEMENT CONCRETE PAVING	-
OPERATING AREA WEST		ENTIRE AREA	EXCAVATE TO 3 FT. DEPTH	BACKFILL WITH IMPORTED FILL TO REQ. SUBGRADE ELEV.	CAP WITH ASPHALT CONCRETE OR CEMENT CONCRETE PAVING	-
FLUFF AREA		AREA UNDER WASTE PILES & ACCESS ROAD	EXCAVATE TO 3 FT. DEPTH OR UNTIL ALL POTENTIAL EHW REMOVED AT MAX. DEPTH OF 8 FT.	BACKFILL AREA WITH IMPORTED FILL TO REQ. SUBGRADE	FILL AREA UNDER WASTE PILES WITH STABILIZED MATERIAL	CAP WASTE PILE AND ACCESS ROAD WITH FINAL ASPHALT CONCRETE PAVING
		AREA UNDER DETENTION BASIN NO.1	EXCAVATE UNTIL ALL FLUFF IS REMOVED WHICH IS EXPECTED TO OCCUR AT A MAXIMUM DEPTH OF 5'-0"	BACKFILL WITH IMPORTED FILL TO REQUIRED SUBGRADE ELEVATION	CAP WITH ASPHALT CONCRETE PAVING	-
PONDS AREA		OUTSIDE SHEET PILING AREA	EXCAVATE TO 3 FT. DEPTH. EXCAVATE DEEPER AS DIRECTED BY THE SITE SUPERVISOR	BACKFILL AREA WITH IMPORTED FILL TO ELEVATION 9.5 TO 10.5	FILL AREA WITH STABILIZED MATERIAL	CAP WITH GEOSYNTHETIC/SOIL COVER
		INSIDE SHEET PILING AREA	STOCKPILE EXCAVATED MATERIAL FROM OTHER AREAS	REMOVE STOCKPILE MATERIAL FROM CY 1 FOR STABILIZATION. EXCAVATE 3 FT FROM INITIAL ELEV. SHOWN ON DWG E263203 OR UNTIL CLAY	BACKFILL AREA WITH IMPORTED FILL TO ELEVATION +10.5	FILL AREA WITH STABILIZED MATERIAL CAP WITH GEOSYNTHETIC/SOIL COVER
TAR PIT/ BOIL AREA		ENTIRE AREA	STORED PHASE 1 EXCAVATED FLUFF MATERIAL	REMOVE & PROCESS FLUFF MATERIAL	BACKFILL WITH IMPORTED FILL TO REQ. SUBGRADE ELEV.	CONSTRUCT DETENTION BASIN NO.2 CAP WITH ASPHALT CONCRETE
				INITIAL EXCAVATION TO 3FT BELOW GRADE. EXCAVATE DEEPER AS DIRECTED BY SITE SUPERVISOR		

Figure from Dalton, Olmsted & Fuglevand, Inc., 1995.

Figure 4-1
Remediation Areas

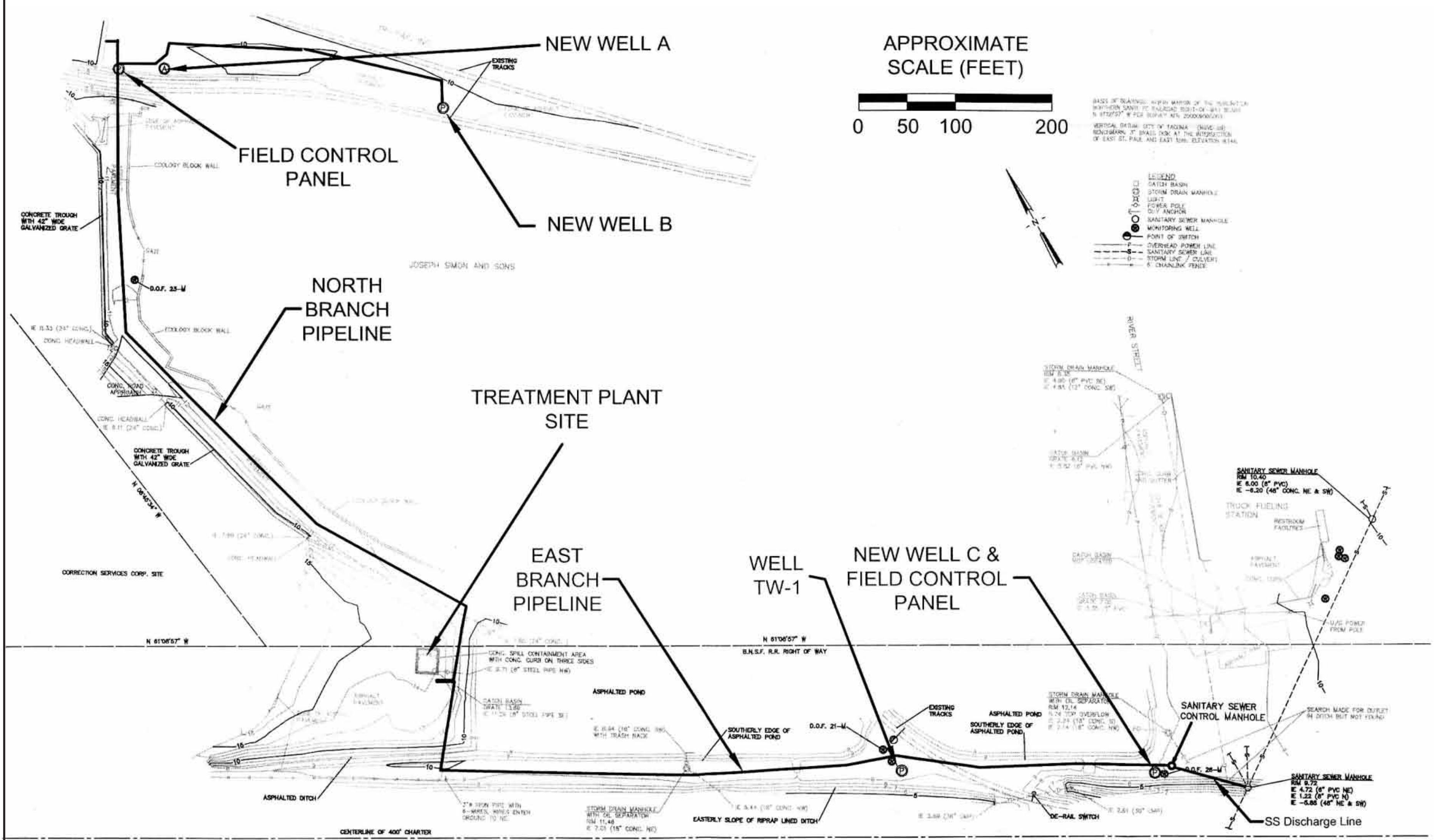


Figure from Alta Geosciences, 2003.

Figure 4-2
Treatment Plant and Extraction Well Locations

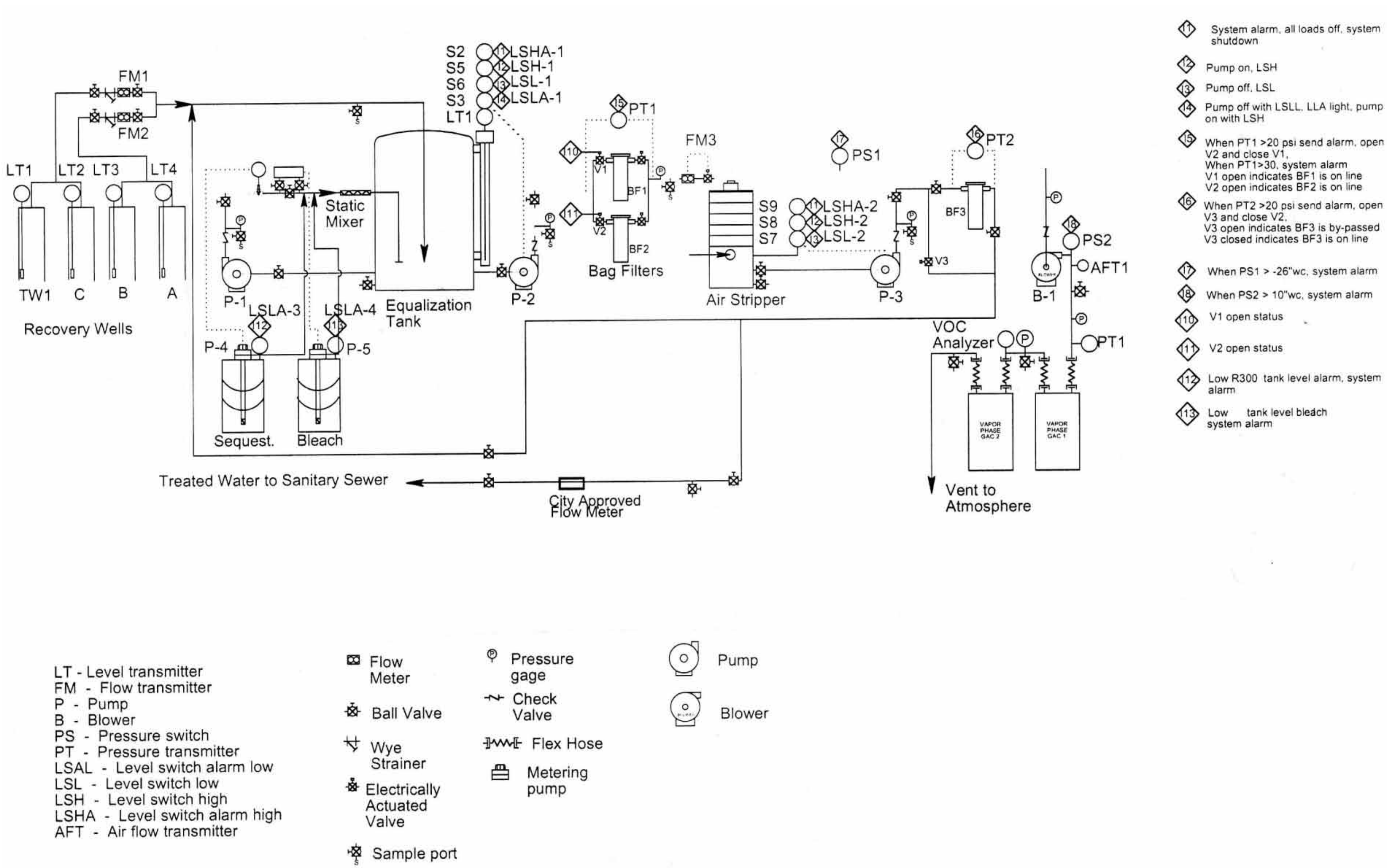


Figure from Alta Geosciences, 2003.

Figure 4-3
Process Flow Diagram for Treatment Plant

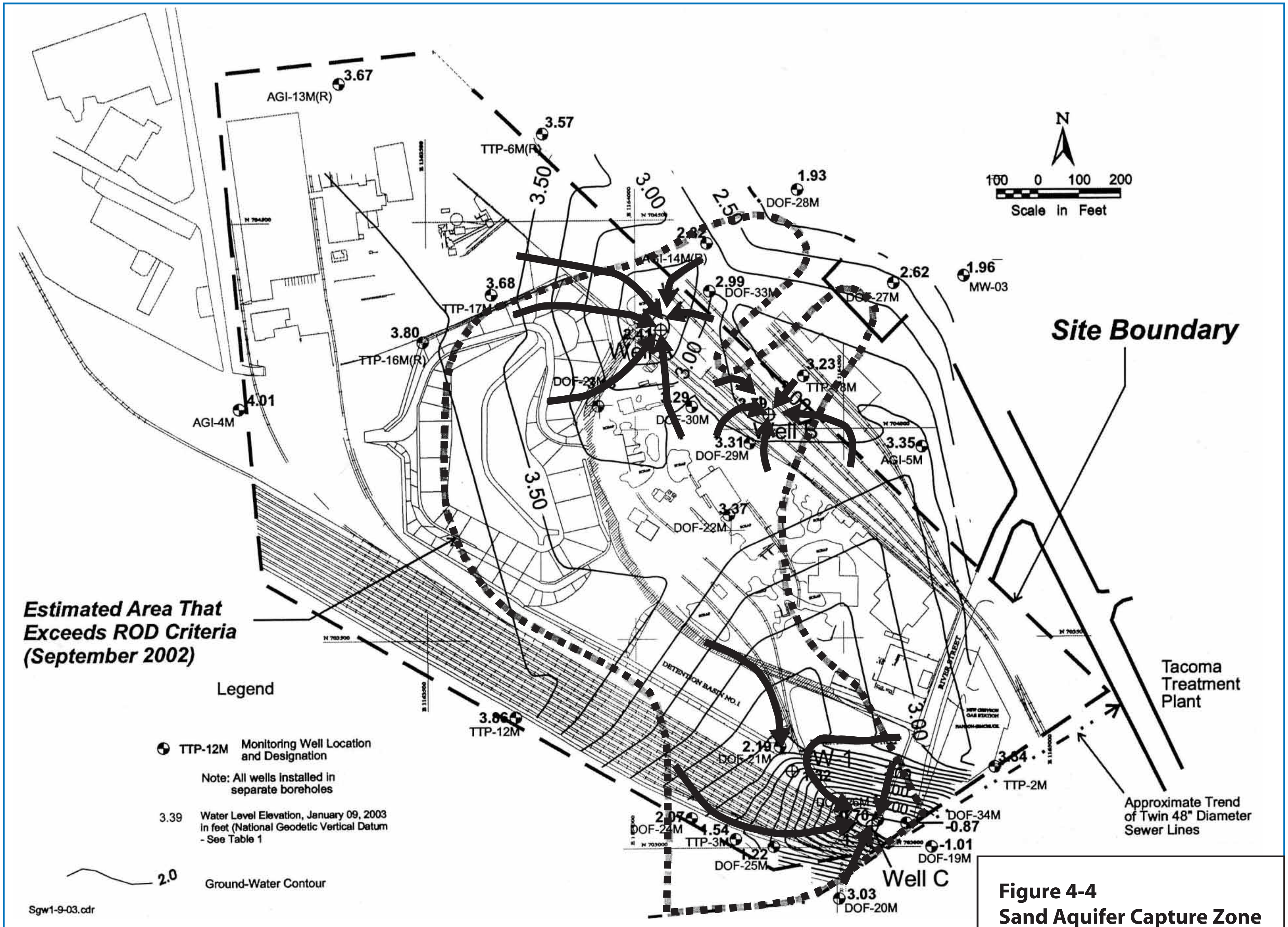


Figure from Dalton, Olmsted & Fuglevand, Inc. 2003.

Figure 4-4
Sand Aquifer Capture Zone

5. Progress Since Last Review

The first five-year review for the Tacoma Tar Pits site was completed in 1998. Section 5.1 summarizes the findings of the 1998 five-year review. Section 5.2 describes the actions taken since the 1998 five-year review was completed. Included in Section 5.2 is a summary of groundwater quality trends over the last five years. Section 5.3 addresses changes in site use that has occurred since the last five-year review.

5.1 1998 Five-Year Review Findings

The 1998 Five-Year Review Report (U.S. EPA, 1998) confirmed that RD/RA work identified by the ROD (U.S. EPA, 1987), Consent Decree with WNG (U.S. EPA, 1991a), and two ESDs (U.S. EPA, 1991b, 1995) had been completed as required, including the following:

- Contaminated soils were excavated, treated, or otherwise removed as required
- Treated soils met minimum criteria with respect to characteristics such as leachability, comprehensive strength, and permeability
- Waste pile and other site covers met the specified standards
- Institutional controls, including land use restrictions, were implemented through deed restrictions
- RA construction was accepted by EPA as complete
- The inspection and maintenance program was satisfactorily implemented
- The water quality monitoring program was being carried out as intended

The 1998 Five-Year Review Report further concluded that there were two areas at the site perimeter where contaminants (primarily benzene) in groundwater had not been sufficiently reduced by the initial RA, as specified by criteria outlined in the ROD and ESDs. The 1998 Five-Year Review Report stated the following:

> *The monitoring data clearly demonstrate exceedances of the standards set forth in the ROD/ESD using the agreed statistical method (CUSUM) for evaluating compliance with that requirement. The two-year waiting period, following completion of construction, for data evaluation has also been satisfied. As set forth in the enforcement documents WNG should be formally notified in writing of the status of our findings, which will set in motion the clock for the PRP to produce a plan for Additional Response Action.*

The above-referenced conclusion triggered the planning, design, and implementation of the groundwater extraction and treatment system that became operational in 2002 (see Sections 4.2.3 and 5.2.1).

5.2 Actions Completed Since the 1998 Five-Year Review

Actions completed since the last five-year review in 1998 are summarized below. A summary of groundwater quality since 1998, with emphasis on the TTP-3M and TT-18M areas, are also provided in this section.

5.2.1 Groundwater Extraction and Treatment

In response to the recommendation made in the 1998 Five-Year Review Report, WNG (now PSE) implemented efforts to select, design, and implement a groundwater remedy for the TTP-3M and TTP-18M areas. The chronology of these activities is summarized as follows:

- 1999—Groundwater remedial alternatives screening
- 2000—Field investigations to support design of the groundwater extraction and treatment facilities (e.g., well installations, pump testing)
- 2000 to 2001—Design studies for groundwater extraction and treatment system (DOF, 2000; Alta Geosciences, 2001a, 2001b)
- Fall 2001 to spring 2002—Construction of the groundwater extraction and treatment facilities
- Spring and summer of 2002—Startup testing
- Fall of 2002 to present—Normal operations

The groundwater extraction and treatment system is described further in Section 4.2.3.

5.2.2 Water Quality Monitoring

Sampling Program

The water quality monitoring program has continued at the Tacoma Tar Pits site since the last five-year review. A total of 36 groundwater monitoring wells, one water-supply well (Hygrade well), and one surface water sampling station (Burlington Northern ditch) are included in the program. The 36 monitoring wells included in the program are screened to monitor the Fill, Sand, and Lower aquifers as follows:

- Fill Aquifer - 8 wells
- Sand Aquifer - 23 wells
- Lower Aquifer - 5 wells

The water monitoring program was last revised in January 2002 (DOF, 2002). At that time, the following general revisions were made:

- Certain monitoring wells that had indicated no exceedances of ROD criteria over an extended period of time were eliminated from the sampling program.

- The sampling frequency for certain stations was reduced from quarterly to semiannual or annual basis (every other year for the Hygrade well) for stations with historically low levels of contamination or no contamination (Hygrade well).
- Lead and PCBs were eliminated from the groundwater sampling program because the concentration of these constituents indicate a long-term trend of being below the ROD criteria (see Section 4.4.1).

The current monitoring schedule (e.g., stations sampled, frequency, analytes) is provided in Appendix B. The water quality monitoring program is discussed further in Section 4.4.1.

Water Quality Trends

Surface water and groundwater quality trends are discussed below. ROD criteria for surface water and groundwater are listed in Table 4-1.

Surface water quality, as measured in the Burlington Northern ditch, consistently meets the ROD criteria. Data for 2002 and 2003 (through March 2003) are provided in Appendix B.

Since the last five-year review in 1998, groundwater quality evaluations have become increasingly focused on benzene. As referenced above, lead and PCBs have been eliminated from the groundwater sampling program. PAHs are present at some locations, but concentrations are typically low (below the ROD criteria in most cases) and co-located with benzene. Likewise, toluene, ethylbenzene, and xylenes are typically co-located with benzene. The following discussion focuses on benzene because the monitoring data collected over the years indicate that it is the primary contaminant of concern for groundwater.

Benzene is typically present above the 53 µg/L ROD criteria in the Sand Aquifer. Figure 5-1 illustrates where benzene is present in the Sand Aquifer above the ROD level of 53 µg/L. As shown in the figure, benzene is present above the 53 µg/L ROD level in three general areas:

- Interior Area—Includes the interior portion of the site generally bounded by the northwestern side of the waste pile, a northeast-southwest trending line running through the middle of the JS&S operating area, the Burlington Northern ditch on the southwest side of the site, and Detention Basin No. 2.
- TTP-3M Area—Includes the area near the south corner of the site in the vicinity of monitoring well TTP-3M.
- TTP-18M Area—Includes the area along the northeast boundary of the site in the vicinity of monitoring well TTP-18M.

Based on available data collected trough March 2003, benzene concentrations range up to approximately 4,000 µg/L in the interior of the site; 3,500 µg/L in the TTP-3M Area (at well DOF-34M); and 2,200 µg/L in the TTP-18M Area (at well DOF-33M). Trend charts showing benzene concentrations in the interior, TTP-3M, and TTP-18M areas are shown in Figures 5-2, 5-3, and 5-4, respectively.

The groundwater extraction wells (see Section 4.2.3 and Figure 4-4) are being operated in the TTP-3M and TTP-18M areas to prevent further offsite migration of groundwater contaminants. At the time the March 2003 groundwater monitoring data were collected (latest available data), the extraction system had only been operating on a continuous basis for 6 months. Although the extraction system is expected to be effective over time in controlling the offsite migration of benzene, the adequacy of the system cannot be assessed based on only 6 months of performance information. Quarterly monitoring will continue and the data will be used to assess the extraction system's impact on plume extent and contaminant concentrations.

Benzene concentrations in many wells at the site are prone to fluctuate, due to either seasonal impacts or for other reasons (see Figures 5-2, 5-3, and 5-4). Therefore, an increase or decrease of benzene concentrations from one monitoring event to the next, or even over several monitoring events, does not necessarily indicate a sustained trend. However, one offsite monitoring location, well TT-14M, appears to warrant special attention in the immediate future. Well TTP-14M has historically defined the extreme northwest limit of the offsite portion of the TTP-18M benzene plume (see Figure 5-1). As shown in Figure 5-4, benzene concentrations at well TTP-14M were below the ROD criteria of 53 µg/L from the mid-1990s when the initial RA was completed to early 2001. In early 2001, benzene concentrations exceeded the ROD level for the first time since the RA was completed and have been increasing ever since. The March 2003 results show that benzene is approaching 1,500 µg/L. The benzene trend at well TTP-14M shows no favorable effects after September 2002 that could be attributed to startup of the groundwater extraction and treatment system. However, the extraction system had only been operating for 6 months prior to March 2003 and it is reasonable to assume that additional time may be required before any groundwater quality improvement becomes evident at well TTP-14M.

5.3 Recent Site Development

Uses of the Tacoma Tar Pits site since the last five-year review have remained unchanged over most of the site, with one exception. The Hygrade facility at the northwest end of the site was demolished shortly after the last five-year review. Some of the vacant land was subsequently used temporarily for log storage. In mid-2003, work began on a 500-bed detention facility for BCIS. The facility is being constructed, and will be operated, by Correctional Services Corporation under contract to BCIS.

The extent of contamination study (Ebasco, 1990b) conducted in the late 1980s to support the RD considered the Hygrade Area (see Figure 3-2). The purpose of the study was to determine the limits of waste and soil contamination requiring excavation. The results of the study indicated that no wastes or contaminated soils requiring excavation or remediation were present in the Hygrade Area. Similarly, groundwater monitoring over the years in the Hygrade Area has demonstrated that shallow groundwater meets ROD criteria.

Plans for the BCIS detention facility were coordinated with EPA personnel by representatives of Correctional Services Corporation as part of project planning efforts. It was determined that the site conditions were not a threat to the health of individuals who are employed or detained at the facility. This conclusion was based on the following:

- The above-referenced extent of contamination study indicated that soils on the Hygrade site did not require remediation.
- Post-remediation monitoring data showing ROD criteria are being achieved for groundwater beneath the Hygrade site (groundwater beneath the site is not used for drinking or any other purpose).
- Soils present in the adjacent waste pile are physically and chemically stabilized and encapsulated beneath an engineered cover system such that there is no opportunity for human exposure to these materials through windblown dust or contaminated surface water runoff.

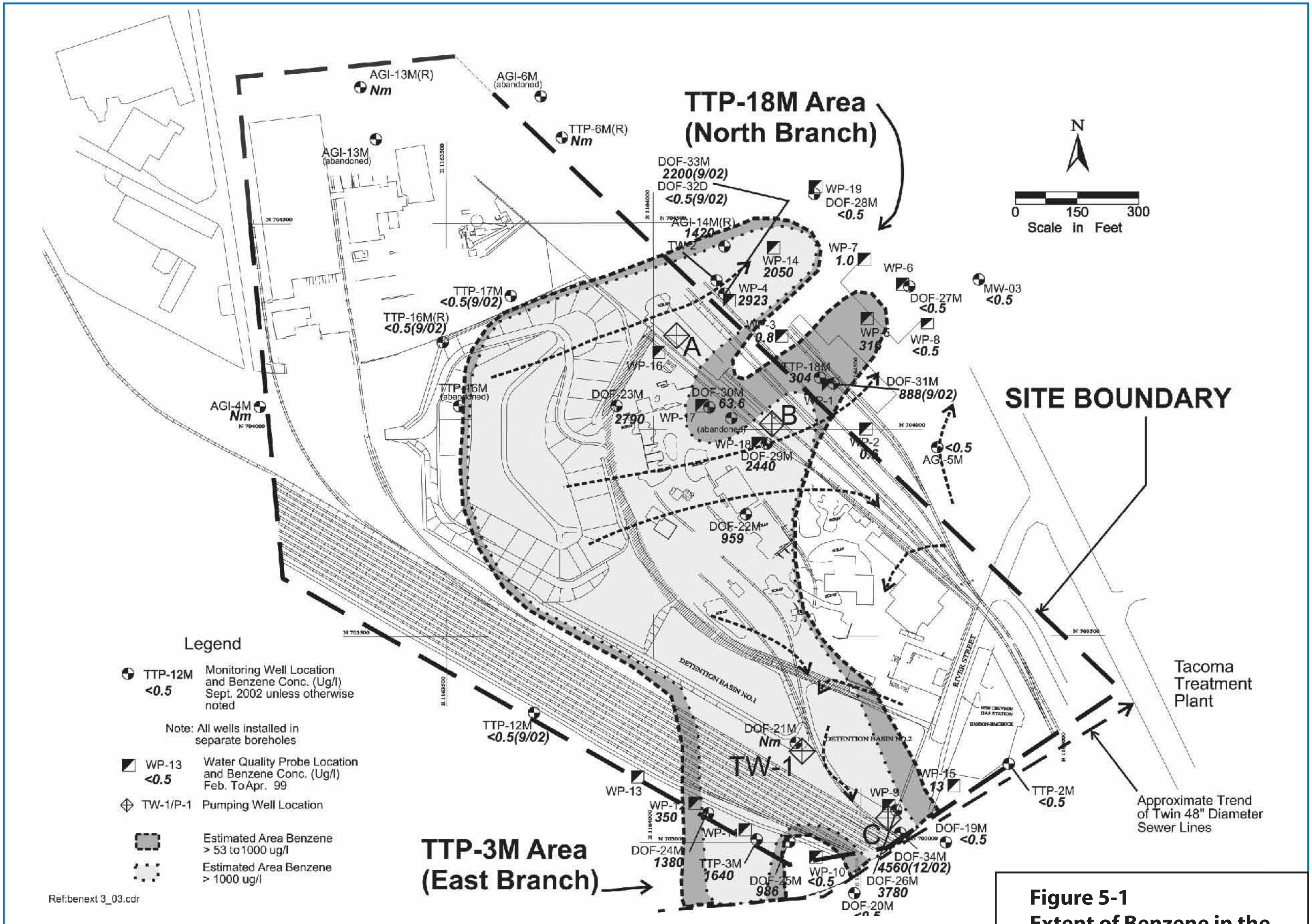
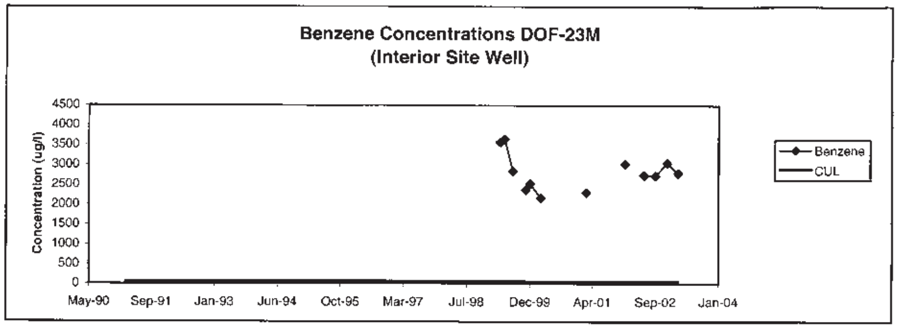
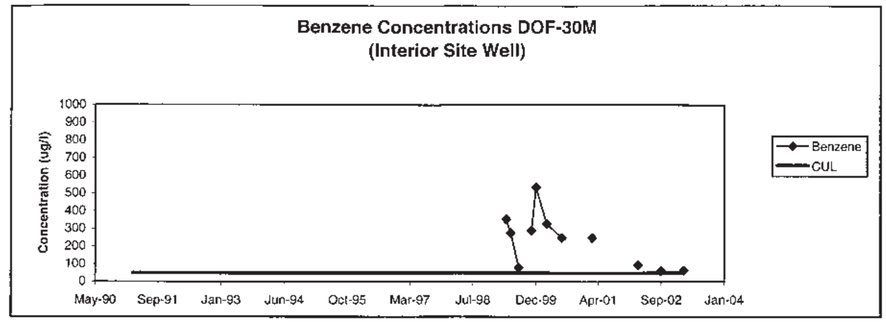


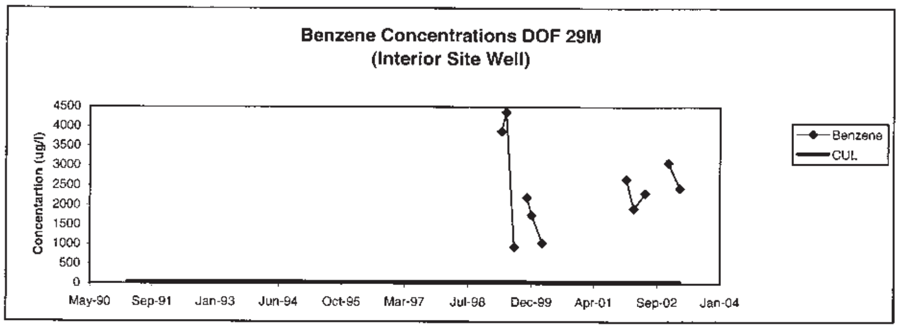
Figure provided by Dalton, Olmsted & Fuglevand, Inc..

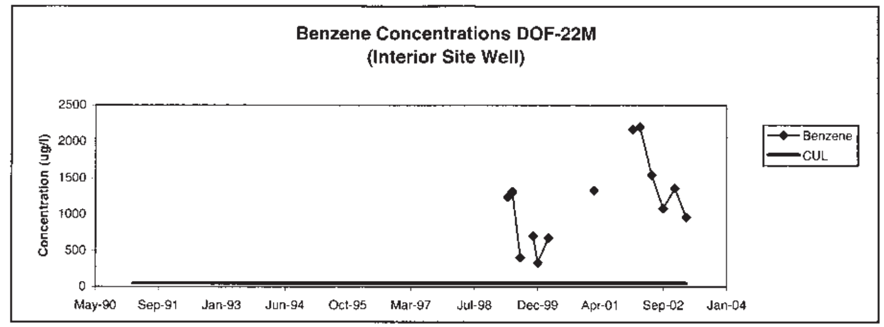
Figure 5-1
Extent of Benzene in the Sand Aquifer

Tacoma Historical Coal Gasification Site









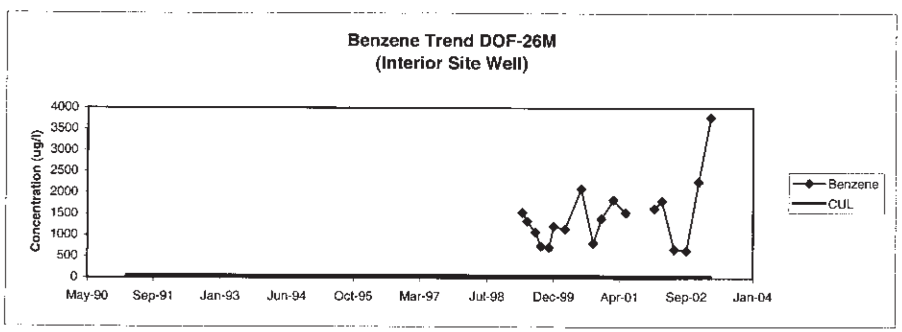


Figure provided by Dalton, Olmsted & Fuglevand, Inc..

Figure 5-2
Benzene Trends in Interior Area Wells

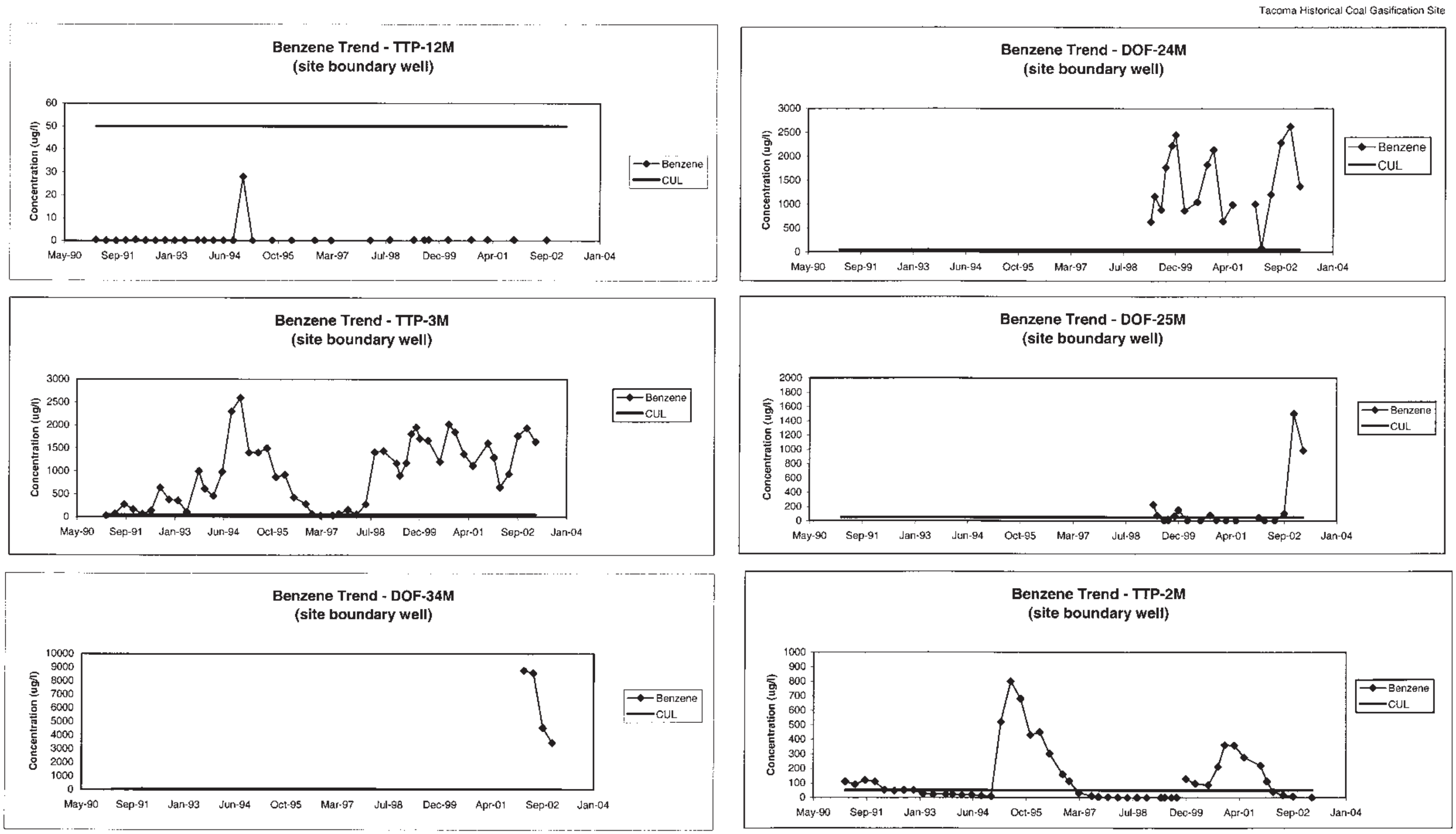


Figure provided by Dalton, Olmsted & Fuglevand, Inc..

Figure 5-3
Benzene Trends in TTP-3M Area Wells

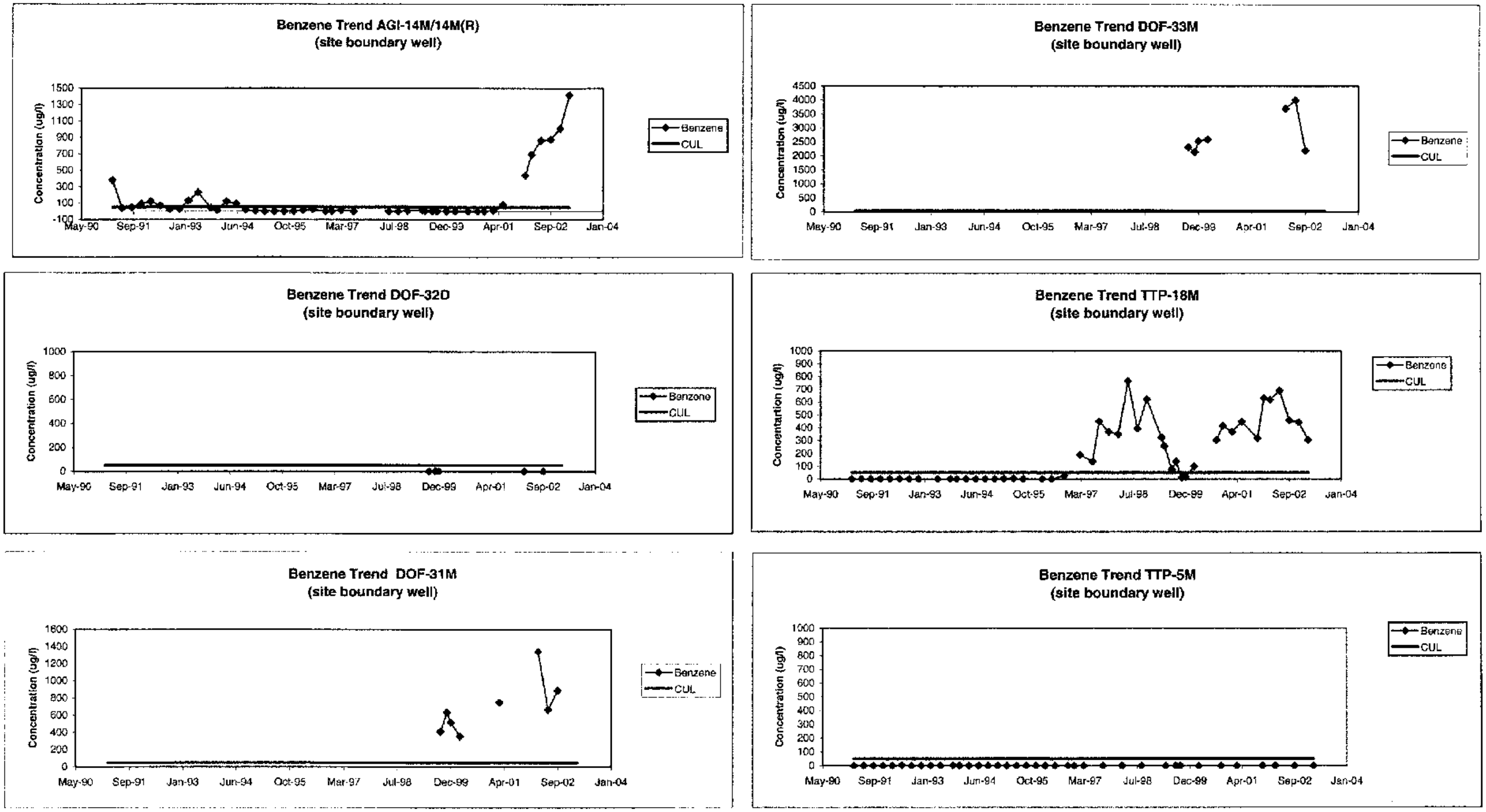


Figure provided by Dalton, Olmsted & Fuglevand, Inc..

Figure 5-4
Benzene Trends in TTP-18M Area Wells

6. Five-Year Review Process

Section 6 addresses the activities completed as part of the five-year review.

6.1 Administrative Components

This five-year review was conducted by EPA Region 10 staff with the assistance of CH2M HILL under EPA Contract No. 69-W-98-228. The review was conducted consistent with EPA's Comprehensive Five-Year Review Guidance (U.S. EPA, 2001). The evaluation was performed between June and September 2003.

6.2 Community Involvement

An public notice announcing the five-year review for the Tacoma Tar Pits site was published in the July 3, 2003, edition of the Tacoma News Tribune. The public notice solicited public comments related to the performance of the remedy for the Tacoma Tar Pits site. A copy of the announcement text is provided in Appendix C. EPA received no responses from the public or any other entity.

6.3 Supporting Documents

Appendix D provides a list of selected historical documents addressing past investigations, RDs and RAs, and ongoing monitoring for the Tacoma Tar Pits site. Because most of the individuals contributing to the five-year review have been involved with the site for a number of years, it was not necessary to review each of the listed documents in detail.

6.4 Data Review

Groundwater, surface water, and treatment plant data are collected on a regular basis as described in Section 5.2. Selected data collected since the last five-year review were reviewed to assess the progress made over the past five years with respect to remedy performance. These data include:

- Quarterly water monitoring reports
- Quarterly treatment plant discharge data

A summary of water quality trends, including conditions related to the benzene groundwater plumes in the TTP-3M and TT-18M areas, is provided in Section 5.2.

6.5 Review of Applicable and Relevant and Appropriate Requirements

An Applicable or Relevant and Appropriate Requirement (ARAR) review was conducted as part of the five-year review. The objective of the ARAR review was to identify federal or state regulatory standards promulgated since the last five-year review that might affect the protectiveness of the remedy. Although ARARs are "frozen" at the time the ROD is signed, EPA's Comprehensive Five-Year Review Guidance (U.S. EPA, 2001) specifies that newly promulgated or revised regulatory standards that bear on the protectiveness of the remedy be identified and evaluated during the five-year review. Requirements that are promulgated or modified after ROD signature must be attained (or waived) only when determined to be applicable or relevant and appropriate and necessary to ensure that the remedy is protective of human health and the environment (40 CFR 300.430(f)(ii)(B)(1)).

The results of the ARAR review are discussed on Section 7.2.

6.6 Site Inspection

A site inspection was conducted on July 24, 2003, as part of the five-year review process. The site visit was conducted to identify any problems associated with the remedy and ongoing site O&M that might interfere with remedy protectiveness.

The following individuals participated in the site visit:

- Lee Marshall, EPA Region 10, Remedial Project Manager
- Doug Holsten, CH2M HILL, EPA contractor
- Matt Dalton, DOF, Project Manager representing PSE
- Marc Simon, JS&S (present for tour of the JS&S site)

Based on the site inspection, the remedy is performing as expected and the related O&M activities appear adequate.

A Site Investigation Checklist is included as Appendix E and provides additional details regarding the condition and performance of the remedy.

6.7 Interviews

Several individuals were interviewed as part of the five-year review process. The interviews were conducted to identify successes or problems related to the remedy and O&M activities.

The following individuals were interviewed:

- Marc Simon, JS&S—Mr. Simon is employed by JS&S and is knowledgeable about the operations at the JS&S facility located within the boundaries of the Tacoma Tar Pits site. Mr. Simon was interviewed during the July 24, 2003, site visit.

- Mark Burley, JS&S—Mr. Burley is employed by JS&S and is knowledgeable about the operations at the JS&S facility located within the boundaries of the Tacoma Tar Pits site. Mr. Burley was interviewed by telephone on August 12, 2003.
- Steve Secrist, PSE—Mr. Secrist is the Tacoma Tar Pits project manager for the remedy and O&M elements for which PSE is responsible. Mr. Secrist was interviewed by telephone on August 14, 2003.
- Matt Dalton, DOF—Mr. Dalton is a consultant to PSE and is the project manager for the remedy and O&M elements for which PSE is responsible. Mr. Dalton was interviewed during the July 24, 2003, site visit.
- Bill Sullivan, Puyallup Tribe—Mr. Sullivan is the environmental director for the Puyallup Tribe, a project stakeholder. Mr. Sullivan was interviewed by telephone on August 12, 2003.
- Christopher Maurer, Ecology—Mr. Maurer is Ecology's point of contact for the Tacoma Tar Pits site. Mr. Maurer was interviewed by telephone on August 8, 2003.

Summaries of the above-referenced interviews are provided as Appendix F.

7. Technical Assessment

Section 7 presents a technical assessment of the remedy performance as implemented at the Tacoma Tar Pits site. As outlined in EPA's *Comprehensive Five-Year Review Guidance* (U.S. EPA, 2001), this assessments is structured to answer the following three questions:

- Is the remedy functioning as intended?
- Have the assumptions upon which the remedy was based changed?
- Has any other information come to light that could affect the remedy's protectiveness?

These questions are addressed in the following sections.

7.1 Is the Remedy Functioning as Intended?

The overall remedy for the Tacoma Tar Pits site includes two main components:

- Original Remedy—The original remedy was completed in 1995 and included excavation and stabilization of contaminated soils and waste, installation of low permeability caps, and surface water controls.
- Groundwater Extraction and Treatment System—A groundwater extraction and treatment system was completed in 2002. The system was designed to control offsite migration of benzene in groundwater at the south and northeast sides of the site (TTP-3M and TTP-18M areas, respectively).

The functionality of these two remedy components is discussed below.

7.1.1 Original Remedy

The components of the original remedy are performing adequately based on a review of site data, interviews with stakeholders, and observations made during the July 24, 2003, site visit.

Based on observations made during the July 24, 2003, site visit, the geomembrane and vegetative cap over the stabilized waste pile appear to be performing adequately. With one exception noted below, no cracks or failures were noted. Similarly, the low permeability concrete and asphalt pavement in the JS&S portion of the site is performing well with no significant wear or cracking that would appear to materially affect the permeability of the surfaces. Based on interviews with JS&S staff (see Appendix F), the pavements in the JS&S operating area are holding up well and the remedy is not restricting JS&S operations. The low permeability asphalt surface in the two detention basins adjacent to the JS&S operating area appears to be in good condition.

Two minor issues were identified during the site visit:

- Minor vegetation growth in surface water ditches may need to be controlled in the future to ensure the functionality of the drainage systems.
- A small failure in the pavement on the access road to the top of the cap needs to be repaired (see Appendix A, Photo 11).

O&M of the original remedy has continued according to the established schedule.

As noted in the 1998 *Five-Year Review* (U.S. EPA, 1998), the original remedy has not been effective in controlling offsite migration of groundwater contamination. This possibility was anticipated by the ROD, which included a contingency for implementing an active groundwater remedy if needed. As discussed in the 1998 five-year review report, continued offsite migration of groundwater contaminants (primarily benzene) triggered an EPA decision to require a supplemental groundwater remedy for the site.

7.1.2 Groundwater Extraction and Treatment System

As addressed in Section 5, the groundwater extraction and treatment system became operational in September 2002 to address benzene plumes in the TTP-3M and TTP-18M areas. Groundwater quality data for these areas is only available through March 2003. Because the system has been operating for only a limited time and the groundwater data is lagging, it is premature to make a conclusion concerning the effectiveness of the system. However, the available data indicate that the extraction wells are exerting the intended hydraulic control over the benzene plumes and the treatment plant is functioning as designed. Continued monitoring will be required to determine if the existing system is adequate to ultimately stop the offsite migration of benzene.

7.2 Have the Assumptions on Which the Remedy was Based Changed?

Changes in standards and exposure pathways are addressed below.

7.2.1 Changes in Standards

The preferred remedial alternative selected by the ROD consisted of a combination of source control measures to control contaminant release and reduce human exposure to contaminants.

The measures to control contaminants in soil and onsite surface water have been implemented. These remedies are protective because the cleanup levels were achieved and because there is no current or potential exposure to humans. ARARs that still must be met at this time are related to groundwater.

Groundwater ARARs Considered in 1987 ROD

The laws and regulations of concern identified in the ROD for groundwater included the Safe Drinking Water Act (SDWA) - Primary Drinking Standards (SDWA U.S.C. § 300; 40 CFR 141), the Resource Conservation and Recovery Act (RCRA) Corrective Action (40 CFR 264; WAC 173-303-645 (11)), and the Clean Water Act (CWA) NPDES Permit Program (WAC 173-220).

The SDWA has been revised on several occasions since the 1987 ROD to incorporate changes associated with regulation of additional contaminants, and to include new information developed from toxicity studies. Lead was among the indicator chemicals identified in the ROD. The cleanup level for lead was derived from the drinking water standards. According to the Risk Assessment, the cleanup level for lead was based on the MCL of 50 μg/L. In 1992, the MCL for lead was changed to an action level of 15 μg/L.

Groundwater performance standards identified in the ROD for benzene (53 μg/L), PCBs (0.2 μg/L), and PAHs (5 to 30 μg/L) were based on the acute (for benzene) and chronic (for total PCBs and PAHs) Freshwater Ambient Water Quality Criteria (AWQC) (40 CFR 131.36) established under the CWA. These criteria were established by the ROD based on possible discharges to off-site surface waters. Currently, there are no published criteria for benzene and PAHs. The current chronic criterion for PCBs by congener is 0.014 μg/L (note that PCBs were eliminated from the groundwater monitoring program in 1997 after sustained compliance with the ROD criterion; see Section 4.4.1). All criteria remain protective because groundwater is treated and not directly discharged to surface water.

In addition, the ROD cited the NPDES permit program as a substantive CWA requirement. As discussed in Section 4.2.3, the remedy for site groundwater now includes extraction and treatment, followed by discharge to the City of Tacoma's POTW. This change continues to be protective because the site must meet the city's permit discharge requirements, which are subject to the CWA. Furthermore, after additional treatment in the POTW, groundwater is discharged with the POTW's effluent under the conditions and requirements of a NPDES permit.

The substantive requirements of RCRA remain unchanged for the Tacoma Tar Pits site since the time the ROD was signed.

Regulatory Changes

MTCA was promulgated in 1989 under WAC 173-340. The rule established that the appropriate cleanup level for sites undergoing RA are the cleanup levels in effect at the time the final cleanup action was selected (WAC 173-340-702(12)(a)). Since the ROD was signed and identified the final cleanup action and cleanup levels prior to the promulgation of MTCA, the original MTCA is not an ARAR. Likewise, MTCA as amended in February 2001 is not an ARAR.

7.2.2 Changes in Exposure Pathways

An onsite groundwater extraction and treatment system began operating at the site in 2002. The system was designed and is operating to achieve the ROD groundwater performance standards at the site boundaries. The extraction of groundwater from the Sand Aquifer is intended to hydraulically control offsite movement of the two benzene plumes (in the TTP-3M and TTP-18M areas). Extracted groundwater is treated onsite and discharged to the City of Tacoma's POTW under Industrial Wastewater Discharge Permit No. 011-636-456. Groundwater receives additional treatment in the City's POTW.

Implementation of the groundwater RA is intended to eliminate offsite migration of contamination that has continued to occur after the initial remedy was completed in 1995. The groundwater remedy improves the protectiveness of the overall remedy because it is designed to actively capture and treat contaminated groundwater before it leaves the site boundaries.

7.3 Has Any Other Information Come to Light that Could Affect the Remedy's Protectiveness?

The five-year review did not identify any other information that could affect the protectiveness of the remedy. The systems associated with the original remedy (e.g., excavation and stabilization of contaminated soils and waste, installation of low permeability caps, surface water controls) appear to be functioning as intended. The exception is that the original remedy did not adequately control the migration of offsite groundwater contamination along the south and northeast boundaries of the site. This situation was recognized in the 1998 five-year review and subsequently addressed by installation of a groundwater extraction and treatment system (see Section 5).

The groundwater extraction and treatment system became operation in 2002. Thus far, the system is working as designed. The system has been operating less than a year and it is premature to determine if the anticipated improvement in groundwater quality is occurring.

No other issues have come to light that would indicate that the remedies as they have been implemented are not protective.

8. Issues

Five issues were identified as part of the five-year review that potentially affect future protectiveness of the remedy. These issues are listed in Table 8-1.

TABLE 8-1
Issues Potentially Affecting the Remedy's Current or Future Protectiveness
Tacoma Tar Pits Site, Tacoma, WA

Issue	Affects Current Protectiveness? (Yes/No)	Affects Future Protectiveness? (Yes/No)
1) The long-term effectiveness of the recently installed groundwater extraction and treatment system in reducing/eliminating offsite groundwater contamination has not yet been proven.	No—Does not affect current protectiveness because the local shallow groundwater system is not used for any purpose.	Yes—Future protectiveness may be an issue if offsite groundwater use changes in the future or if contaminated groundwater eventually reaches the Puyallup River.
2) Benzene shows an increasing concentration trend at offsite well TTP-14M (TTP-18M Area) starting in late 2001. No reduction of this trend is evident since the groundwater extraction and treatment system became operational in 2002.	No—Does not affect current protectiveness because the local shallow groundwater system is not used for any purpose.	Yes—Future protectiveness may be an issue if offsite groundwater use changes in the future or if contaminated groundwater eventually reaches the Puyallup River.
3) A small pavement failure has occurred in the road accessing the top of the stabilized waste pile.	No—The underlying low permeability cap remains in place and inhibits conveyance of water to the waste material.	Yes—If not repaired, the pavement failure area could expand and affect the functionality of the waste pile cap.
4) Vegetation is growing in some surface water drainage channels	No—The vegetation is not currently affecting the functionality of the drainage system.	Yes—Without maintenance, the vegetation may become more extensive and inhibit surface water flow.
5) Hydraulic conductivity testing of asphalt pavement covers has not been performed every five years, as required by the *Inspection and Maintenance Manual* (Ebasco, 1995).	No—Visual observations conducted during annual inspections and the July 24, 2003, site visit indicate that the asphalt is currently in good condition in those areas where the pavement is intended to act as a low-permeability cover (e.g., detention basins).	Yes—The lack of systematic assessment of asphalt pavement condition could lead to a situation where deterioration goes undetected. Under a worst-case scenario, such asphalt deterioration could result in increased permeability and unintended infiltration of surface water to the groundwater system, possibly accelerating the migration of groundwater contaminants.

9. Recommendations and Follow-up Actions

Table 9-1 lists the recommended follow-up actions related to the issues identified in Section 8.

TABLE 9-1
Recommendations/Follow-up Actions Regarding Issues Potentially Affecting the Remedy's Current or Future Protectiveness
Tacoma Tar Pits Site, Tacoma, WA

Issue	Recommendations/Follow-up Actions	Party Respons-ible	Oversight Agency	Milestone Date	Follow-up Actions Affect Protectiveness? (Yes/No) Current	Follow-up Actions Affect Protectiveness? (Yes/No) Future
1) Effectiveness of groundwater extraction and treatment system remains unproven.	Continue a) operating and optimizing the groundwater treatment/extraction system and b) monitoring groundwater and hydraulic capture on quarterly basis	PSE	EPA	12/31/04[a]	No	Yes
2) Benzene concentrations in offsite well TTP-14M are on an increasing trend.	Continue monitoring. Additional investigations and/or groundwater extraction should be initiated by 6/30/04 if the increase in benzene concentrations continue.	PSE	EPA	06/30/04	No	Yes
3) A small pavement failure has occurred in the road accessing the top of the stabilized waste pile.	The pavement failure should be repaired before the rainy season begins (e.g., November 2003). It is expected the failure will be identified as an action item during the next annual inspection by PSE (fall 2003).	PSE	EPA	10/31/03	No	Yes
4) Vegetative growth in surface water drainage channels	The current vegetation, and its potential impact to surface water drainage, should be assessed during the next annual inspection. A maintenance plan should be identified if needed.	PSE	EPA	11/30/03[b]	No	Yes
5) Hydraulic conductivity testing of asphalt pavement covers has not been performed every five years as required.	The scheduled frequency for hydraulic conductivity testing should be followed or an alternative way of systematically assessing asphalt pavement condition and permeability should be developed.	PSE	EPA	12/31/03	No	Yes

[a] Milestone date of 12/31/04 represents the estimated time by which the effectiveness of the groundwater extraction system may be evident. Continued groundwater quality and hydraulic monitoring needs to continue during the interim period and beyond.
[b] The extent and impact of the vegetation should be surveyed during the annual inspection in fall 2003 and a plan to address the issue should be developed by the milestone date of 11/30/03 (if required).

10. Protectiveness Statement

The remedy for the Tacoma Tar Pits site protects human health and the environment in the short-term. Sources of contamination including waste materials and contaminated soils have been excavated and either permanently stabilized in an onsite engineered waste pile or disposed of offsite. Low permeability caps and storm water drainage/detention systems are in place across critical areas of the site (e.g., stabilized waste pile). The low permeability caps and surface water controls prevent direct exposure to, and inhibit leaching of, stabilized wastes. These caps and surface water controls further act to minimize onsite groundwater recharge that could accelerate the movement of contaminated groundwater.

Groundwater continues to be contaminated beneath the interior of the site as anticipated by the ROD. Groundwater contamination has continued to migrate offsite in two areas. The primary contaminant of concern for groundwater is benzene. Presently, groundwater contamination does not present a threat to human health and the environment because shallow groundwater is not (1) used for any purpose in the vicinity of the site, or (2) discharging into local surface water bodies (e.g., Puyallup River) where it could potentially impact ecological receptors.

For the remedy to be protective in the long term, the following actions need to be taken:

- Ongoing annual inspections and O&M procedures must continue to ensure onsite remedy elements such as low permeability caps and surface water control structures remain functional.
- The recently constructed groundwater extraction and treatment system must continue to be operated to control and eliminate the offsite extension of benzene plumes in the TTP-3M and TTP-18M areas. Additional extraction wells or other optimization actions may ultimately be required if it is determined that the existing extraction configuration is not adequate.

11. Next Review

The next five-year review for the Tacoma Tar Pits site is required by September 2008, five years from the date of this review.

12. References

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U.S. EPA. 1991a. Consent Decree for Settlement Between the United States of America and Washington Natural Gas Company, No. C89-155TB (Consolidated with C89-489TB and C90-5373B). Lodged with U.S. District Court, Western District of Washington at Tacoma on October 4, 1991.

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U.S. EPA. 1998. *Five-Year Review, Tacoma Tar Pits Superfund Site*. U.S. Environmental Protection Agency. September 1998.

U.S. EPA. 2001. *Comprehensive Five-Year Review Guidance*. EPA 540-R-01-007. U.S. Environmental Protection Agency. June 2001.

APPENDIX A

Site Photos

Photo 1: Groundwater treatment plant with Detention Basin No. 1 in background.

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Photo 2: Groundwater treatment plant.

Photo 3: Groundwater treatment plant.

Photo 4: Groundwater treatment plant.

Photo 5: Groundwater treatment plant with Detention Basin No. 1 in foreground.

Photo 6: View to southeast from top of waste pile.

Photo 7: Detention Basin No. 1.

Photo 8: Southwest slope of waste pile.


Photo 9: View to north from top of waste pile.


Photo 10: BCIS facility under construction in "Hygrade Area."

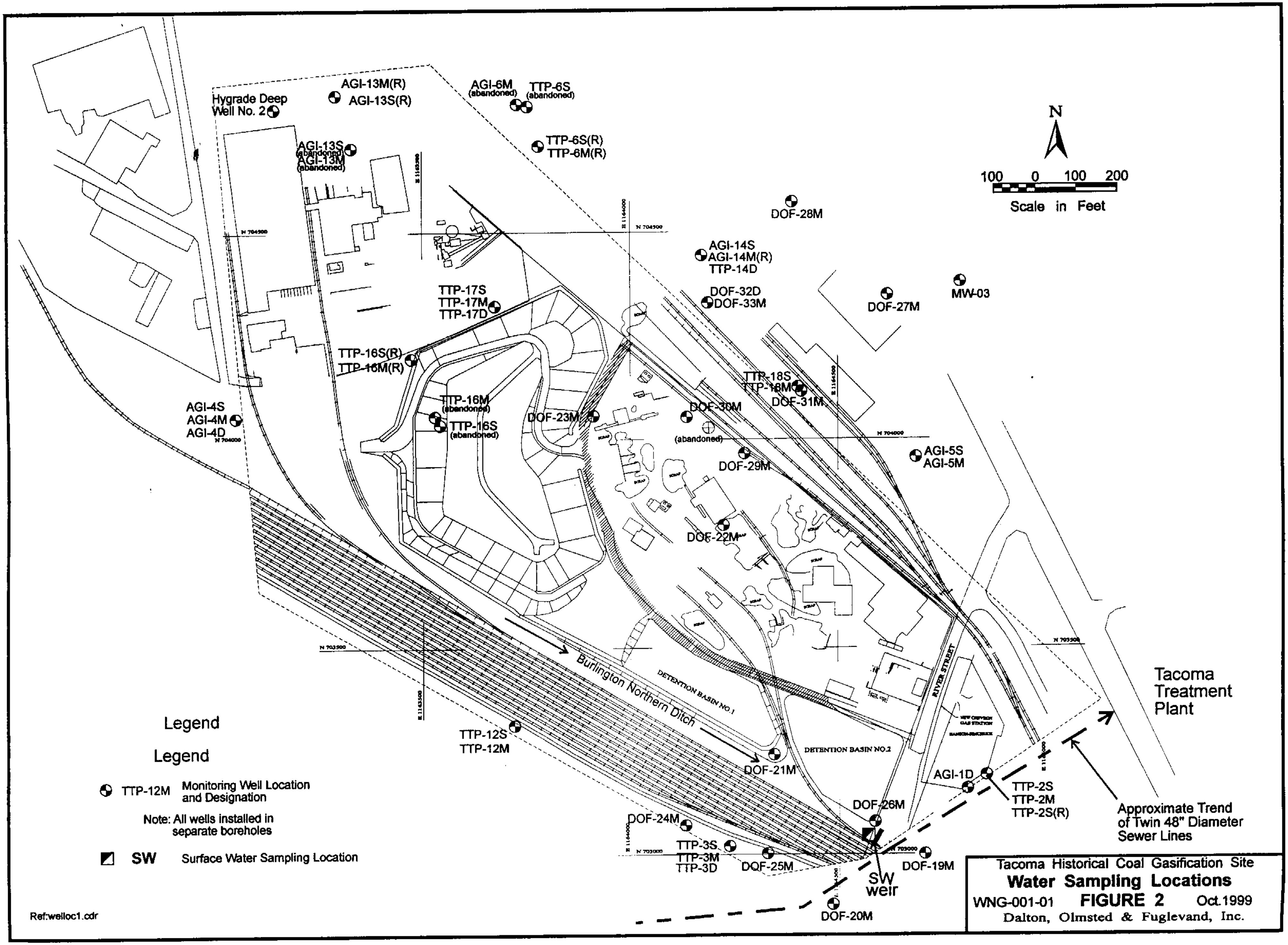
Photo 11: Small pavement failure in road accessing top of waste pile.

Photo 12: Example of vegetation in drainage ditch.

APPENDIX B

Water Monitoring Program and Results

Monitoring Locations



Tacoma Historical Coal Gasification Site

Water Sampling Locations

WNG-001-01 **FIGURE 2** Oct.1999

Dalton, Olmsted & Fuglevand, Inc.

Monitoring Schedule

Dalton, Olmsted & Fuglevand, Inc. *Environmental Consultants*

10827 NE 68th Street., Suite B • Kirkland, Washington 98033
Telephone (425) 827-4588 (FAX 739-9885)

2002 SAMPLING SCHEDULE

MEMORANDUM

TO: Lee Marshall - EPA

FROM: Matthew Dalton

DATE: January 4, 2002

SUBJECT: Revised Monitoring Program
THCGS

REF. NO: WNG-001-01 (revQTRMONSCH102.doc)

Cc: Steve Secrist - PSE
John Rork - PSE
Doug Holsten – CH2MHill
Terry Olmsted - DOF

Based on our conversation of January 2, 2002, we will implement the revised monitoring program summarized in our report titled "Summary of Water Quality Trends and Proposed Revised Monitoring Program" dated September 10, 2001. As agreed, the Hygrade well will be sampled for BTEX and PAHs every other year starting in September 2002. The revised program is attached as Table 1.

The program will be effective starting with the next monitoring round scheduled for January 2002. In the revised monitoring schedule, the next round was initially scheduled for December 2001 but was postponed until January 2002 to allow outstanding issues to be resolved.

We are working on developing a start-up monitoring program for the pump and treat system. This will be forwarded to you for review and comment in the next couple of weeks.

Please call if you have any additional questions or comments.

Matt Dalton

Table 1 - Revised Post-Remediation Monitoring Schedule (Effective January 2002)

Well	Water Level	Field Parameters(1)	BTEX	PAHs	PCBs	Dissolved* Lead/Cadmium	Notes
SITE BOUNDARY WELLS							
Fill Aquifer Wells							
TTP-2S(R)	Q	Q	Q	Q	(2)	(2)*	East/southeast portion of site
TTP-3S	Q	A*	A*	A*	(2)	(2)*	East/southeast portion of site; often dry; meets ROD criteria
AGI-4S	Q	(2)*	(2)*	(2)*	(2)	(2)*	Upgradient well; meets ROD criteria
AGI-5S	Q	A*	A*	A	(2)	(2)*	Meets ROD criteria
TTP-6S(R)	Q	(2)*	(2)*	(2)*	(2)	(2)*	Meets ROD criteria
TTP-12S	Q	A*	A*	(2)*	(2)	(2)*	Meets ROD criteria
AGI-13S	Q	(2)*	(2)*	(2)*	(2)	(2)*	Meets ROD criteria
AGI-14S	Q	A*	A*	A*	(2)	(2)*	Meets ROD criteria
TTP-18S	Q	A	A	A	(2)	(2)*	Meets ROD criteria; often dry
Sand Aquifer Wells							
TTP-2M	Q	Q	Q	Q	(2)	(2)*	East/southeast portion of site; benzene exceeds ROD criteria
TTP-3M	Q	Q	Q	Q	(2)	(2)*	East/southeast portion of site; benzene exceeds ROD criteria
AGI-4M	Q	(2)*	(2)*	(2)*	(2)	(2)*	Upgradient well; meets ROD criteria
AGI-5M	Q	S	S	A	(2)	(2)*	Meets ROD criteria
TTP-6M(R)	Q	(2)*	(2)*	(2)*	(2)	(2)*	Meets ROD criteria
TTP-12M	Q	A*	A*	(2)*	(2)	(2)*	Meets ROD criteria
AGI-13M	Q	(2)*	(2)*	(2)*	(2)	(2)*	Meets ROD criteria
AGI-14M	Q	Q	Q	S*	(2)	(2)*	Meets ROD criteria; consistent benzene detections
TTP-18M	Q	Q	Q	Q	(2)	(2)*	Exceeds benzene criteria
DOF-24M	Q*	Q*	Q*	—	—	—	New well since 1997
DOF-25M	Q*	Q*	Q*	—	—	—	New well since 1997
DOF-31M	Q*	Q*	Q*	S*	—	—	New well since 1997
DOF-33M	Q*	Q*	Q*	S*	—	—	New well since 1997
DOF-34M	Q*	Q*	Q*	S*	—	—	Proposed new well
Deep Wells							
AGI-1D	S*	S*	S*	S*	(2)	(2)*	East/southeast portion of site; meets ROD criteria
TTP-3D	S*	S*	S*	S*	(2)	(2)*	East/southeast portion of site; meets ROD criteria
TTP-4D	S*	(2)*	(2)*	(2)*	(2)	(2)*	Meets ROD criteria
TTP-14D	S*	A*	A*	A*	(2)	(2)*	Meets ROD criteria
Hygrade	—	(3)*	(3)*	(3)*	(2)	(2)*	Very deep well; meets ROD criteria
DOF-32D	S*	S*	S*	—	(2)	—	New well since 1997
INTERIOR INFORMATION WELLS							
Fill Aquifer Wells							
TTP-16S(R)	Q	A	A	A	(2)	(2)*	Interior site well; meets ROD criteria
TTP-17S	Q	A*	A*	A*	(2)	(2)*	Interior site well; meets ROD criteria
Sand Aquifer Wells							

Table 1 - Revised Post-Remediation Monitoring Schedule (Effective January 2002)

Well	Water Level	Field Parameters(1)	BTEX	PAHs	PCBs	Dissolved* Lead/Cadmium	Notes
TTP-16M(R)	Q	A	A	A	(2)	(2)*	Interior site well; meets ROD criteria
TTP-17M	Q	A*	A*	A*	(2)	(2)*	Interior site well; meets ROD criteria
DOF-21M	Q*	-----	-----	-----	-----	-----	New well since 1997
DOF-22M	Q*	Q*	Q*	S*	-----	-----	New well since 1997
DOF-23M	Q*	Q*	Q*	Q*	-----	-----	New well since 1997
DOF-26M	Q*	Q*	Q*	S*	-----	-----	New well since 1997
DOF-29M	Q*	Q*	Q*	S*	-----	-----	New well since 1997
DOF-30M	Q*	S*	S*	S*	-----	-----	New well since 1997
Deep Wells							
TTP-17D	Q	A*	A*	A*	(2)	(2)*	Interior site well; meets ROD criteria
DOWN-GRADIENT WELLS							
Sand Aquifer Wells							
DOF-19M	Q	S*	S*	S*	(2)	-----	On east side of sewer lines
DOF-20M	Q	S*	S*	S*	(2)	-----	On east side of sewer lines
DOF-27M	Q*	S*	S*	A*	-----	-----	New well since 1997
DOF-28M	Q*	S*	S*	A*	-----	-----	New well since 1997
MW-03	Q*	S*	S*	A*	-----	-----	
SURFACE WATER							
SW	-----	S*	S*	A*	(2)	Q(Cd);S*(Pb)	Surface water

A - Annual Sampling (September)
S - Semiannual Sampling (March and September)
Q - Quarterly Sampling (March, June, September & December)
* - Revision to monitoring program

(1) - Water Level, pH, Conductivitiy, Temperature & Turbidity
(2) - Eliminated from monitoring program
(3) - Sample every other year starting in September 2002
----- - Not part of past or proposed program

Monitoring Data, 2002

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	AGI-1D				TTP-2S (R)				TTP-2M			
Date	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02
Field Parameters												
pH	6.8	nm	6.8		6.5	6.5	6.4		7.2	7.5	7.5	
Conductivity (umohos)	625	nm	649		679	793	880		728	704	712	
Temperature (C)	13	nm	13		12.0	14.5	16		12.8	14.1	15	
Turbidity (NTU)	0.8	nm	7.0		65	31	21		3.7	4.6	6.5	
Volatiles (ug/l)												
Benzene	0.5 U	nm	0.5 U	nm	29.7	0.87 J	0.5 U	1.8	40.4	17	7.4	1.9
Toluene	0.5 U	nm	0.5 U	nm	2.11	1.47 J	0.94	0.83	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	nm	0.5 U	nm	79.8	1.12 J	0.5 U	2.6	4.52	0.5 U	0.5 U	0.5 U
Total Xylenes	1.0 U	nm	1.0 U	nm	62.6	34.6 J	17.0	8.8	12.9	3.78	2.8	1.0 U
PAHs (ug/l)												
Acenaphthene	0.1 U	nm	0.1 U	nm	19.7	17.4	16.0	8.6	13.7	11.9	12.1	9.8
Acenaphthylene	0.1 U	nm	0.1 U	nm	2.0	1.4	1.2	2.2	0.1 U	0.1 U	0.13	0.1 U
Anthracene	0.1 U	nm	0.1 U	nm	1.2	1.7	1.3	0.68	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(a)anthracene	0.1 U	nm	0.1 U	nm	0.1 U	0.17	0.16	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(a)pyrene	0.1 U	nm	0.1 U	nm	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(b)fluoranthene	0.1 U	nm	0.1 U	nm	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(ghi) perylene	0.1 U	nm	0.1 U	nm	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(k)fluoranthene	0.1 U	nm	0.1 U	nm	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chrysene	0.1 U	nm	0.1 U	nm	0.1 U	0.13	0.21	0.1 U	0.1 U	0.11	0.1 U	0.1 U
Dibenzo(a,h)anthracene	0.1 U	nm	0.1 U	nm	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Fluoranthene	0.1 U	nm	0.1 U	nm	0.51	1.1	1.1	0.45	0.1 U	0.13	0.1 U	0.1 U
Fluorene	0.1 U	nm	0.1 U	nm	6.1	6.4	5.2	4.1	0.88	1.05	1.1	0.83
Indeno(1,2,3-cd)pyrene	0.1 U	nm	0.1 U	nm	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Naphthalene	0.1 U	nm	0.1 U	nm	144	33.7	0.95	27.8	26.4	4.36	3.1	0.1 U
Phenanthrene	0.1 U	nm	0.1 U	nm	3.26	1.8	1.5	1.8	0.1 U	0.1 U	0.1 U	0.1 U
Pyrene	0.1 U	nm	0.1 U	nm	0.76	0.84	1.6	0.60	0.1 U	0.17	0.1 U	0.1 U
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	TTP-3S				TTP-3M				TTP-3D			
Date	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02
Field Parameters												
pH	nm	nm	dry		6.9	7.0	7.0		6.4	nm	7.4	
Conductivity (umohos)	nm	nm	dry		2650	3300	4480		817	nm	914	
Temperature (C)	nm	nm	dry		12.0	14.8	14		12	nm	13	
Turbidity (NTU)	nm	nm	dry		8.6	14.0	2.3		5.2	nm	1.5	
Volatiles (ug/l)												
Benzene	nm	nm	dry	nm	648	940	1,770	1,940	0.5 U	nm	0.5 U	nm
Toluene	nm	nm	dry	nm	5.0 U	9.05	25 U	14.7	0.5 U	nm	0.5 U	nm
Ethylbenzene	nm	nm	dry	nm	422	588	660	609	0.5 U	nm	0.5 U	nm
Total Xylenes	nm	nm	dry	nm	153 J	136 R	277 J	231	1.0 U	nm	1 U	nm
PAHs (ug/l)												
Acenaphthene	nm	nm	dry	nm	66.7	81.9	103	135	0.1 U	nm	0.1 U	nm
Acenaphthylene	nm	nm	dry	nm	1.3	2.3	1.8	2.0 U	0.1 U	nm	0.1 U	nm
Anthracene	nm	nm	dry	nm	0.1 U	2.0 UJ	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Benzo(a)anthracene	nm	nm	dry	nm	0.1 U	2.0 UJ	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Benzo(a)pyrene	nm	nm	dry	nm	0.1 U	2.0 U	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Benzo(b)fluoranthene	nm	nm	dry	nm	0.1 U	2.0 UJ	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Benzo(ghi) perylene	nm	nm	dry	nm	0.1 U	2.0 U	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Benzo(k)fluoranthene	nm	nm	dry	nm	0.1 U	2.0 UJ	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Chrysene	nm	nm	dry	nm	0.1 U	2.0 UJ	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Dibenzo(a,h)anthracene	nm	nm	dry	nm	0.1 U	2.0 U	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Fluoranthene	nm	nm	dry	nm	0.1 U	2.0 UJ	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Fluorene	nm	nm	dry	nm	2.4	3.1	4.3	2.0 U	0.1 U	nm	0.1 U	nm
Indeno(1,2,3-cd)pyrene	nm	nm	dry	nm	0.1 U	2.0 U	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Naphthalene	nm	nm	dry	nm	256	294	365	387	0.1 U	nm	0.1 U	nm
Phenanthrene	nm	nm	dry	nm	0.1 U	2.0 UJ	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
Pyrene	nm	nm	dry	nm	0.1 U	2.0 UJ	0.1 U	2.0 U	0.1 U	nm	0.1 U	nm
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	AGI-4S				AGI-4M				TTP-4D			
Date	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02
Field Parameters												
pH	nm	nm	nm		nm	nm	nm		nm	nm	nm	
Conductivity (umohos)	nm	nm	nm		nm	nm	nm		nm	nm	nm	
Temperature (C)	nm	nm	nm		nm	nm	nm		nm	nm	nm	
Turbidity (NTU)	nm	nm	nm		nm	nm	nm		nm	nm	nm	
Volatiles (ug/l)												
Benzene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Toluene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Ethylbenzene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Xylenes	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
PAHs (ug/l)												
Acenaphthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Acenaphthylene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Anthracene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(a)anthracene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(a)pyrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(b)fluoranthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(ghi) perylene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(k)fluoranthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Chrysene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dibenzo(a,h)anthracene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Fluoranthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Fluorene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Indeno(1,2,3-cd)pyrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Naphthalene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Phenanthrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Pyrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	AGI-5S				AGI-5M				TTP-6S(R)			
Date	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02
Field Parameters												
pH	nm	nm	6.3		7.6	nm	7.8		nm	nm	nm	
Conductivity (umohos)	nm	nm	1123		1211	nm	1082		nm	nm	nm	
Temperature (C)	nm	nm	15		13	nm	14		nm	nm	nm	
Turbidity (NTU)	nm	nm	3.5		2.2	nm	6.1		nm	nm	nm	
Volatiles (ug/l)												
Benzene	nm	nm	0.5 U	nm	0.92 J	nm	0.5 U	nm	nm	nm	nm	nm
Toluene	nm	nm	0.5 U	nm	0.5 U	nm	0.5 U	nm	nm	nm	nm	nm
Ethylbenzene	nm	nm	0.5 U	nm	0.5 U	nm	0.5 U	nm	nm	nm	nm	nm
Total Xylenes	nm	nm	1.0 U	nm	1.0 U	nm	1.0 U	nm	nm	nm	nm	nm
PAHs (ug/l)												
Acenaphthene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Acenaphthylene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Anthracene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Benzo(a)anthracene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Benzo(a)pyrene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Benzo(b)fluoranthene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Benzo(ghi) perylene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Benzo(k)fluoranthene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Chrysene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Dibenzo(a,h)anthracene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Fluoranthene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Fluorene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Indeno(1,2,3-cd)pyrene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Naphthalene	nm	nm	0.14	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Phenanthrene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
Pyrene	nm	nm	0.1 U	nm	nm	nm	0.1 UJ	nm	nm	nm	nm	nm
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	TTP-8M(R)				TTP-12S				TTP-12M			
Date	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02
Field Parameters												
pH	nm	nm	nm		nm	nm	6.6		nm	nm	7.0	
Conductivity (umohos)	nm	nm	nm		nm	nm	809		nm	nm	4300	
Temperature (C)	nm	nm	nm		nm	nm	16		nm	nm	13	
Turbidity (NTU)	nm	nm	nm		nm	nm	12		nm	nm	2.3	
Volatiles (ug/l)												
Benzene	nm	nm	nm	nm	nm	nm	0.5 U	nm	nm	nm	0.5 U	nm
Toluene	nm	nm	nm	nm	nm	nm	0.5 U	nm	nm	nm	0.5 U	nm
Ethylbenzene	nm	nm	nm	nm	nm	nm	0.5 U	nm	nm	nm	0.5 U	nm
Total Xylenes	nm	nm	nm	nm	nm	nm	1 U	nm	nm	nm	1 U	nm
PAHs (ug/l)												
Acenaphthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Acenaphthylene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Anthracene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(a)anthracene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(a)pyrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(b)fluoranthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(ghi) perylene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Benzo(k)fluoranthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Chrysene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dibenzo(a,h)anthracene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Fluoranthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Fluorene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Indeno(1,2,3-cd)pyrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Naphthalene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Phenanthrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Pyrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	AGI-13S/(R)				AGI-13M/(R)				AGI-14S			
Date	**3/02**	**6/02**	**9/02**	**12/02**	**3/02**	**6/02**	**9/02**	**12/02**	**3/02**	**6/02**	**9/02**	**12/02**
Field Parameters												
pH	nm	nm	nm		nm	nm	nm		nm	nm	7.1	
Conductivity (umohos)	nm	nm	nm		nm	nm	nm		nm	nm	559	
Temperature (C)	nm	nm	nm		nm	nm	nm		nm	nm	16	
Turbidity (NTU)	nm	nm	nm		nm	nm	nm		nm	nm	15	
Volatiles (ug/l)												
Benzene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.53	nm
Toluene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.5 U	nm
Ethylbenzene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.5 U	nm
Total Xylenes	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	1.0 U	nm
PAHs (ug/l)												
Acenaphthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Acenaphthylene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Anthracene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Benzo(a)anthracene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Benzo(a)pyrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Benzo(b)fluoranthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Benzo(ghi) perylene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Benzo(k)fluoranthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Chrysene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Dibenzo(a,h)anthracene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Fluoranthene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Fluorene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Indeno(1,2,3-cd)pyrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Naphthalene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Phenanthrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
Pyrene	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	0.1 U	nm
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	AGI-14M(R)				TTP-14D				TTP-16S(R)			
Date	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02
Field Parameters												
pH	**6.8**	**6.8**	**6.7**		nm	nm	**7.7**		nm	nm	**6.7**	
Conductivity (umohos)	**1820**	**1797**	**1877**		nm	nm	**2510**		nm	nm	**508**	
Temperature (C)	**13.0**	**14.1**	**13**		nm	nm	**13**		nm	nm	**16**	
Turbidity (NTU)	**285**	**188**	**1.9**		nm	nm	**0.4**		nm	nm	**120**	
Volatiles (ug/l)												
Benzene	**692**	**865**	**875**	**1010**	nm	nm	0.5 U	nm	nm	nm	0.5 U	nm
Toluene	10 U	**1.11**	12.5 U	**2.9**	nm	nm	0.5 U	nm	nm	nm	0.5 U	nm
Ethylbenzene	**66.4**	**63**	**76.4**	**59.6**	nm	nm	0.5 U	nm	nm	nm	0.5 U	nm
Total Xylenes	**77.3**	**63.2**	**77.2**	**66.1**	nm	nm	1.0 U	nm	nm	nm	1.0 U	nm
PAHs (ug/l)												
Acenaphthene	**10.9**	nm	**7.7**	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Acenaphthylene	0.1 U	nm	**0.25**	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Anthracene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(a)anthracene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(a)pyrene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(b)fluoranthene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(ghi) perylene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(k)fluoranthene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Chrysene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Dibenzo(a,h)anthracene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Fluoranthene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Fluorene	0.1 U	nm	**0.17**	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Indeno(1,2,3-cd)pyrene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Naphthalene	**4.1**	nm	**3.3**	nm	nm	nm	0.1 U	nm	nm	nm	**0.13**	nm
Phenanthrene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	0.1 U	nm
Pyrene	0.1 U	nm	0.1 U	nm	nm	nm	0.1 U	nm	nm	nm	**0.15**	nm
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	TTP-16M(R)							
Date	3/02		6/02		9/02		12/02	
Field Parameters								
pH	nm		nm		6.7			
Conductivity (umohos)	nm		nm		807			
Temperature (C)	nm		nm		14			
Turbidity (NTU)	nm		nm		32			
Volatiles (ug/l)								
Benzene	nm		nm		0.5	U	nm	
Toluene	nm		nm		0.5	U	nm	
Ethylbenzene	nm		nm		0.5	U	nm	
Total Xylenes	nm		nm		1.0	U	nm	
PAHs (ug/l)								
Acenaphthene	nm		nm		0.1	U	nm	
Acenaphthylene	nm		nm		0.1	U	nm	
Anthracene	nm		nm		0.1	U	nm	
Benzo(a)anthracene	nm		nm		0.1	U	nm	
Benzo(a)pyrene	nm		nm		0.1	U	nm	
Benzo(b)fluoranthene	nm		nm		0.1	U	nm	
Benzo(ghi) perylene	nm		nm		0.1	U	nm	
Benzo(k)fluoranthene	nm		nm		0.1	U	nm	
Chrysene	nm		nm		0.1	U	nm	
Dibenzo(a,h)anthracene	nm		nm		0.1	U	nm	
Fluoranthene	nm		nm		0.1	U	nm	
Fluorene	nm		nm		0.1	U	nm	
Indeno(1,2,3-cd)pyrene	nm		nm		0.1	U	nm	
Naphthalene	nm		nm		0.1	U	nm	
Phenanthrene	nm		nm		0.1	U	nm	
Pyrene	nm		nm		0.1	U	nm	
PCBs (ug/l)								
1016	nm		nm		nm		nm	
1221	nm		nm		nm		nm	
1232	nm		nm		nm		nm	
1242	nm		nm		nm		nm	
1248	nm		nm		nm		nm	
1254	nm		nm		nm		nm	
1260	nm		nm		nm		nm	
Other Parameters								
Dissolved Lead (ug/l)	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm	

Well Number	TTP-17S							
Date	3/02		6/02		9/02		12/02	
Field Parameters								
pH	nm		nm		6.4			
Conductivity (umohos)	nm		nm		806			
Temperature (C)	nm		nm		15			
Turbidity (NTU)	nm		nm		3.1			
Volatiles (ug/l)								
Benzene	nm		nm		0.5	U	nm	
Toluene	nm		nm		0.5	U	nm	
Ethylbenzene	nm		nm		0.5	U	nm	
Total Xylenes	nm		nm		1.0	U	nm	
PAHs (ug/l)								
Acenaphthene	nm		nm		0.1	U	nm	
Acenaphthylene	nm		nm		0.1	U	nm	
Anthracene	nm		nm		0.1		nm	
Benzo(a)anthracene	nm		nm		0.1	U	nm	
Benzo(a)pyrene	nm		nm		0.1	U	nm	
Benzo(b)fluoranthene	nm		nm		0.1	U	nm	
Benzo(ghi) perylene	nm		nm		0.1	U	nm	
Benzo(k)fluoranthene	nm		nm		0.1	U	nm	
Chrysene	nm		nm		0.1	U	nm	
Dibenzo(a,h)anthracene	nm		nm		0.1	U	nm	
Fluoranthene	nm		nm		0.1	U	nm	
Fluorene	nm		nm		0.1	U	nm	
Indeno(1,2,3-cd)pyrene	nm		nm		0.1	U	nm	
Naphthalene	nm		nm		0.1	U	nm	
Phenanthrene	nm		nm		0.1	U	nm	
Pyrene	nm		nm		0.1	U	nm	
PCBs (ug/l)								
1016	nm		nm		nm		nm	
1221	nm		nm		nm		nm	
1232	nm		nm		nm		nm	
1242	nm		nm		nm		nm	
1248	nm		nm		nm		nm	
1254	nm		nm		nm		nm	
1260	nm		nm		nm		nm	
Other Parameters								
Dissolved Lead (ug/l)	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm	

Well Number	TTP-17M							
Date	3/02		6/02		9/02		12/02	
Field Parameters								
pH	nm		nm		6.8			
Conductivity (umohos)	nm		nm		898			
Temperature (C)	nm		nm		14			
Turbidity (NTU)	nm		nm		22.0			
Volatiles (ug/l)								
Benzene	nm		nm		0.5	U	nm	
Toluene	nm		nm		0.5	U	nm	
Ethylbenzene	nm		nm		0.5	U	nm	
Total Xylenes	nm		nm		1.0	U	nm	
PAHs (ug/l)								
Acenaphthene	nm		nm		1.6		nm	
Acenaphthylene	nm		nm		0.1	U	nm	
Anthracene	nm		nm		0.1	U	nm	
Benzo(a)anthracene	nm		nm		0.1	U	nm	
Benzo(a)pyrene	nm		nm		0.1	U	nm	
Benzo(b)fluoranthene	nm		nm		0.1	U	nm	
Benzo(ghi) perylene	nm		nm		0.1	U	nm	
Benzo(k)fluoranthene	nm		nm		0.1	U	nm	
Chrysene	nm		nm		0.1	U	nm	
Dibenzo(a,h)anthracene	nm		nm		0.1	U	nm	
Fluoranthene	nm		nm		0.1	U	nm	
Fluorene	nm		nm		0.1	U	nm	
Indeno(1,2,3-cd)pyrene	nm		nm		0.1	U	nm	
Naphthalene	nm		nm		0.1	U	nm	
Phenanthrene	nm		nm		0.1	U	nm	
Pyrene	nm		nm		0.1	U	nm	
PCBs (ug/l)								
1016	nm		nm		nm		nm	
1221	nm		nm		nm		nm	
1232	nm		nm		nm		nm	
1242	nm		nm		nm		nm	
1248	nm		nm		nm		nm	
1254	nm		nm		nm		nm	
1260	nm		nm		nm		nm	
Other Parameters								
Dissolved Lead (ug/l)	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm	

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	TTP-17D								TTP-18S								TTP-18M							
Date	3/02		6/02		9/02		12/02		3/02		6/02		9/02		12/02		3/02		6/02		9/02		12/02	
Field Parameters																								
pH	nm		nm		8.0				nm		nm		ISV				7.3		7.1		7.1			
Conductivity (umohos)	nm		nm		3380				nm		nm		ISV				3100		3200		2980			
Temperature (C)	nm		nm		13				nm		nm		ISV				14.4		16.4		16.0			
Turbidity (NTU)	nm		nm		0.5				nm		nm		ISV				9.2		3.1		1.4			
Volatiles (ug/l)																								
Benzene	nm		nm		0.5	U	nm		nm		nm		0.5	UJ	nm		619	J	690		458		444	
Toluene	nm		nm		0.5	U	nm		nm		nm		0.5	UJ	nm		5.0	U	1.1		1.2		0.97	
Ethylbenzene	nm		nm		0.5	U	nm		nm		nm		0.5	UJ	nm		5.0	U	6.6		11.0		10.6	
Total Xylenes	nm		nm		1.0	U	nm		nm		nm		1.0	UJ	nm		12.9	J	13.8		12.9	J	13.2	
PAHs (ug/l)																								
Acenaphthene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	U	0.1	UJ	0.1	U
Acenaphthylene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	U	0.1	UJ	0.1	U
Anthracene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Benzo(a)anthracene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Benzo(a)pyrene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Benzo(b)fluoranthene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Benzo(ghi) perylene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Benzo(k)fluoranthene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Chrysene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Dibenzo(a,h)anthracene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Fluoranthene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Fluorene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	U	0.1	UJ	0.1	U
Indeno(1,2,3-cd)pyrene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Naphthalene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		19.4		61.2		2.8	J	14.8	
Phenanthrene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
Pyrene	nm		nm		0.1	U	nm		nm		nm		ISV		nm		0.1	U	0.5	UJ	0.1	UJ	0.1	U
PCBs (ug/l)																								
1016	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1221	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1232	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1242	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1248	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1254	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1260	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
Other Parameters																								
Dissolved Lead (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	DOF-19M							
Date	3/02		6/02		9/02		12/02	
Field Parameters								
pH	6.8		nm		7.1			
Conductivity (umohos)	1108		nm		1171			
Temperature (C)	12.2		nm		14			
Turbidity (NTU)	166		nm		85			
Volatiles (ug/l)								
Benzene	0.5	U	nm		0.5	U	nm	
Toluene	0.5	U	nm		0.5	U	nm	
Ethylbenzene	0.5	U	nm		0.5	U	nm	
Total Xylenes	1.0	U	nm		1.0	U	nm	
PAHs (ug/l)								
Acenaphthene	0.1	U	nm		0.11		nm	
Acenaphthylene	0.1	U	nm		0.1	U	nm	
Anthracene	0.1	U	nm		0.1	U	nm	
Benzo(a)anthracene	0.1	U	nm		0.1	U	nm	
Benzo(a)pyrene	0.1	U	nm		0.1	U	nm	
Benzo(b)fluoranthene	0.1	U	nm		0.1	U	nm	
Benzo(ghi) perylene	0.1	U	nm		0.1	U	nm	
Benzo(k)fluoranthene	0.1	U	nm		0.1	U	nm	
Chrysene	0.1	U	nm		0.1	U	nm	
Dibenzo(a,h)anthracene	0.1	U	nm		0.1	U	nm	
Fluoranthene	0.1	U	nm		0.1	U	nm	
Fluorene	0.1	U	nm		0.1	U	nm	
Indeno(1,2,3-cd)pyrene	0.1	U	nm		0.1	U	nm	
Naphthalene	0.1	U	nm		0.1	U	nm	
Phenanthrene	0.1	U	nm		0.1	U	nm	
Pyrene	0.1	U	nm		0.1	U	nm	
PCBs (ug/l)								
1016	nm		nm		nm		nm	
1221	nm		nm		nm		nm	
1232	nm		nm		nm		nm	
1242	nm		nm		nm		nm	
1248	nm		nm		nm		nm	
1254	nm		nm		nm		nm	
1260	nm		nm		nm		nm	
Other Parameters								
Dissolved Lead (ug/l)	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm	

Well Number	DOF-20M							
Date	3/02		6/02		9/02		12/02	
Field Parameters								
pH	7.0		nm		7.1			
Conductivity (umohos)	2100		nm		6750			
Temperature (C)	13		nm		14			
Turbidity (NTU)	96		nm		58			
Volatiles (ug/l)								
Benzene	0.5	U	nm		0.52		nm	
Toluene	0.5	U	nm		0.5	U	nm	
Ethylbenzene	0.5	U	nm		0.5	U	nm	
Total Xylenes	1.0	U	nm		1.0	U	nm	
PAHs (ug/l)								
Acenaphthene	0.1	U	nm		0.19		nm	
Acenaphthylene	0.1	U	nm		0.1	U	nm	
Anthracene	0.1	U	nm		0.1	U	nm	
Benzo(a)anthracene	0.1	U	nm		0.1	U	nm	
Benzo(a)pyrene	0.1	U	nm		0.1	U	nm	
Benzo(b)fluoranthene	0.1	U	nm		0.1	U	nm	
Benzo(ghi) perylene	0.1	U	nm		0.1	U	nm	
Benzo(k)fluoranthene	0.1	U	nm		0.1	U	nm	
Chrysene	0.1	U	nm		0.1	U	nm	
Dibenzo(a,h)anthracene	0.1	U	nm		0.1	U	nm	
Fluoranthene	0.1	U	nm		0.14		nm	
Fluorene	0.1	U	nm		0.16		nm	
Indeno(1,2,3-cd)pyrene	0.1	U	nm		0.1	U	nm	
Naphthalene	0.1	U	nm		0.1	U	nm	
Phenanthrene	0.1	U	nm		0.18		nm	
Pyrene	0.1	U	nm		0.12		nm	
PCBs (ug/l)								
1016	nm		nm		nm		nm	
1221	nm		nm		nm		nm	
1232	nm		nm		nm		nm	
1242	nm		nm		nm		nm	
1248	nm		nm		nm		nm	
1254	nm		nm		nm		nm	
1260	nm		nm		nm		nm	
Other Parameters								
Dissolved Lead (ug/l)	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm	

Well Number	Hygrade No. 2							
Date	3/02		6/02		9/02		12/02	
Field Parameters								
pH	nm		nm		8.5			
Conductivity (umohos)	nm		nm		130			
Temperature (C)	nm		nm		13			
Turbidity (NTU)	nm		nm		0.3			
Volatiles (ug/l)								
Benzene	nm		nm		0.5	U	nm	
Toluene	nm		nm		0.5	U	nm	
Ethylbenzene	nm		nm		0.5	U	nm	
Total Xylenes	nm		nm		1.0	U	nm	
PAHs (ug/l)								
Acenaphthene	nm		nm		0.1	UJ	nm	
Acenaphthylene	nm		nm		0.1	UJ	nm	
Anthracene	nm		nm		0.1	UJ	nm	
Benzo(a)anthracene	nm		nm		0.1	UJ	nm	
Benzo(a)pyrene	nm		nm		0.1	UJ	nm	
Benzo(b)fluoranthene	nm		nm		0.1	UJ	nm	
Benzo(ghi) perylene	nm		nm		0.1	UJ	nm	
Benzo(k)fluoranthene	nm		nm		0.1	UJ	nm	
Chrysene	nm		nm		0.1	UJ	nm	
Dibenzo(a,h)anthracene	nm		nm		0.1	UJ	nm	
Fluoranthene	nm		nm		0.1	UJ	nm	
Fluorene	nm		nm		0.1	UJ	nm	
Indeno(1,2,3-cd)pyrene	nm		nm		0.1	UJ	nm	
Naphthalene	nm		nm		0.1	UJ	nm	
Phenanthrene	nm		nm		0.1	UJ	nm	
Pyrene	nm		nm		0.1	UJ	nm	
PCBs (ug/l)								
1016	nm		nm		nm		nm	
1221	nm		nm		nm		nm	
1232	nm		nm		nm		nm	
1242	nm		nm		nm		nm	
1248	nm		nm		nm		nm	
1254	nm		nm		nm		nm	
1260	nm		nm		nm		nm	
Other Parameters								
Dissolved Lead (ug/l)	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm	

December data not validated

Table 3 - Summary of Water Quality Data - Monitoring Year 2002

Well Number	SW								MW-3							
Date	3/02		6/02		9/02		12/02		3/02		6/02		9/02		12/02	
Field Parameters																
pH	6.2		nm		dry				7.3		nm		7.3			
Conductivity (umohos)	213		nm		dry				15,800		nm		15000			
Temperature (C)	10.3		nm		dry				13		nm		13			
Turbidity (NTU)	72		nm		dry				3.5		nm		0.5			
Volatiles (ug/l)																
Benzene	3.4		nm		dry		nm		0.5	U	nm		0.5	U	nm	
Toluene	0.64		nm		dry		nm		0.5	U	nm		0.5	U	nm	
Ethylbenzene	3.4		nm		dry		nm		0.5	U	nm		0.5	U	nm	
Total Xylenes	2.7		nm		dry		nm		1.0	U	nm		1.0	U	nm	
PAHs (ug/l)																
Acenaphthene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Acenaphthylene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Anthracene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Benzo(a)anthracene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Benzo(a)pyrene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Benzo(b)fluoranthene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Benzo(ghi) perylene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Benzo(k)fluoranthene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Chrysene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Dibenzo(a,h)anthracene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Fluoranthene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Fluorene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Indeno(1,2,3-cd)pyrene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Naphthalene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Phenanthrene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
Pyrene	nm		nm		dry		nm		nm		nm		0.1	UJ	nm	
PCBs (ug/l)																
1016	nm		nm		nm		nm		nm		nm		nm		nm	
1221	nm		nm		nm		nm		nm		nm		nm		nm	
1232	nm		nm		nm		nm		nm		nm		nm		nm	
1242	nm		nm		nm		nm		nm		nm		nm		nm	
1248	nm		nm		nm		nm		nm		nm		nm		nm	
1254	nm		nm		nm		nm		nm		nm		nm		nm	
1260	nm		nm		nm		nm		nm		nm		nm		nm	
Other Parameters																
Dissolved Lead (ug/l)	19.9		nm		nm		1	U	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	1	U	nm		nm		1	U	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm	

Notes to Table 2

nm= Not measured-well and/or analyte not on monitoring schedule
U = Not detected at indicated detection limit
J = Estimated concentration
ISV= Insufficient volume

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2002

Well Number	DOF-21M				DOF-22M				DOF-23M			
Date	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02
Field Parameters												
pH	nm	nm	nm	nm	6.9	7.1	6.8		6.7	6.9	6.7	
Conductivity (umohos)	nm	nm	nm	nm	4440	4200	3870		1508	1766	1733	
Temperature (C)	nm	nm	nm	nm	14.5	17.4	16		12.9	15.5	15	
Turbidity (NTU)	nm	nm	nm	nm	17	210	4.1		9	3.2	6.2	
Volatiles (ug/l)												
Benzene	nm	nm	nm	nm	2200	1540	1080	1360	nm	2740	2730	3050
Toluene	nm	nm	nm	nm	46.3	47.9	10.9 J	26.3	nm	25 U	50 U	10 U
Ethylbenzene	nm	nm	nm	nm	722	591	482	513	nm	955	906	1020
Total Xylenes	nm	nm	nm	nm	412 J	351	928 J	218	nm	424	400	414
PAHs (ug/l)												
Acenaphthene	nm	nm	nm	nm	70.9	nm	19.9 J	nm	151	187	53.1	253
Acenaphthylene	nm	nm	nm	nm	12.9	nm	2.3 J	nm	0.1 U	0.1 U	1.1	0.1 U
Anthracene	nm	nm	nm	nm	3.1	nm	1.2 J	nm	1.4	3.1	1.4	1.9
Benzo(a)anthracene	nm	nm	nm	nm	0.57	nm	0.12 J	nm	0.18	0.31	0.21	0.30
Benzo(a)pyrene	nm	nm	nm	nm	0.1 U	nm	0.1 UJ	nm	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(b)fluoranthene	nm	nm	nm	nm	0.53	nm	0.1 UJ	nm	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(ghi) perylene	nm	nm	nm	nm	0.1 U	nm	0.1 UJ	nm	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(k)fluoranthene	nm	nm	nm	nm	0.21	nm	0.1 UJ	nm	0.1 U	0.1 U	0.1 U	0.1 U
Chrysene	nm	nm	nm	nm	0.50	nm	0.12 J	nm	0.18	0.31	0.19	0.30
Dibenzo(a,h)anthracene	nm	nm	nm	nm	0.1 U	nm	0.1 UJ	nm	0.1 U	0.1 U	0.1 U	0.1 U
Fluoranthene	nm	nm	nm	nm	1.1	nm	0.45 J	nm	0.78	1.1	0.39	0.91
Fluorene	nm	nm	nm	nm	16	nm	6.0 J	nm	12.3	0.1 U	59.2	15.1
Indeno(1,2,3-cd)pyrene	nm	nm	nm	nm	0.1 U	nm	0.1 UJ	nm	0.1 U	0.1 U	0.1 U	0.1 U
Naphthalene	nm	nm	nm	nm	1390	nm	228 J	nm	627	457	29.2	215
Phenanthrene	nm	nm	nm	nm	13.6	nm	4.5 J	nm	5.1	6.7	4.5	5.8
Pyrene	nm	nm	nm	nm	2.0	nm	0.59 J	nm	1.4	1.8	1.1	1.6
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2002

Well Number	DOF-24M								DOF-25M								DOF-26M							
Date	3/02		6/02		9/02		12/02		3/02		6/02		9/02		12/02		3/02		6/02		9/02		12/02	
Field Parameters																								
pH	7.3		7.3		7.3				6.8		7		6.5				6.5		7.1		6.8			
Conductivity (umohos)	5400		4200		5030				1552		1370		2030				627		603		537			
Temperature (C)	12.6		13.8		14				12		13.7		14				11.5		13.5		14			
Turbidity (NTU)	1.9		25		5.3				4.7		74		4.5				100		53		18			
Volatiles (ug/l)																								
Benzene	83.4		1210		2290		2,630		0.87		1.0	U	103		1500		1,810		673		646		2,260	
Toluene	5	U	13.3		122		28.2		0.5	U	1.0	U	2.5	U	9.4		10	U	5	U	10	U	6.5	
Ethylbenzene	347		609		889		989		5.4		1.0	U	44.9		392		563		176		194		748	
Total Xylenes	69.1	J	135		343	J	361		1	U	2.0	U	12	J	131		274		71.5		94		419	
PAHs (ug/l)																								
Acenaphthene	nm		nm		nm		nm		nm		nm		nm		nm		70.5		nm		27.1		nm	
Acenaphthylene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.51		nm	
Anthracene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.17		nm	
Benzo(a)anthracene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
Benzo(a)pyrene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
Benzo(b)fluoranthene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
Benzo(ghi) perylene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
Benzo(k)fluoranthene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
Chrysene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
Dibenzo(a,h)anthracene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
Fluoranthene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
Fluorene	nm		nm		nm		nm		nm		nm		nm		nm		18.6		nm		8.5		nm	
Indeno(1,2,3-cd)pyrene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
Naphthalene	nm		nm		nm		nm		nm		nm		nm		nm		2780		nm		173		nm	
Phenanthrene	nm		nm		nm		nm		nm		nm		nm		nm		3.5		nm		1.7		nm	
Pyrene	nm		nm		nm		nm		nm		nm		nm		nm		0.1	U	nm		0.1	U	nm	
PCBs (ug/l)																								
1016	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1221	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1232	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1242	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1248	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1254	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
1260	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
Other Parameters																								
Dissolved Lead (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm		nm	

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2002

Well Number	DOF-27M				DOF-28M				DOF-29M			
Date	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02
Field Parameters												
pH	6.8	nm	7.3	nm	6.8	nm	7	nm	7.1	7.1	na	
Conductivity (umohos)	2890	nm	2840	nm	2200	nm	2920	nm	3750	3800	na	
Temperature (C)	13.5	nm	13	nm	12.7	nm	13	nm	13.2	15.9	na	
Turbidity (NTU)	7.9	nm	2.6	nm	70	nm	2.3	nm	31	220	na	
Volatiles (ug/l)												
Benzene	0.5 U	nm	0.5 U	nm	0.5 U	nm	0.5 U	nm	1920	2310	na	3080
Toluene	0.5 U	nm	0.5 U	nm	0.5 U	nm	0.5 U	nm	6.0	25 U	na	25 U
Ethylbenzene	0.5 U	nm	0.5 U	nm	0.5 U	nm	0.5 U	nm	562	585	na	733
Total Xylenes	1.0 U	nm	1.0 U	nm	1.0 U	nm	1.0 U	nm	146 J	173	na	204
PAHs (ug/l)												
Acenaphthene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	42.7	nm	na	nm
Acenaphthylene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Anthracene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Benzo(a)anthracene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Benzo(a)pyrene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Benzo(b)fluoranthene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Benzo(ghi) perylene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.13	nm	na	nm
Benzo(k)fluoranthene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Chrysene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Dibenzo(a,h)anthracene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Fluoranthene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Fluorene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Indeno(1,2,3-cd)pyrene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Naphthalene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	59.8	nm	na	nm
Phenanthrene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
Pyrene	nm	nm	0.1 U	nm	nm	nm	0.1 UR	nm	0.1 U	nm	na	nm
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2002

Well Number	DOF-30M				DOF-31M				DOF-32D			
Date	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02	3/02	6/02	9/02	12/02
Field Parameters												
pH	6.8	nm	6.9	nm	7.2	7.3	7.1	nm	7.1	nm	7.5	nm
Conductivity (umohos)	2460	nm	2400	nm	3250	3400	3110	nm	2280	nm	2350	nm
Temperature (C)	12.9	nm	15	nm	13.5	14.9	16	nm	12.7	nm	13	nm
Turbidity (NTU)	280	nm	23	nm	2.4	3.6	2.3	nm	3.8	nm	2.8	nm
Volatiles (ug/l)												
Benzene	95.3	nm	59.4	nm	1340	664	888	nm	0.5 U	nm	0.5 U	nm
Toluene	0.66 J	nm	0.61	nm	3.1	4.8	2.4 J	nm	0.5 U	nm	0.5 U	nm
Ethylbenzene	2.0 J	nm	1.9	nm	159	182	182	nm	0.5 U	nm	0.5 U	nm
Total Xylenes	5.2	nm	4.9	nm	94.5	102	94.1 J	nm	1.3	nm	1.4 J	nm
PAHs (ug/l)												
Acenaphthene	7.4	nm	4.4	nm	2.9	nm	2.9	nm	nm	nm	0.1 U	nm
Acenaphthylene	0.1 U	nm	0.28	nm	0.69	nm	0.72	nm	nm	nm	0.1 U	nm
Anthracene	0.11	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(a)anthracene	0.11	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(a)pyrene	0.1 U	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(b)fluoranthene	0.1 U	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(ghi) perylene	0.1 U	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Benzo(k)fluoranthene	0.1 U	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Chrysene	0.11	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Dibenzo(a,h)anthracene	0.1 U	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Fluoranthene	0.21	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Fluorene	0.1 U	nm	0.13	nm	0.2 U	nm	0.13	nm	nm	nm	0.1 U	nm
Indeno(1,2,3-cd)pyrene	0.4	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Naphthalene	2.9	nm	1.9	nm	74.7	nm	1.7	nm	nm	nm	0.1 U	nm
Phenanthrene	0.21	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
Pyrene	0.29	nm	0.1 U	nm	0.2 U	nm	0.1 U	nm	nm	nm	0.1 U	nm
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2002

Well Number	DOF-33M								DOF-34M							
Date	3/02		6/02		9/02		12/02		3/02		6/02		9/02		12/02	
Field Parameters																
pH	6.8		6.9		6.8		nm		7.1		7.1		7.2			
Conductivity (umohos)	1840		1700		1160		nm		2780		2090		971			
Temperature (C)	12.6		14		14		nm		11.8		13.5		14			
Turbidity (NTU)	5.5		6.5		3.2		nm		260		298		>200			
Volatiles (ug/l)																
Benzene	3690		3990		2200		nm		8780		8590		4560		3460	
Toluene	25	U	3.72		2.5	J	nm		50	U	100	U	100	U	25	U
Ethylbenzene	665		576		517		nm		1390		1470		1160		1430	
Total Xylenes	384		141	R	270	J	nm		761		738		371	J	478	
PAHs (ug/l)																
Acenaphthene	105		nm		79.8		nm		137		nm		231	J	nm	
Acenaphthylene	0.1	U	nm		1.1		nm		0.1	U	nm		0.93	J	nm	
Anthracene	0.1	U	nm		0.25		nm		0.1	U	nm		0.11	J	nm	
Benzo(a)anthracene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
Benzo(a)pyrene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
Benzo(b)fluoranthene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
Benzo(ghi) perylene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
Benzo(k)fluoranthene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
Chrysene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
Dibenzo(a,h)anthracene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
Fluoranthene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
Fluorene	8.3		nm		11		nm		14.4		nm		28.7	J	nm	
Indeno(1,2,3-cd)pyrene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
Naphthalene	557		nm		4.0	J	nm		4290		nm		216	J	nm	
Phenanthrene	0.1	U	nm		0.14		nm		0.76		nm		0.53	J	nm	
Pyrene	0.1	U	nm		0.1	U	nm		0.1	U	nm		0.1	UJ	nm	
PCBs (ug/l)																
1016	nm		nm		nm		nm		nm		nm		nm		nm	
1221	nm		nm		nm		nm		nm		nm		nm		nm	
1232	nm		nm		nm		nm		nm		nm		nm		nm	
1242	nm		nm		nm		nm		nm		nm		nm		nm	
1248	nm		nm		nm		nm		nm		nm		nm		nm	
1254	nm		nm		nm		nm		nm		nm		nm		nm	
1260	nm		nm		nm		nm		nm		nm		nm		nm	
Other Parameters																
Dissolved Lead (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm		nm		nm		nm		nm	

Notes to Table 3

NM = Not measured
U = Not detected at indicated detection limit
J = Estimated Concentration
R= QC criteria not achieved
na= Not accessible

Monitoring Data, 2003

Table 3 - Summary of Water Quality Data - Monitoring Year 2003

Well Number	AGI-1D							
Date	3/03		6/03		9/03		12/03	
Field Parameters								
pH	**6.7**							
Conductivity (umohos)	**754**							
Temperature (C)	**11.5**							
Turbidity (NTU)	**0.2**							
Volatiles (ug/l)								
Benzene	0.5	U						
Toluene	0.5	U						
Ethylbenzene	0.5	U						
Total Xylenes	1.0	U						
PAHs (ug/l)								
Acenaphthene	0.1	U						
Acenaphthylene	0.1	U						
Anthracene	0.1	U						
Benzo(a)anthracene	0.01	U						
Benzo(a)pyrene	0.01	U						
Benzo(b)fluoranthene	0.01	U						
Benzo(ghi) perylene	0.1	U						
Benzo(k)fluoranthene	0.01	U						
Chrysene	0.01	U						
Dibenzo(a,h)anthracene	0.01	U						
Fluoranthene	0.1	U						
Fluorene	0.1	U						
Indeno(1,2,3-cd)pyrene	0.01	U						
Naphthalene	0.1	U						
Phenanthrene	0.1	U						
Pyrene	0.1	U						
PCBs (ug/l)								
1016	**nm**		**nm**		**nm**		**nm**	
1221	**nm**		**nm**		**nm**		**nm**	
1232	**nm**		**nm**		**nm**		**nm**	
1242	**nm**		**nm**		**nm**		**nm**	
1248	**nm**		**nm**		**nm**		**nm**	
1254	**nm**		**nm**		**nm**		**nm**	
1260	**nm**		**nm**		**nm**		**nm**	
Other Parameters								
Dissolved Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Dissolved Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	

Well Number	TTP-2S (R)							
Date	3/03		6/03		9/03		12/03	
Field Parameters								
pH	**6.5**							
Conductivity (umohos)	**649**							
Temperature (C)	**11.0**							
Turbidity (NTU)	**21**							
Volatiles (ug/l)								
Benzene	**1.1**							
Toluene	0.5	U						
Ethylbenzene	**2.7**							
Total Xylenes	**5.3**							
PAHs (ug/l)								
Acenaphthene	**9.6**							
Acenaphthylene	**2.0**							
Anthracene	**0.93**							
Benzo(a)anthracene	0.01	U						
Benzo(a)pyrene	0.01	U						
Benzo(b)fluoranthene	0.01	U						
Benzo(ghi) perylene	0.1	U						
Benzo(k)fluoranthene	0.01	U						
Chrysene	0.01	U						
Dibenzo(a,h)anthracene	0.01	U						
Fluoranthene	**1.1**							
Fluorene	**3.9**							
Indeno(1,2,3-cd)pyrene	0.01	U						
Naphthalene	**28**							
Phenanthrene	**1.3**							
Pyrene	**1.1**							
PCBs (ug/l)								
1016	**nm**		**nm**		**nm**		**nm**	
1221	**nm**		**nm**		**nm**		**nm**	
1232	**nm**		**nm**		**nm**		**nm**	
1242	**nm**		**nm**		**nm**		**nm**	
1248	**nm**		**nm**		**nm**		**nm**	
1254	**nm**		**nm**		**nm**		**nm**	
1260	**nm**		**nm**		**nm**		**nm**	
Other Parameters								
Dissolved Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Dissolved Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	

Well Number	TTP-2M							
Date	3/03		6/03		9/03		12/03	
Field Parameters								
pH	**7.3**							
Conductivity (umohos)	**741**							
Temperature (C)	**12.0**							
Turbidity (NTU)	**8.6**							
Volatiles (ug/l)								
Benzene	0.5	U						
Toluene	0.5	U						
Ethylbenzene	0.5	U						
Total Xylenes	1.0	U						
PAHs (ug/l)								
Acenaphthene	**9.73**							
Acenaphthylene	0.1	U						
Anthracene	0.1	U						
Benzo(a)anthracene	0.01	U						
Benzo(a)pyrene	0.01	U						
Benzo(b)fluoranthene	0.01	U						
Benzo(ghi) perylene	0.1	U						
Benzo(k)fluoranthene	0.01	U						
Chrysene	0.01	U						
Dibenzo(a,h)anthracene	0.01	U						
Fluoranthene	0.1	U						
Fluorene	**0.81**							
Indeno(1,2,3-cd)pyrene	0.01	U						
Naphthalene	**0.22**							
Phenanthrene	0.1	U						
Pyrene	0.1	U						
PCBs (ug/l)								
1016	**nm**		**nm**		**nm**		**nm**	
1221	**nm**		**nm**		**nm**		**nm**	
1232	**nm**		**nm**		**nm**		**nm**	
1242	**nm**		**nm**		**nm**		**nm**	
1248	**nm**		**nm**		**nm**		**nm**	
1254	**nm**		**nm**		**nm**		**nm**	
1260	**nm**		**nm**		**nm**		**nm**	
Other Parameters								
Dissolved Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Dissolved Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	

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Table 3 - Summary of Water Quality Data - Monitoring Year 2003

Well Number	TTP-3S				TTP-3M				TTP-3D			
Date	**3/03**	**6/03**	**9/03**	**12/03**	**3/03**	**6/03**	**9/03**	**12/03**	**3/03**	**6/03**	**9/03**	**12/03**
Field Parameters												
pH	nm				6.9				6.7			
Conductivity (umohos)	nm				3200				760			
Temperature (C)	nm				11.5				10.5			
Turbidity (NTU)	nm				5.9				0.3			
Volatiles (ug/l)												
Benzene	nm				1,640				0.5 U			
Toluene	nm				10 U				0.5 U			
Ethylbenzene	nm				492				0.5 U			
Total Xylenes	nm				184				1.0 U			
PAHs (ug/l)												
Acenaphthene	nm				84.5				0.1 U			
Acenaphthylene	nm				0.55				0.1 U			
Anthracene	nm				0.1 U				0.1 U			
Benzo(a)anthracene	nm				0.01 U				0.01 U			
Benzo(a)pyrene	nm				0.01 U				0.01 U			
Benzo(b)fluoranthene	nm				0.01 U				0.01 U			
Benzo(ghi) perylene	nm				0.1 U				0.1 U			
Benzo(k)fluoranthene	nm				0.01 U				0.01 U			
Chrysene	nm				0.01 U				0.01 U			
Dibenzo(a,h)anthracene	nm				0.01 U				0.01 U			
Fluoranthene	nm				0.1 U				0.1 U			
Fluorene	nm				1.66				0.1 U			
Indeno(1,2,3-cd)pyrene	nm				0.01 U				0.01 U			
Naphthalene	nm				383				0.1 U			
Phenanthrene	nm				0.1 U				0.1 U			
Pyrene	nm				0.1 U				0.1 U			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2003

Well Number	AGI-4S				AGI-4M				TTP-4D			
Date	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03
Field Parameters												
pH	nm				nm				nm			
Conductivity (umohos)	nm				nm				nm			
Temperature (C)	nm				nm				nm			
Turbidity (NTU)	nm				nm				nm			
Volatiles (ug/l)												
Benzene	nm				nm				nm			
Toluene	nm				nm				nm			
Ethylbenzene	nm				nm				nm			
Total Xylenes	nm				nm				nm			
PAHs (ug/l)												
Acenaphthene	nm				nm				nm			
Acenaphthylene	nm				nm				nm			
Anthracene	nm				nm				nm			
Benzo(a)anthracene	nm				nm				nm			
Benzo(a)pyrene	nm				nm				nm			
Benzo(b)fluoranthene	nm				nm				nm			
Benzo(ghi) perylene	nm				nm				nm			
Benzo(k)fluoranthene	nm				nm				nm			
Chrysene	nm				nm				nm			
Dibenzo(a,h)anthracene	nm				nm				nm			
Fluoranthene	nm				nm				nm			
Fluorene	nm				nm				nm			
Indeno(1,2,3-cd)pyrene	nm				nm				nm			
Naphthalene	nm				nm				nm			
Phenanthrene	nm				nm				nm			
Pyrene	nm				nm				nm			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Well Number	AGI-5S				AGI-5M				TTP-6S(R)			
Date	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03
Field Parameters												
pH	nm				7.4				nm			
Conductivity (umohos)	nm				1430				nm			
Temperature (C)	nm				13				nm			
Turbidity (NTU)	nm				2.7				nm			
Volatiles (ug/l)												
Benzene	nm				0.5 U				nm			
Toluene	nm				0.5 U				nm			
Ethylbenzene	nm				0.5 U				nm			
Total Xylenes	nm				1.0 U				nm			
PAHs (ug/l)												
Acenaphthene	nm				nm				nm			
Acenaphthylene	nm				nm				nm			
Anthracene	nm				nm				nm			
Benzo(a)anthracene	nm				nm				nm			
Benzo(a)pyrene	nm				nm				nm			
Benzo(b)fluoranthene	nm				nm				nm			
Benzo(ghi) perylene	nm				nm				nm			
Benzo(k)fluoranthene	nm				nm				nm			
Chrysene	nm				nm				nm			
Dibenzo(a,h)anthracene	nm				nm				nm			
Fluoranthene	nm				nm				nm			
Fluorene	nm				nm				nm			
Indeno(1,2,3-cd)pyrene	nm				nm				nm			
Naphthalene	nm				nm				nm			
Phenanthrene	nm				nm				nm			
Pyrene	nm				nm				nm			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2003

Well Number	TTP-6M(R)				TTP-12S				TTP-12M			
Date	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03
Field Parameters												
pH	nm				nm				nm			
Conductivity (umohos)	nm				nm				nm			
Temperature (C)	nm				nm				nm			
Turbidity (NTU)	nm				nm				nm			
Volatiles (ug/l)												
Benzene	nm				nm				nm			
Toluene	nm				nm				nm			
Ethylbenzene	nm				nm				nm			
Total Xylenes	nm				nm				nm			
PAHs (ug/l)												
Acenaphthene	nm				nm				nm			
Acenaphthylene	nm				nm				nm			
Anthracene	nm				nm				nm			
Benzo(a)anthracene	nm				nm				nm			
Benzo(a)pyrene	nm				nm				nm			
Benzo(b)fluoranthene	nm				nm				nm			
Benzo(ghi) perylene	nm				nm				nm			
Benzo(k)fluoranthene	nm				nm				nm			
Chrysene	nm				nm				nm			
Dibenzo(a,h)anthracene	nm				nm				nm			
Fluoranthene	nm				nm				nm			
Fluorene	nm				nm				nm			
Indeno(1,2,3-cd)pyrene	nm				nm				nm			
Naphthalene	nm				nm				nm			
Phenanthrene	nm				nm				nm			
Pyrene	nm				nm				nm			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

March data not validated

Table 3 - Summary of Water Quality Data - Monitoring Year 2003

Well Number	AGI-13S/(R)				AGI-13M/(R)				AGI-14S			
Date	**3/03**	**6/03**	**9/03**	**12/03**	**3/03**	**6/03**	**9/03**	**12/03**	**3/03**	**6/03**	**9/03**	**12/03**
Field Parameters												
pH	nm				nm				nm			
Conductivity (umohos)	nm				nm				nm			
Temperature (C)	nm				nm				nm			
Turbidity (NTU)	nm				nm				nm			
Volatiles (ug/l)												
Benzene	nm				nm				nm			
Toluene	nm				nm				nm			
Ethylbenzene	nm				nm				nm			
Total Xylenes	nm				nm				nm			
PAHs (ug/l)												
Acenaphthene	nm				nm				nm			
Acenaphthylene	nm				nm				nm			
Anthracene	nm				nm				nm			
Benzo(a)anthracene	nm				nm				nm			
Benzo(a)pyrene	nm				nm				nm			
Benzo(b)fluoranthene	nm				nm				nm			
Benzo(ghi) perylene	nm				nm				nm			
Benzo(k)fluoranthene	nm				nm				nm			
Chrysene	nm				nm				nm			
Dibenzo(a,h)anthracene	nm				nm				nm			
Fluoranthene	nm				nm				nm			
Fluorene	nm				nm				nm			
Indeno(1,2,3-cd)pyrene	nm				nm				nm			
Naphthalene	nm				nm				nm			
Phenanthrene	nm				nm				nm			
Pyrene	nm				nm				nm			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2003

Well Number	AGI-14M(R)				TTP-14D				TTP-16S(R)			
Date	**3/03**	**6/03**	**9/03**	**12/03**	**3/03**	**6/03**	**9/03**	**12/03**	**3/03**	**6/03**	**9/03**	**12/03**
Field Parameters												
pH	**6.6**				nm				nm			
Conductivity (umohos)	**1980**				nm				nm			
Temperature (C)	**13.0**				nm				nm			
Turbidity (NTU)	**3.6**				nm				nm			
Volatiles (ug/l)												
Benzene	**1420**				nm				nm			
Toluene	5 U				nm				nm			
Ethylbenzene	**171**				nm				nm			
Total Xylenes	**123**				nm				nm			
PAHs (ug/l)												
Acenaphthene	**12.0**				nm				nm			
Acenaphthylene	0.1 U				nm				nm			
Anthracene	0.1 U				nm				nm			
Benzo(a)anthracene	0.01 U				nm				nm			
Benzo(a)pyrene	0.01 U				nm				nm			
Benzo(b)fluoranthene	0.01 U				nm				nm			
Benzo(ghi) perylene	0.1 U				nm				nm			
Benzo(k)fluoranthene	0.01 U				nm				nm			
Chrysene	0.01 U				nm				nm			
Dibenzo(a,h)anthracene	0.01 U				nm				nm			
Fluoranthene	0.1 U				nm				nm			
Fluorene	0.1 U				nm				nm			
Indeno(1,2,3-cd)pyrene	0.01 U				nm				nm			
Naphthalene	**38.7**				nm				nm			
Phenanthrene	0.1 U				nm				nm			
Pyrene	0.1 U				nm				nm			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2003

Well Number	TTP-16M(R)				TTP-17S				TTP-17M			
Date	**3/03**	**6/03**	**9/03**	**12/03**	**3/03**	**6/03**	**9/03**	**12/03**	**3/03**	**6/03**	**9/03**	**12/03**
Field Parameters												
pH	nm				nm				nm			
Conductivity (umohos)	nm				nm				nm			
Temperature (C)	nm				nm				nm			
Turbidity (NTU)	nm				nm				nm			
Volatiles (ug/l)												
Benzene	nm				nm				nm			
Toluene	nm				nm				nm			
Ethylbenzene	nm				nm				nm			
Total Xylenes	nm				nm				nm			
PAHs (ug/l)												
Acenaphthene	nm				nm				nm			
Acenaphthylene	nm				nm				nm			
Anthracene	nm				nm				nm			
Benzo(a)anthracene	nm				nm				nm			
Benzo(a)pyrene	nm				nm				nm			
Benzo(b)fluoranthene	nm				nm				nm			
Benzo(ghi) perylene	nm				nm				nm			
Benzo(k)fluoranthene	nm				nm				nm			
Chrysene	nm				nm				nm			
Dibenzo(a,h)anthracene	nm				nm				nm			
Fluoranthene	nm				nm				nm			
Fluorene	nm				nm				nm			
Indeno(1,2,3-cd)pyrene	nm				nm				nm			
Naphthalene	nm				nm				nm			
Phenanthrene	nm				nm				nm			
Pyrene	nm				nm				nm			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 3 - Summary of Water Quality Data - Monitoring Year 2003

Well Number	TTP-17D							
Date	3/03		6/03		9/03		12/03	
Field Parameters								
pH	nm							
Conductivity (umohos)	nm							
Temperature (C)	nm							
Turbidity (NTU)	nm							
Volatiles (ug/l)								
Benzene	nm							
Toluene	nm							
Ethylbenzene	nm							
Total Xylenes	nm							
PAHs (ug/l)								
Acenaphthene	nm							
Acenaphthylene	nm							
Anthracene	nm							
Benzo(a)anthracene	nm							
Benzo(a)pyrene	nm							
Benzo(b)fluoranthene	nm							
Benzo(ghi) perylene	nm							
Benzo(k)fluoranthene	nm							
Chrysene	nm							
Dibenzo(a,h)anthracene	nm							
Fluoranthene	nm							
Fluorene	nm							
Indeno(1,2,3-cd)pyrene	nm							
Naphthalene	nm							
Phenanthrene	nm							
Pyrene	nm							
PCBs (ug/l)								
1016	nm		nm		nm		nm	
1221	nm		nm		nm		nm	
1232	nm		nm		nm		nm	
1242	nm		nm		nm		nm	
1248	nm		nm		nm		nm	
1254	nm		nm		nm		nm	
1260	nm		nm		nm		nm	
Other Parameters								
Dissolved Lead (ug/l)	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm	

Well Number	TTP-18S							
Date	3/03		6/03		9/03		12/03	
Field Parameters								
pH	nm							
Conductivity (umohos)	nm							
Temperature (C)	nm							
Turbidity (NTU)	nm							
Volatiles (ug/l)								
Benzene	nm							
Toluene	nm							
Ethylbenzene	nm							
Total Xylenes	nm							
PAHs (ug/l)								
Acenaphthene	nm							
Acenaphthylene	nm							
Anthracene	nm							
Benzo(a)anthracene	nm							
Benzo(a)pyrene	nm							
Benzo(b)fluoranthene	nm							
Benzo(ghi) perylene	nm							
Benzo(k)fluoranthene	nm							
Chrysene	nm							
Dibenzo(a,h)anthracene	nm							
Fluoranthene	nm							
Fluorene	nm							
Indeno(1,2,3-cd)pyrene	nm							
Naphthalene	nm							
Phenanthrene	nm							
Pyrene	nm							
PCBs (ug/l)								
1016	nm		nm		nm		nm	
1221	nm		nm		nm		nm	
1232	nm		nm		nm		nm	
1242	nm		nm		nm		nm	
1248	nm		nm		nm		nm	
1254	nm		nm		nm		nm	
1260	nm		nm		nm		nm	
Other Parameters								
Dissolved Lead (ug/l)	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm	

Well Number	TTP-18M							
Date	3/03		6/03		9/03		12/03	
Field Parameters								
pH	7.0							
Conductivity (umohos)	2870							
Temperature (C)	14.0							
Turbidity (NTU)	0.6							
Volatiles (ug/l)								
Benzene	304							
Toluene	2.5	U						
Ethylbenzene	22							
Total Xylenes	18							
PAHs (ug/l)								
Acenaphthene	0.1	U						
Acenaphthylene	0.1	U						
Anthracene	0.1	U						
Benzo(a)anthracene	0.01	U						
Benzo(a)pyrene	0.01	U						
Benzo(b)fluoranthene	0.01	U						
Benzo(ghi) perylene	0.1	U						
Benzo(k)fluoranthene	0.01	U						
Chrysene	0.01	U						
Dibenzo(a,h)anthracene	0.01	U						
Fluoranthene	0.1	U						
Fluorene	0.1	U						
Indeno(1,2,3-cd)pyrene	0.01	U						
Naphthalene	18.7							
Phenanthrene	0.1	U						
Pyrene	0.1	U						
PCBs (ug/l)								
1016	nm		nm		nm		nm	
1221	nm		nm		nm		nm	
1232	nm		nm		nm		nm	
1242	nm		nm		nm		nm	
1248	nm		nm		nm		nm	
1254	nm		nm		nm		nm	
1260	nm		nm		nm		nm	
Other Parameters								
Dissolved Lead (ug/l)	nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm		nm	

Well Number	DOF-19M							
Date	3/03		6/03		9/03		12/03	
Field Parameters								
pH	**6.9**							
Conductivity (umohos)	**1179**							
Temperature (C)	**11.5**							
Turbidity (NTU)	**152**							
Volatiles (ug/l)								
Benzene	0.5	U						
Toluene	0.5	U						
Ethylbenzene	0.5	U						
Total Xylenes	1.0	U						
PAHs (ug/l)								
Acenaphthene	0.1	U						
Acenaphthylene	0.1	U						
Anthracene	0.1	U						
Benzo(a)anthracene	0.01	U						
Benzo(a)pyrene	0.01	U						
Benzo(b)fluoranthene	0.01	U						
Benzo(ghi) perylene	0.1	U						
Benzo(k)fluoranthene	0.01	U						
Chrysene	0.01	U						
Dibenzo(a,h)anthracene	0.01	U						
Fluoranthene	0.1	U						
Fluorene	0.1	U						
Indeno(1,2,3-cd)pyrene	0.01	U						
Naphthalene	0.1	U						
Phenanthrene	0.1	U						
Pyrene	0.1	U						
PCBs (ug/l)								
1016	**nm**		**nm**		**nm**		**nm**	
1221	**nm**		**nm**		**nm**		**nm**	
1232	**nm**		**nm**		**nm**		**nm**	
1242	**nm**		**nm**		**nm**		**nm**	
1248	**nm**		**nm**		**nm**		**nm**	
1254	**nm**		**nm**		**nm**		**nm**	
1260	**nm**		**nm**		**nm**		**nm**	
Other Parameters								
Dissolved Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Dissolved Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	

Well Number	DOF-20M							
Date	3/03		6/03		9/03		12/03	
Field Parameters								
pH	**6.9**							
Conductivity (umohos)	**2660**							
Temperature (C)	**12**							
Turbidity (NTU)	**121**							
Volatiles (ug/l)								
Benzene	0.5	U						
Toluene	0.5	U						
Ethylbenzene	0.5	U						
Total Xylenes	1.0	U						
PAHs (ug/l)								
Acenaphthene	0.1	U						
Acenaphthylene	0.1	U						
Anthracene	0.1	U						
Benzo(a)anthracene	0.01	U						
Benzo(a)pyrene	0.01	U						
Benzo(b)fluoranthene	0.01	U						
Benzo(ghi) perylene	0.1	U						
Benzo(k)fluoranthene	0.01	U						
Chrysene	0.01	U						
Dibenzo(a,h)anthracene	0.01	U						
Fluoranthene	0.1	U						
Fluorene	0.1	U						
Indeno(1,2,3-cd)pyrene	0.01	U						
Naphthalene	0.1	U						
Phenanthrene	0.1	U						
Pyrene	0.1	U						
PCBs (ug/l)								
1016	**nm**		**nm**		**nm**		**nm**	
1221	**nm**		**nm**		**nm**		**nm**	
1232	**nm**		**nm**		**nm**		**nm**	
1242	**nm**		**nm**		**nm**		**nm**	
1248	**nm**		**nm**		**nm**		**nm**	
1254	**nm**		**nm**		**nm**		**nm**	
1260	**nm**		**nm**		**nm**		**nm**	
Other Parameters								
Dissolved Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Dissolved Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	

Well Number	Hygrade No. 2							
Date	3/03		6/03		9/03		12/03	
Field Parameters								
pH	**nm**							
Conductivity (umohos)	**nm**							
Temperature (C)	**nm**							
Turbidity (NTU)	**nm**							
Volatiles (ug/l)								
Benzene	**nm**							
Toluene	**nm**							
Ethylbenzene	**nm**							
Total Xylenes	**nm**							
PAHs (ug/l)								
Acenaphthene	**nm**							
Acenaphthylene	**nm**							
Anthracene	**nm**							
Benzo(a)anthracene	**nm**							
Benzo(a)pyrene	**nm**							
Benzo(b)fluoranthene	**nm**							
Benzo(ghi) perylene	**nm**							
Benzo(k)fluoranthene	**nm**							
Chrysene	**nm**							
Dibenzo(a,h)anthracene	**nm**							
Fluoranthene	**nm**							
Fluorene	**nm**							
Indeno(1,2,3-cd)pyrene	**nm**							
Naphthalene	**nm**							
Phenanthrene	**nm**							
Pyrene	**nm**							
PCBs (ug/l)								
1016	**nm**		**nm**		**nm**		**nm**	
1221	**nm**		**nm**		**nm**		**nm**	
1232	**nm**		**nm**		**nm**		**nm**	
1242	**nm**		**nm**		**nm**		**nm**	
1248	**nm**		**nm**		**nm**		**nm**	
1254	**nm**		**nm**		**nm**		**nm**	
1260	**nm**		**nm**		**nm**		**nm**	
Other Parameters								
Dissolved Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Lead (ug/l)	**nm**		**nm**		**nm**		**nm**	
Dissolved Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	
Total Cadmium (ug/l)	**nm**		**nm**		**nm**		**nm**	

Table 3 - Summary of Water Quality Data - Monitoring Year 2003

Well Number	SW								MW-3							
Date	3/03		6/03		9/03		12/03		3/03		6/03		9/03		12/03	
Field Parameters																
pH	**6.7**								**7.1**							
Conductivity (umohos)	**241**								**14,550**							
Temperature (C)	**10.0**								**13.5**							
Turbidity (NTU)	**2.8**								**32.0**							
Volatiles (ug/l)																
Benzene	0.5	U							0.5	U						
Toluene	0.5	U							0.5	U						
Ethylbenzene	0.5	U							0.5	U						
Total Xylenes	1.0	U							1.0	U						
PAHs (ug/l)																
Acenaphthene	nm								nm							
Acenaphthylene	nm								nm							
Anthracene	nm								nm							
Benzo(a)anthracene	nm								nm							
Benzo(a)pyrene	nm								nm							
Benzo(b)fluoranthene	nm								nm							
Benzo(ghi) perylene	nm								nm							
Benzo(k)fluoranthene	nm								nm							
Chrysene	nm								nm							
Dibenzo(a,h)anthracene	nm								nm							
Fluoranthene	nm								nm							
Fluorene	nm								nm							
Indeno(1,2,3-cd)pyrene	nm								nm							
Naphthalene	nm								nm							
Phenanthrene	nm								nm							
Pyrene	nm								nm							
PCBs (ug/l)																
1016	nm		nm		nm		nm		nm		nm		nm		nm	
1221	nm		nm		nm		nm		nm		nm		nm		nm	
1232	nm		nm		nm		nm		nm		nm		nm		nm	
1242	nm		nm		nm		nm		nm		nm		nm		nm	
1248	nm		nm		nm		nm		nm		nm		nm		nm	
1254	nm		nm		nm		nm		nm		nm		nm		nm	
1260	nm		nm		nm		nm		nm		nm		nm		nm	
Other Parameters																
Dissolved Lead (ug/l)	1	U	nm		nm				nm		nm		nm		nm	
Total Lead (ug/l)	nm		nm		nm				nm		nm		nm		nm	
Dissolved Cadmium (ug/l)	1	U	nm		nm				nm		nm		nm		nm	
Total Cadmium (ug/l)	nm		nm		nm				nm		nm		nm		nm	

Notes to Table 2

nm= Not measured-well and/or analyte not on monitoring schedule
U = Not detected at indicated detection limit
J = Estimated concentration
ISV= Insufficient volume

March data not validated

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2003

Well Number	DOF-21M				DOF-22M				DOF-23M			
Date	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03
Field Parameters												
pH	nm				6.8				6.6			
Conductivity (umohos)	nm				3260				1624			
Temperature (C)	nm				12.5				13.5			
Turbidity (NTU)	nm				3.1				2.6			
Volatiles (ug/l)												
Benzene	nm				959				2790			
Toluene	nm				16.0				25 U			
Ethylbenzene	nm				412				963			
Total Xylenes	nm				160				428			
PAHs (ug/l)												
Acenaphthene	nm				nm				176			
Acenaphthylene	nm				nm				0.1 U			
Anthracene	nm				nm				1.1			
Benzo(a)anthracene	nm				nm				0.15			
Benzo(a)pyrene	nm				nm				0.01 U			
Benzo(b)fluoranthene	nm				nm				0.01 U			
Benzo(ghi) perylene	nm				nm				0.1 U			
Benzo(k)fluoranthene	nm				nm				0.01 U			
Chrysene	nm				nm				0.27			
Dibenzo(a,h)anthracene	nm				nm				0.01 U			
Fluoranthene	nm				nm				1.5			
Fluorene	nm				nm				17.3			
Indeno(1,2,3-cd)pyrene	nm				nm				0.01 U			
Naphthalene	nm				nm				185			
Phenanthrene	nm				nm				5.9			
Pyrene	nm				nm				1.2			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2003

Well Number	DOF-24M				DOF-25M				DOF-26M			
Date	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03
Field Parameters												
pH	7.2				6.8				6.8			
Conductivity (umohos)	4530				3820				783			
Temperature (C)	12.0				13.0				12.0			
Turbidity (NTU)	2.8				6.1				4.3			
Volatiles (ug/l)												
Benzene	1380				986				3,780			
Toluene	15.5				10 U				62			
Ethylbenzene	797				440				605			
Total Xylenes	180				130				345			
PAHs (ug/l)												
Acenaphthene	nm				nm				68.6			
Acenaphthylene	nm				nm				0.1 U			
Anthracene	nm				nm				0.45			
Benzo(a)anthracene	nm				nm				0.01 U			
Benzo(a)pyrene	nm				nm				0.01 U			
Benzo(b)fluoranthene	nm				nm				0.01 U			
Benzo(ghi) perylene	nm				nm				0.1 U			
Benzo(k)fluoranthene	nm				nm				0.01 U			
Chrysene	nm				nm				0.01 U			
Dibenzo(a,h)anthracene	nm				nm				0.01 U			
Fluoranthene	nm				nm				0.1 U			
Fluorene	nm				nm				14.7			
Indeno(1,2,3-cd)pyrene	nm				nm				0.01 U			
Naphthalene	nm				nm				1970			
Phenanthrene	nm				nm				3.2			
Pyrene	nm				nm				0.1 U			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2003

Well Number	DOF-27M				DOF-28M				DOF-29M			
Date	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03
Field Parameters												
pH	**7.2**				**6.7**				**7.2**			
Conductivity (umohos)	**2500**				**3200**				**4080**			
Temperature (C)	**13.0**				**13.0**				**11.0**			
Turbidity (NTU)	**3.6**				**4.1**				**3.8**			
Volatiles (ug/l)												
Benzene	0.5 U				0.5 U				**2440**			
Toluene	0.5 U				0.5 U				12.5 U			
Ethylbenzene	0.5 U				0.5 U				**666**			
Total Xylenes	1.0 U				1.0 U				**210**			
PAHs (ug/l)												
Acenaphthene	nm				nm				**61.1**			
Acenaphthylene	nm				nm				0.1 U			
Anthracene	nm				nm				0.1 U			
Benzo(a)anthracene	nm				nm				0.01 U			
Benzo(a)pyrene	nm				nm				0.01 U			
Benzo(b)fluoranthene	nm				nm				0.01 U			
Benzo(ghi) perylene	nm				nm				0.1 U			
Benzo(k)fluoranthene	nm				nm				0.01 U			
Chrysene	nm				nm				0.01 U			
Dibenzo(a,h)anthracene	nm				nm				0.01 U			
Fluoranthene	nm				nm				0.1 U			
Fluorene	nm				nm				0.1 U			
Indeno(1,2,3-cd)pyrene	nm				nm				0.01 U			
Naphthalene	nm				nm				**31.2**			
Phenanthrene	nm				nm				0.1 U			
Pyrene	nm				nm				0.1 U			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2003

Well Number	DOF-30M				DOF-31M				DOF-32D			
Date	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03	3/03	6/03	9/03	12/03
Field Parameters												
pH	**6.8**				nm				nm			
Conductivity (umohos)	**2380**				nm				nm			
Temperature (C)	**14.0**				nm				nm			
Turbidity (NTU)	**86**				nm				nm			
Volatiles (ug/l)												
Benzene	**63.6**				nm				nm			
Toluene	**0.57**				nm				nm			
Ethylbenzene	**2.1**				nm				nm			
Total Xylenes	**5.1**				nm				nm			
PAHs (ug/l)												
Acenaphthene	**5.2**				nm				nm			
Acenaphthylene	**0.13**				nm				nm			
Anthracene	0.1 U				nm				nm			
Benzo(a)anthracene	0.01 U				nm				nm			
Benzo(a)pyrene	0.01 U				nm				nm			
Benzo(b)fluoranthene	0.01 U				nm				nm			
Benzo(ghi) perylene	0.1 U				nm				nm			
Benzo(k)fluoranthene	0.01 U				nm				nm			
Chrysene	0.01 U				nm				nm			
Dibenzo(a,h)anthracene	0.01 U				nm				nm			
Fluoranthene	0.1 U				nm				nm			
Fluorene	0.1 U				nm				nm			
Indeno(1,2,3-cd)pyrene	0.01 U				nm				nm			
Naphthalene	**3.0**				nm				nm			
Phenanthrene	0.1 U				nm				nm			
Pyrene	0.1 U				nm				nm			
PCBs (ug/l)												
1016	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters												
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm

Table 4 - Summary of Water Quality Data - Additional Monitoring Wells - Monitoring Year 2003

Well Number	DOF-33M				DOF-34M			
Date	**3/03**	**6/03**	**9/03**	**12/03**	**3/03**	**6/03**	**9/03**	**12/03**
Field Parameters								
pH	nm				nm			
Conductivity (umohos)	nm				nm			
Temperature (C)	nm				nm			
Turbidity (NTU)	nm				nm			
Volatiles (ug/l)								
Benzene	nm				nm			
Toluene	nm				nm			
Ethylbenzene	nm				nm			
Total Xylenes	nm				nm			
PAHs (ug/l)								
Acenaphthene	nm				nm			
Acenaphthylene	nm				nm			
Anthracene	nm				nm			
Benzo(a)anthracene	nm				nm			
Benzo(a)pyrene	nm				nm			
Benzo(b)fluoranthene	nm				nm			
Benzo(ghi) perylene	nm				nm			
Benzo(k)fluoranthene	nm				nm			
Chrysene	nm				nm			
Dibenzo(a,h)anthracene	nm				nm			
Fluoranthene	nm				nm			
Fluorene	nm				nm			
Indeno(1,2,3-cd)pyrene	nm				nm			
Naphthalene	nm				nm			
Phenanthrene	nm				nm			
Pyrene	nm				nm			
PCBs (ug/l)								
1016	nm	nm	nm	nm	nm	nm	nm	nm
1221	nm	nm	nm	nm	nm	nm	nm	nm
1232	nm	nm	nm	nm	nm	nm	nm	nm
1242	nm	nm	nm	nm	nm	nm	nm	nm
1248	nm	nm	nm	nm	nm	nm	nm	nm
1254	nm	nm	nm	nm	nm	nm	nm	nm
1260	nm	nm	nm	nm	nm	nm	nm	nm
Other Parameters								
Dissolved Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm
Total Lead (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm
Dissolved Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm
Total Cadmium (ug/l)	nm	nm	nm	nm	nm	nm	nm	nm

Notes to Table 3

NM = Not measured
U = Not detected at indicated detection limit
J = Estimated Concentration
R= QC criteria not achieved
na= Not accessible

APPENDIX C

Public Notice

EPA to Review Cleanup at Tacoma Tar Pits Superfund Site

We Invite Your Comments Through July 31

The U.S Environmental Protection Agency (EPA) is doing a Five-Year Review of the Tacoma Tar Pits Superfund Site near Portland Avenue in Tacoma. The review is a checkup to make sure the cleanup is proceeding as planned, and that it protects people and the environment.

EPA welcomes your participation during our review. If you have information that may help EPA with the review, contact Lee Marshall, EPA Project Manager, by July 31, 2003. Phone: 206 553-2723 or 800 424-4372. Email: marshall.lee@epa.gov. TTY users may call the Federal Relay Service at 800 877-8339 and give the operator Lee Marshall's phone number.

The Tacoma Tar Pits Site is part of the Commencement Bay Nearshore Tideflats Superfund Site. It is listed on EPA's National Priorities List of the nation's most contaminated hazardous waste sites. Contamination includes heavy metals, benzene, and coal tars. Cleanup has included pumping and treating groundwater, as well as digging up wastes and stabilizing and capping them on-site. To learn more, visit www.epa.gov/r10earth/, click on *Index A-Z*, then on *T*, then on *Tacoma Tar Pits*.

APPENDIX D

Supporting Documents

APPENDIX D

Supporting Documents

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DOF. 2003c. *Water Quality Monitoring Report, September 2002 Sampling Events, Tacoma Historical Coal Gasification Site*. Dalton, Olmsted & Fuglevand, Inc. January 23, 2002 [sic, should read 2003].

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Envirosphere. 1987. *Feasibility Study of the Tacoma Historical Coal Gasification Site, Final Report*. Prepared by Envirosphere Company, Bellevue, Washington. July 1987.

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APPENDIX E

Site Visit Checklist

Five-Year Review Site Visit Documentation Form Tacoma Tar Pits

I. SITE INFORMATION	
Site name: Tacoma Tar Pits Operable Unit (Operable Unit 23) Commencement Bay Nearshore/Tideflats Superfund Site	**Date of inspection:** July 24, 2003
Location and Region: Tacoma, Pierce County, Washington EPA Region 10	**EPA ID:** WAD980723795
Agency, office, or company leading the five-year review: EPA Region 10 assisted by CH2M HILL under EPA contract No. 69-W-98-228	**Weather/temperature:** Approx. 75°F, sunny

Remedy Includes: (Check all that apply)

- ☑ Landfill cover/containment
- ☑ Access controls
- ☑ Institutional controls
- ☑ Groundwater pump and treatment
- ☑ Surface water collection and treatment
- ☐ Other__________
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Inspection team:

Lee Marshall, RPM - EPA Region 10

Doug Holsten - CH2M HILL (EPA contractor)

Matt Dalton - Dalton, Olmsted & Fuglevand (O&M consultant for Puget Sound Energy)

II. GENERAL SITE CONDITIONS
A. General
1. **Vandalism/trespassing** ☐ Location shown on site map ☑ No vandalism evident Remarks
2. **Land use changes on site** ☑ Applicable ☐ N/A Remarks: Immigration Naturalization Service (INS) detention facility under construction on old Hygrade property.
3. **Land use changes off site** ☐ Applicable ☑ N/A Remarks
B. Roads ☑ Applicable ☐ N/A
1. **Roads damaged** ☐ Location shown on site map ☑ Roads adequate ☐ N/A Remarks: Road pavements generally in good condition. One instance of pavement and surged failure (approx. 2 x 3 feet) noted on waste pile access road. See attached Photo 1.
C. Other Site Conditions
Remarks

III. LANDFILL COVERS ☐ Applicable ☐ N/A
A. Landfill Surface
1. **Settlement** (Low spots) ☐ Location shown on site map ☑ Settlement not evident Areal extent______ Depth______ Remarks______
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______
5. **Vegetative Cover** ☑ Grass ☐ Cover properly established ☐ No signs of stress ☐ Trees/Shrubs (indicate size and locations on a diagram) Remarks: No significant breaches in vegetative cover. M. Dalton reports that grass cover is mowed annually.
6. **Alternative Cover (armored rock, concrete, etc.)** ☐ Applicable ☑ 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______
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.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☑ N/A or okay
Remarks______________________________

2. **Bench Breached** ☐ Location shown on site map ☑ N/A or okay
Remarks______________________________

3. **Bench Overtopped** ☐ Location shown on site map ☑ N/A or okay
Remarks______________________________

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.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent______________ Depth______________
Remarks______________________________

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type______________ Areal extent______________
Remarks______________________________

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent______________ Depth______________
Remarks______________________________

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent______________ Depth______________
Remarks______________________________

5. **Obstructions** Type______________ ☐ No obstructions
☐ Location shown on site map Areal extent______________ Size______________
Remarks______________________________

6. **Excessive Vegetative Growth** Type______________
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent______________
Remarks______________________________

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. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks____

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

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

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks____

F. Cover Drainage Layer ☑ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☑ N/A
Remarks: Outlet pipes not visible. Drainage system subject to annual site inspection by Puget Sound Energy. No problems evident.

2. **Outlet Rock Inspected** ☐ Functioning ☑ N/A
Remarks: See note above.

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

1. **Siltation** Areal extent______ Depth______ ☐ N/A
☐ Siltation not evident
Remark: Minor siltation in Detention Basin #1 (basin collecting runoff from waste pile). This basin is reportedly cleaned/swept annually. Annual maintenance scheduled for later this summer.

2. **Erosion** Areal extent______ Depth______
☑ Erosion not evident
Remarks______

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks: Outline pipes not visible. These are subject to annual inspection by Puget Sound Energy and Joseph Simon & Sons.

4. **Dam** ☐ Functioning ☑ N/A
Remarks______

H. Retaining Walls ☐ Applicable ☑ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement______ Vertical displacement______
Rotational displacement______
Remarks______

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks______

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

1. **Siltation** ☐ Location shown on site map ☑ Siltation not evident
Areal extent______ Depth______
Remarks______

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☑ Vegetation does not impede flow
Areal extent______ Type______
Remarks: Some vegetation (e.g., blackberry bushes) noted in ditches draining the waste pile and in the BNSF ditch. Vegetation does not appear to affect function of ditches. M. Dalton indicates that vegetation growth/effects will be monitored and addressed if required based on findings of future site inspections.

3.	**Erosion** ☐ Location shown on site map ☑ Erosion not evident Areal extent____________ Depth__________ Remarks______________________________________
4.	**Discharge Structure** ☑ Functioning ☐ N/A Remarks: Ditches around perimeter of waste pile discharge by pipe directly into Detention Basin #1.

IV. GROUNDWATER/SURFACE WATER REMEDIES ☑ Applicable ☐ N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines ☑ Applicable ☐ N/A
1. **Pumps, Wellhead Plumbing, and Electrical** ☑ Good condition ☑ All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks: Extraction system is relatively new - only been operating for approx. one year.
2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☑ Good condition ☐ Needs Maintenance Remarks: Pipelines are buried and therefore not visible. Systems has been operating for only one year and M. Dalton reports no problems with flow to/from treatment plant.
3. **Spare Parts and Equipment** ☑ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks: Treatment plant is checked once every 1 to 2 weeks. Per M. Dalton, repairs are made as needed.
B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A
1. **Collection Structures, Pumps, and Electrical** ☑ Good condition ☐ Needs Maintenance Remarks: Flow to/from Detention Basin #1 is by gravity. Detention Basin #2 handles run-off from Joseph Simon & Sons. Pumps used to direct water from basin to oil/water separator. These system is subject to annual inspection.
2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☑ Good condition ☐ Needs Maintenance Remarks: See above.
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks: See above.
C. Groundwater 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): Sequestering agent to control bio-fouling. ☐ Others________ ☑ Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional: did not check ☐ Sampling/maintenance log displayed and up to date: did not check ☐ Equipment properly identified: did not check ☐ Quantity of groundwater treated annually: Approx. 14 gpm or 7.4 million gallons per year.

2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A ☑ Good condition ☐ Needs Maintenance Remark: Condition appears good.
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A ☑ Good condition ☐ Proper secondary containment ☐ Needs Maintenance Remarks: Condition appears good.
4.	**Discharge Structure and Appurtenances** ☐ N/A ☑ Good condition ☐ Needs Maintenance Remarks: Discharge pipeline from plant is buried. No leakage/problems evident.
5.	**Treatment Building(s)** ☐ N/A ☑ Good condition ☐ Needs repair ☑ Chemicals and equipment properly stored Remarks: Treatment plant is covered by roof only and surrounded by locked cyclone fence. No deficiencies noted. Supplies/equipment stored in locked 20-foot-long (?) shipping container. Appears very secure.
6.	**Monitoring Wells** (pump and treatment remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks: Did not check every well. No problems noted. Problems subject to detection during quarterly monitoring.

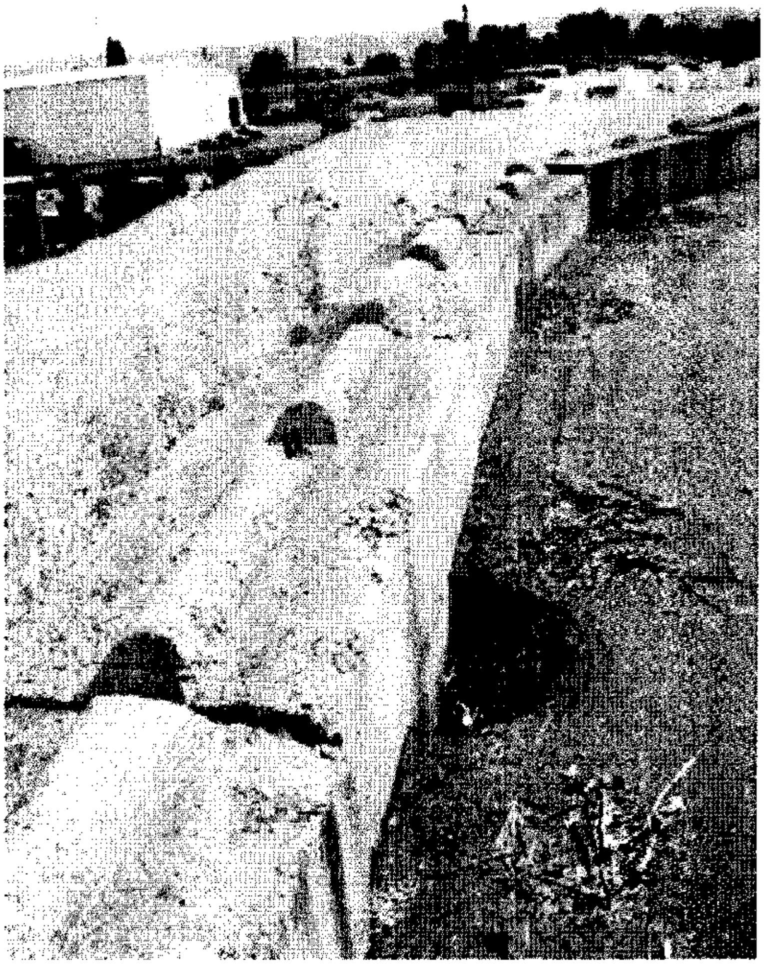

Photo #1 - Small Pavement Failure in Waste Pile Access Road

APPENDIX F

Interview Forms

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Burley, Mark	Employee	Joseph Simon & Sons	August 12, 2003
Dalton, Matt	PSE Contractor, O&M	Dalton, Olmsted, & Fuglevand	July 24, 2003
Maurer, Christopher	Ecology Point of Contact for TTP Site	Wash. State Dept. of Ecology	August 8, 2003
Simon, Marc	Employee	Joseph Simon & Sons	July 24, 2003
Secrist, Steve	Site Environmental Manager for PSE	Puget Sound Energy	August 14, 2003
Sullivan, Bill	Tribal Environment Director	Puyallup Tribe	August 12, 2003

INTERVIEW RECORD

Site Name: Tacoma Tar Pits, Tacoma, WA	**EPA ID No.: WAD980723795**
Subject: Five-Year Review	**Time:** 2:45 P — Date: 8/12/03
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:**	☒ Incoming ☐ Outgoing Returned call

Contact Made By:

Name: Doug Holsten	**Title: Site Manager**	**Organization: CH2M HILL**

Individual Contacted:

Name: Mark Burley	**Title: Joseph Simon & Sons employee**	**Organization: Joseph Simon & Sons**

Telephone No: (253) 272-9364 **Fax No:** **E-Mail Address:**	**Street Address: 2202 River Street** **City, State, Zip: Tacoma, WA 98421**

Summary Of Conversation

1. Is the remedy functioning as expected? How well is the remedy performing?

Overall remedy appears to be working well. JS&S concerned with pavement (cap) and stormwater system supporting the recycling operations. The remedy presents no negative impacts for JS&S.

2. Pavements holding up?

Yes. Pavements holding up well considering they have been in place for nearly 10 years.

3. Any issues with stormwater system?

JS&S has a NPDES permit for stormwater. Oil/water separator has been installed since initial remedy to treat stormwater from the recycling facility. Stormwater testing shows JS&S meets NPDES permit requirements for oils/petroleum. However, recent testing indicates JS&S is not in compliance for copper, lead, and zinc. These exceedances are not related to the remedy but are a direct result of recycling operation issues. JS&S is implementing BMPs to address the issue (frequent sweeping, keep scrap piles covered).

4. Any O&M difficulties?

No significant operational problems. Past JS&S experience indicates that coordination with Puget Sound Energy is appropriate on O&M issues.

5. Other comments?

None.

INTERVIEW RECORD

Site Name: Tacoma Tar Pits, Tacoma, WA		EPA ID No.: WAD980723795
Subject: Five-Year Review		Time: 10-11 am / Date: 7/24/03
Type: ☐ Telephone ☒ Visit ☐ Other Location of Visit: TAR PITS SITE		☐ Incoming ☐ Outgoing

Contact Made By:

Name: Doug Holsten DH	Title: Site Manager	Organization: CH2M HILL

Individual Contacted:

Name: Matt Dalton	Title: Project Manager	Organization: Dalton, Olmsted & Fuglevand
Telephone No: (425) 827-4588 Fax No: E-Mail Address: mdalton@dofnw.com		Street Address: 10827 NE 68th St., Suite B City, State, Zip: Kirkland, WA 98033

Summary Of Conversation

1. Is the remedy functioning as expected? How well is the remedy performing?
REMEDY PERFORMING WELL – AS EXPECTED. GROUNDWATER EXTRACTION AND TREATMENT SYSTEM HAS BEEN OPERATIONAL FOR APPROX. 1 YEAR. TREATMENT PLANT PERFORMING AS DESIGNED/INTENDED.

2. What do the monitoring data show? Are there any trends that show contaminant levels are decreasing?
WITH RE: TO GROUNDWATER EXTRACTION/TREATMENT, NO DISCERNABLE TRENDS APPARENT YET. HOWEVER, NO INDICATION THAT PLUME IS SPREADING.

3. Current volume of groundwater being extracted/treated?
APPROX 14 gpm TOTAL: ~2 gpm FROM "EAST BRANCH" AND ~12 gpm FROM "NORTH BRANCH". (4 WELLS TOTAL)

4. How efficient is the new groundwater treatment plant?
VERY EFFICIENT. 100% REMOVAL OF BENZENE.

5. On-site O&M presence?
ONCE EVERY 1 TO 2 WEEKS FOR TREATMENT PLANT CHECKS. QUARTERLY FOR GW AND PLANT EFFLUENT MONITORING. ANNUAL SITE INSPECTION (SUMMER)

6. Opportunities to optimize O&M?
NOTHING AT THIS TIME. SYSTEM TO ADD SEQUESTERING AGENT TO PLANT INFLUENT WAS RECENTLY ADDED TO INHIBIT BIO-FOULING. THIS ACTION WILL HELP MAINTAIN PLANT EFFICIENCY.

INTERVIEW RECORD

Site Name: Tacoma Tar Pits, Tacoma, WA		EPA ID No.: WAD980723795
Subject: Five-Year Review		Time: 9:45A — Date: 8/8/03
Type: ☒ Telephone ☐ Visit ☐ Other Location of Visit:		☒ Incoming ☐ Outgoing RETURN CALL
Contact Made By:		
Name: Doug Holsten	Title: Site Manager	Organization: CH2M HILL
Individual Contacted:		
Name: Christopher Maurer	Title: Point of Contact for TTP Site	Organization: Wash. State Dept. of Ecology
Telephone No: (360) 407-7223 Fax No: E-Mail Address: cmau461@ecy.wa.gov	Street Address: PO Box 47600 City, State, Zip: Olympia, WA 98504-7600	
Summary Of Conversation		

MR. MAURER HAS NO INPUT OR CONCERNS AT THIS TIME, WITH REGARD TO THE TTP SITE.

REQUESTED THAT COPY OF 5-YEAR REVIEW REPORT BE SENT TO ECOLOGY WHEN DOCUMENT IS COMPLETE.

INTERVIEW RECORD

Site Name: Tacoma Tar Pits, Tacoma, WA	EPA ID No.: WAD980723795
Subject: Five-Year Review	Time: 1:15 P | Date: 8/14/03
Type: ☒ Telephone ☐ Visit ☐ Other Location of Visit:	☒ Incoming ☐ Outgoing Return call.

Contact Made By:

Name: Doug Holsten	Title: Site Manager	Organization: CH2M HILL

Individual Contacted:

Name: Steven Secrist	Title: Site Manager for TTP Site	Organization: Puget Sound Energy (PSE)

Telephone No: (425) 462-3178 Fax No: E-Mail Address:	Street Address: City, State, Zip:

Summary Of Conversation

Attempted to reach Mr. Secrist on August 12, 2003. Returned call on August 14, 2003.

1. Is the remedy functioning as expected? How well is the remedy performing?

   Stabilization/capping of wastes/soils appears to be effective except for benzene in groundwater. PSE is disappointed that the original remedy was not effective enough to adequately address the benzene issue. After approximately a year of pump and treat operations, however, benzene appears to be under control. PSE's interpretation of the benzene data suggests that contaminant levels have peaked.

2. Pavements holding up?

   No issues/concerns mentioned.

3. Any issues with stormwater system?

   No issues/concerns mentioned. City of Tacoma has been very cooperative on stormwater issues.

4. Any O&M difficulties?

   No issues/concerns mentioned.

5. Other comments?

   None.

INTERVIEW RECORD

Site Name: Tacoma Tar Pits, Tacoma, WA		EPA ID No.: WAD980723795
Subject: Five-Year Review		Time: 10 Am / Date: 7/24/03
Type: ☐ Telephone ☒ Visit ☐ Other Location of Visit: Tar Pits Site		☐ Incoming ☐ Outgoing
Contact Made By:		
Name: Doug Holsten DH	Title: Site Manager	Organization: CH2M HILL
Individual Contacted:		
Name: Marc Simon	Title: Joseph Simon & Sons employee	Organization: Joseph Simon & Sons
Telephone No: (253) 272-9364 Fax No: E-Mail Address:	Street Address: 2202 River Street City, State, Zip: Tacoma, WA 98421	

Summary Of Conversation

1. Is the remedy functioning as expected? How well is the remedy performing?

   IMPROVEMENTS TO JS&S SITE ARE WORKING WELL. NO PROBLEMS.

2. Pavements holding up?

   NO PROBLEMS. BOTH CONCRETE AND ASPHALT PAVEMENTS HOLDING UP WELL.

3. Any issues with stormwater system?

   NO PROBLEMS. STORMWATER SYSTEM CLEANED OUT ANNUALLY. DETENTION BASIN SWEPT ANNUALLY.

4. Any O&M difficulties?

   NONE.

5. Other comments?

   IMPROVEMENTS MADE DURING REMEDIATION HAVE LEFT JS&S WITH ONE OF THE BEST FACILITIES IN THE METALS RECYCLING INDUSTRY.

INTERVIEW RECORD

Site Name: Tacoma Tar Pits, Tacoma, WA	EPA ID No.: WAD980723795	
Subject: Five-Year Review	Time: 2:30 P	Date: 8/12/03
Type: ☒ Telephone ☐ Visit ☐ Other Location of Visit:	☐ Incoming ☒ Outgoing	

Contact Made By:		
Name: Doug Holsten	Title: Site Manager	Organization: CH2M HILL
Individual Contacted:		
Name: Bill Sullivan	Title: Environmental Coordinator	Organization: Puyallup Tribe

Telephone No: (253)573-7850 Fax No: E-Mail Address:	Street Address: 1850 Alexander Avenue City, State, Zip: Tacoma, WA 98421

Summary Of Conversation

1. What is your overall impression of the project?

   Minimal involvement with the site since the remedy was implemented. Very interested in the efficacy of new groundwater extraction and treatment system.

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

   None.

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

   None.

4. Do you feel well informed about the site's activities and progress?

   The major issue for the Puyallup Tribe is potential for discharge of contaminated groundwater or surface water from the site to the Puyallup River and Commencement Bay. The Tribe would like be kept better informed on the performance of the new groundwater extraction and treatment system.

Mr. Sullivan expressed interest in how/where treated groundwater was discharged. Informed him that treatment plant effluent is discharged to the City of Tacoma POTW - not storm sewer.

5. Other comments?

Mr. Sullivan would like a copy of the 5-year review report when available.