Final East Parcel Corrective Measures Implementation Work Plan

Former Rhone-Poulenc Site

Tukwila, Washington

Prepared for:

Container Properties, L.L.C.
Tukwila, Washington

December 2007

Project No. 8769

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Prepared for:

Container Properties, L.L.C.
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Prepared by:

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December 2007

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On behalf of the respondents, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information submitted. I certify that the information contained in or accompanying this document, the Final East Parcel Corrective Measures Implementation Work Plan, is true, accurate, and complete. As to those portions of the report for which I cannot personally verify accuracy, I certify under penalty of law that this document and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who may manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

By: ______________________ Date: December 13, 2007

Mr. Gary Dupuy, Project Coordinator

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APPENDIXES

ABBREVIATIONS AND ACRONYMS

APS	Applied Professional Services
ARI	Analytical Resources, Inc.
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
Cascade	Cascade Drilling, Inc.
Clearcreek	Clearcreek Contractors, Inc.
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
COC	chain-of-custody
Container Properties	Container Properties, LLC
cu yd	cubic yards
DO	dissolved oxygen
Ecology	Washington State Department of Ecology
EDDs	electronic data deliverables
EPA	U.S. Environmental Protection Agency
GAC	granular activated carbon
Geomatrix	Geomatrix Consultants, Inc.
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HCIM	Hydraulic control interim measure
HDPE	high-density polyethylene
IAAI	Insurance Auto Auctions, Inc.
lb	pounds
LNAPL	light nonaqueous-phase liquid
LS/LD	laboratory spike/laboratory spike duplicate
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
Monsanto	Monsanto Chemical Company
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicates
NOC	Notice of Construction
O&M	Operations and Maintenance
Order	Administrative Order on Consent No. 1091-11-20-3008(h)
OSHA	U.S. Occupational Safety and Health Administration
P&ID	piping and instrumentation diagram
PID	photoionization detector
PLC	programmable logic controller
PEL	permissible exposure limit
PPE	personal protective equipment
ppm	parts per million
PSCAA	Puget Sound Clean Air Agency

ABBREVIATIONS AND ACRONYMS
(Continued)

PVC	polyvinyl chloride
QAPP	quality assurance project plan
QC	quality control
psig	pounds per square inch gauge
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
Rhodia	Rhodia, Inc.
ROI	radius of influence
scfm	standard cubic feet per minute
SVE	soil vapor extraction
TOC	total organic carbon
µg/L	micrograms per liter
VOCs	volatile organic compounds
WAC	Washington Administrative Code
WISHA	Washington Industrial Safety and Health Act

FINAL EAST PARCEL CORRECTIVE MEASURES IMPLEMENTATION WORK PLAN

Former Rhone-Poulenc Site
Tukwila, Washington

1.0 INTRODUCTION

Geomatrix Consultants, Inc. (Geomatrix), has prepared this work plan to outline plans for contingent corrective measures to address affected groundwater in the East Parcel of the former Rhone-Poulenc Site. The former Rhone-Poulenc facility is located along the Duwamish Waterway at 9229 East Marginal Way South, Tukwila, Washington, as shown on Figure 1. Due to previous use of the facility and historic releases to site soil and groundwater, a Resource Conservation and Recovery Act (RCRA) corrective action is being conducted at the facility. Corrective action is being conducted under Administrative Order on Consent No. 1091-11-20-3008(h) (Order) between the Respondents (Container Properties, L.L.C. [Container Properties]; Rhodia, Inc. [Rhodia]; and Bayer CropScience) and the U.S. Environmental Protection Agency, Region 10 (EPA), dated March 31, 1993, as amended. Container Properties, Rhodia, and Bayer CropScience are collectively referred to as the Respondents.

Under the terms of the Order, the Respondents have completed a RCRA Facility Investigation (RFI) and have implemented three interim measures. A soil vapor extraction (SVE) system was installed and operated to remove toluene from soil beneath the former tank farm. The SVE system was operated until recovery diminished to *de minimis* levels and has since been removed. In 2003 a hydraulic control interim measure (HCIM) was implemented in the western portion of the site. Construction for the HCIM was completed early in 2004. The HCIM, which consists of a barrier wall enclosing the most highly affected areas and a groundwater recovery system, is currently being operated pursuant to the requirements of the Order. In 2006, substantial characterization and soil removal were conducted to remediate affected soil in the eastern portion of the site. The 2006 interim measure achieved interim cleanup levels in the eastern portion of the site (Geomatrix, 2006a).

In 2006, Container Properties redeveloped the former Rhone-Poulenc site. In support of this redevelopment, Container Properties subdivided the site into two separate parcels (the West and East Parcels), as shown in Figure 2. Container Properties is the current owner of the West Parcel. While both parcels were part of the former Rhone-Poulenc facility covered under the Order, the East Parcel was not used extensively for chemical processing and, based on sampling results presented in the RFI Report, has not been substantially affected by past operations (CH2M HILL, 1995). Based on the results of the soil removal interim measure conducted for the East Parcel, EPA issued a partial determination of "corrective action complete without controls" for soil; this determination specified that additional remedial action may be needed to address a limited area of groundwater contamination beneath the southwestern portion of the East Parcel (EPA, 2006). The East Parcel was subsequently purchased by the Museum of Flight in late 2006.

A final Corrective Measures Study (CMS) for the East Parcel was submitted to EPA in October 2006 (Geomatrix, 2006b). The CMS identified and evaluated potential corrective action alternatives that would address affected soil and groundwater within the East Parcel and identified a final corrective measure alternative that would achieve appropriate cleanup standards for the East Parcel. The preferred alternative identified in the CMS included excavation and off-site landfill disposal of affected soil, with natural attenuation of residual toluene in the southwest corner of the East Parcel. In the December 2006 partial determination of corrective action complete without controls, EPA specified that within 6 months the Respondents must submit either a demonstration that the concentration of toluene in groundwater is below the final groundwater cleanup level for the East Parcel (1.0 milligram per liter [mg/L]) or a Corrective Measures Implementation (CMI) Work Plan for a contingent corrective action to address groundwater contamination.

Results of groundwater sampling conducted in May 2007 (Appendix A) indicate that groundwater near the southwest corner of the East Parcel is affected by toluene at concentrations greater than 1 mg/L. This CMI Work Plan documents plans for a contingent corrective measure to address the limited affected groundwater area in the East Parcel. The project area for this CMI Work Plan includes the toluene-affected soil that has been delineated within the West Parcel, as described in Section 2.4, and the toluene-affected groundwater located beneath the western portion of the East Parcel and the eastern portion of the West Parcel, as described in Section 2.5. These areas will be referred to in this report as the CMI Project Area, as shown in Figure 2.

1.1 PURPOSE AND OBJECTIVES

The purpose of this CMI Work Plan is to describe additional measures to address groundwater on the East Parcel affected by toluene, which will ultimately be remediated to concentrations below the final groundwater cleanup level established for the East Parcel. The scope of this CMI Work Plan is limited to addressing affected groundwater beneath the area defined in the

Short Plat description included as Appendix B and designated the East Parcel in Figure 2. In order to prevent re-contamination of groundwater in the East Parcel, the Work Plan includes remedial measures to address residual toluene contamination present beneath the eastern portion of the West Parcel. This CMI Work Plan does not fully address corrective action requirements for the West Parcel.

The following corrective measure objectives have been identified for the East Parcel to address requirements under the Order, the partial determination of corrective action complete without controls, and applicable regulations.

1. Protect human health and the environment.
2. Attain the final cleanup standard established for toluene in groundwater beneath the East Parcel, as specified by the EPA (EPA, 2006).
3. Reduce toluene contamination within an area that has been defined within the eastern portion on the West Parcel so as to prevent toluene migration from the West Parcel to the East Parcel.
4. Comply with applicable federal and state laws and regulations for management of any wastes generated from corrective action activities.

1.2 WORK PLAN OVERVIEW

To remediate remaining toluene-affected groundwater, a combination of biosparge wells and vent wells will be used. Seven biosparging wells will be installed to enhance aerobic biodegradation of toluene in affected groundwater. A compressor will be used to inject air at low pressure into the well screens (located so that they are constantly below the water table) to supply oxygen to indigenous biota. Because groundwater on the East Parcel is tidally influenced and the water table is located at or just below a silt layer, there is a large capillary fringe zone above the water table that will also support active biodegradation of toluene. To ensure that the capillary fringe zone is addressed, seven vent wells will be installed and screened across the fringe zone. A small vacuum pump will be used to induce the flow of air through the vent wells and encourage the capture of injected biosparge air. This captured air will be directed to granular activated carbon (GAC) units for treatment prior to venting to the atmosphere.

It is anticipated that this enhanced bioremediation program will attain the final groundwater cleanup standard for toluene established by EPA (1 mg/L) within 3 to 6 months of system operation. A monitoring program, including installation of new monitoring wells, has been included to confirm attainment of the groundwater cleanup level.

Following this introduction, this work plan is divided into the following sections.

- Section 2.0 describes the history of activities and previous investigations conducted on the East Parcel, describes hydrogeology, and presents the final approved cleanup standard for the East Parcel.
- Section 3.0 summarizes the design of the biosparge/vent well system.
- Section 4.0 describes required construction-related plans, including permitting requirements, preconstruction plans, a construction quality assurance plan, and the health and safety plan (HASP).
- Section 5.0 presents the operation, monitoring, inspection, and maintenance plan.
- Section 6.0 presents the project schedule and reporting requirements.
- Section 7.0 presents the references cited in this work plan.

Figures and tables follow Section 7.0.

1.3 PROGRAM MANAGEMENT PLAN

The corrective measure for the East Parcel will be implemented under the supervision of Geomatrix. Gary Dupuy, the Project Coordinator specified under the Order, will have overall responsibility for implementation of the program. The Project Manager for the CMI will be Larry McGaughey; he has significant experience at the site and has managed previous interim measures conducted for the East Parcel. Drilling and well installation will be directed by licensed geologists or hydrogeologists reporting directly to the Project Manager. Operation, maintenance, and monitoring will be performed by environmental professionals reporting to the Project Manager. Contact information for the management personnel are as follows:

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Phone: (206) 342-1760

The primary subcontractors for the CMI are as follows:

Driller
Cascade Drilling, Inc. (Cascade)
PO Box 1184
Woodinville, Washington 98072
Contact - Mr. Brian Gose
Phone: (425) 485-8908

Biosparging System Installation Contractor
Clearcreek Contractors, Inc. (Clearcreek)
3203 15th Street
Everett, WA 98201
Contact - Mr. Mark McCullough
Phone: (425) 252-5800

Analytical Laboratory
Analytical Resources, Inc. (ARI)
4611 S. 134th Place
Tukwila, WA 98168-3240
Contact – Mr. Mark Harris
Phone: (206) 695-6210

Additional subcontractors may be employed if necessary and appropriate to complete the CMI.

2.0 SITE DESCRIPTION AND ENVIRONMENTAL ISSUES

This section provides background on the site history, environmental setting, current conditions, and applicable cleanup standards.

2.1 SITE DESCRIPTION

The two parcels of the former Rhone-Poulenc site occupy a total of approximately 21 acres within the City of Tukwila in an area known as Seattle's South End Industrial District. Industrial use of the site began in the 1930s when I.F. Laucks built a pilot plant to formulate glue for use in plywood manufacturing. In 1946, Monsanto Chemical Company (Monsanto) purchased the site and continued the manufacture of glue, paints, and resins, and used the property for storage of wood preservatives. Monsanto began vanillin production in 1952, which continued through sale of the property to Rhone-Poulenc in 1986, until Rhone-Poulenc ceased manufacturing at the site in 1991. Rhone-Poulenc closed the site permanently in April 1991 and transferred the title of the property to Rhodia in January 1998. Rhodia sold the property in November 1998 to Container Properties, the current owner. Bayer CropScience is the successor to Rhone-Poulenc, Inc.

Since facility closure in 1991, investigations have been completed to evaluate environmental impacts to soil and groundwater. The investigations have followed the RCRA process from an initial RCRA Facility Assessment (RFA) through the RFI (AGI, 2001). Studies completed subsequent to the RFI include geoprobe and geotechnical investigations conducted in support of the interim measure design. Quarterly monitoring of groundwater is currently conducted at the site.

In April 2003 Container Properties completed construction of an interim measure to control the potential for contaminants from the western portion of the site to migrate toward the Duwamish Waterway. The interim measure consisted of the installation of a subsurface low-permeability barrier wall surrounding the environmentally impacted portion of the site (West Parcel), along with a system of groundwater extraction wells and a pretreatment system to pump and treat groundwater from inside the contained area.

In 2006, Container Properties redeveloped the entire site. As part of the redevelopment, the site was divided into two separate parcels (West and East Parcels) (Figure 2). Although both the West and East Parcels were part of the former Rhone-Poulenc facility, previous investigations have shown that the East Parcel was not substantially affected by past operations.

In summer and fall 2006, extensive soil characterization and removal activities occurred in the East Parcel where RFI and post-RFI soil sampling results exceeded the East Parcel cleanup levels, and where historical sampling data were not sufficient to fully characterize the nature and extent of contamination. This work is summarized in more detail in Section 2.3. The East Parcel has been sold to the Museum of Flight.

2.2 GEOLOGIC AND HYDROGEOLOGIC SETTING

This section describes the geologic and hydrogeologic environment at the site.

2.2.1 Site Hydrogeology

The unsaturated zone occurs from ground surface to depths ranging from about 5 to about 11 feet below ground surface (bgs). This zone consists primarily of hydraulically placed fill with smaller volumes of construction fill. Low-permeability silt and clay strata occur locally at the base of the fill, which may cause perching of infiltrating precipitation. The thickness of the fill (i.e., fill placed prior to the 2006 voluntary interim measure) in the East Parcel is generally limited to depths of about 4 to about 8 feet. The fill is underlain by low-permeability, organic-rich silt and clayey silt that extend into the water table. The uppermost water-bearing unit, referred to as the Upper Aquifer, underlies the unsaturated zone and is continuous beneath the upland portions of the former Rhone-Poulenc site. Groundwater in the Upper Aquifer generally occurs under unconfined conditions within the alluvial deposits. The Upper Aquifer is approximately 50 feet thick and is composed of sands and silty sands (AGI, 2001; URS, 2002a). On the East Parcel, the uppermost portion of the Upper Aquifer may be within the finer grained unit that overlies the sand, particularly during high tide.

The Upper Aquitard underlies the Upper Aquifer and is composed of alluvial or glaciomarine silt with scattered traces of fine sand. The Upper Aquitard ranges in thickness from approximately 15 to 50 feet and has an average thickness of approximately 20 feet.

2.2.2 Groundwater Elevation and Flow

Groundwater flow conditions beneath the East Parcel have likely been affected by the installation of a subsurface barrier wall on the West Parcel, although the direction of groundwater flow beneath the East Parcel has not been evaluated since completion of the barrier wall in 2003. In previous investigations, the net groundwater flow direction across the East Parcel was determined to be from east to west in the Upper Aquifer, with flow patterns in the southern portion of the East Parcel deviating to the south, toward Slip 6. After completion of the barrier wall, the groundwater flow is still likely from east to west over the eastern portion of the East Parcel. It is expected that groundwater flow divides in the western portion of the property, with one portion flowing to the south around the barrier wall and toward Slip No. 6 and the other portion flowing to the north, around the wall onto the adjacent property, and then west toward the Duwamish Waterway. Water levels outside the barrier wall are influenced by tidal fluctuations; therefore, it is difficult to evaluate groundwater flows in this area based on the available manual groundwater level measurements. In the 23 borings performed in the general vicinity of toluene-affected groundwater in the southwest corner of the East Parcel, depth to groundwater has ranged from 10 to 13.5 feet bgs.

2.3 PREVIOUS REMEDIAL ACTIONS

In summer and fall 2006, affected soil from the entire East Parcel was characterized and removed. As noted previously, a small area of toluene-affected groundwater was identified in the southwest corner of the East Parcel (Geomatrix, 2006a). A total of approximately 5,000 cubic yards (cu yd) of soil exceeding the cleanup standards was excavated for off-site landfill disposal in August and September 2006. Excavation depths over most of the affected area ranged from 2 to 4 feet bgs; in the southwestern portion of the former Compressor and Maintenance Areas, the excavation extended to a maximum depth of 17 feet bgs. Confirmation soil sampling and analysis conducted after excavation confirmed that soil interim cleanup levels had been achieved in the East Parcel.

The excavation to remove soil affected by toluene within the Maintenance Area in the extreme southwest corner of the East Parcel extended to the south property line, to at least 10 feet into the West Parcel, and to at least 6 to 12 inches below the water table. A sheen of toluene was visible on the water table in the excavation after completion of all soil removal. Approximately 14,000 gallons of groundwater were pumped from the open excavation to remove the most highly affected groundwater; the recovered groundwater was pretreated and discharged to the King County sewer system for final treatment and discharge. The excavation was backfilled with clean, imported, silty sand fill.

2.4 NATURE AND EXTENT OF TOLUENE-AFFECTED SOIL CONTAMINATION

The nature and extent of toluene-affected soil addressed by this Work Plan was defined by the direct push borings completed during the voluntary interim measure conducted for the East Parcel. A total of 19 direct push borings (GMX-1 through GMX-19) were completed on the East and West Parcels, as shown in Figure 3. These borings were logged and soil observations were recorded, including photoionization detector (PID) headspace readings and lithologic observations. Soil samples were not collected from all borings; if visual evidence and/or PID readings indicated that soil was obviously affected by toluene (such as for Borings GMX-11 and GMX-12), soil samples were not collected for laboratory analysis. Figure 3 summarizes the PID readings and the soil analytical results for these borings. Soil analytical results from these investigations are summarized in Table 1, and boring logs for Borings GMX-1 through GMX-19 are included as Appendix C.

The maximum toluene concentration reported in these soil samples was found in the sample from Boring GMX-15 at 30,000 milligrams per kilogram (mg/kg). While soil samples were not collected from GMX-11 or GMX-12, the field observations suggest that toluene is also present at elevated concentrations at these two locations.

Toluene-affected soil was removed from the southwestern corner of the East Parcel, as described in Section 2.3. During the deep excavations within the western portion of the East Parcel, toluene-affected soils were encountered, leading to enlargement of the excavation in this area; some soils within the eastern portion of the West Parcel were also removed. It was concluded that the toluene-affected soil was caused by a release from an underground line used by Rhone-Poulenc to transfer toluene from the storage tank to the vanillin process; this line was located near the area affected by toluene. The location of the toluene process line is shown in Figure 3. The location of the line, in particular the location of the 90-degree turn, is consistent with the delineated extent of toluene-impacted soil.

Figure 3 shows the approximate extent of toluene-affected soil removed during the East Parcel Voluntary Interim Measure (Geomatrix, 2006a), as well as the extent of remaining toluene-affected soil in the area addressed by this Work Plan. The lateral extent of toluene-affected soil has been defined to the east, north, west, and south, as based on the results of the direct-push borings. During excavation of the storm water quality unit directly west of Boring GMX-5, no toluene odor or sheen was noted, despite the fact that this excavation extended to at least 10 feet bgs. Moreover, no odor was noted for the western half of the excavations for the storm `water bypass line or in the excavation for the storm water vault discharge line. The excavations for these discharge lines started at 10 feet bgs (at the manhole for the bypass line and at the east end of the storm water vault for the storm water vault discharge line), then extended to approximately 14 feet bgs in connecting to the King County Storm Sewer. Therefore additional source delineation is not required or needed to implement corrective actions. The vertical extent of toluene-affected soil extends to the groundwater table, as toluene is less dense than water and would float on groundwater. As noted in the East Parcel

Characterization and Voluntary Interim Action Report, toluene-affected soil above the water table has been removed from the East Parcel (Geomatrix, 2006a).

2.5 NATURE AND EXTENT OF GROUNDWATER CONTAMINATION

Toluene had originally been identified in grab groundwater samples collected in the southwest corner of the East Parcel, in the general vicinity of GMX-5, during a geoprobe investigation completed in the summer of 2001 (AGI, 2001). Three groundwater samples were collected at sample location F18, located just to the south-southeast of GMX-5; no soil samples were collected. Toluene was detected in groundwater samples collected at this location at depths of 15, 30, and 45 feet at 34, 13, and 180 micrograms per liter (µg/L), respectively (AGI, 2001). During 2006 and 2007, groundwater in and surrounding the southwest corner of the East Parcel was sampled and analyzed for toluene in four direct-push sampling events. The 2006-2007 characterization included Borings GMX-1 to GMX-21, GMX-20A, and GMX-21A. Borings GMX-1 to GMX-21 were installed to assess the extent of toluene-affected groundwater, as described in the characterization report (Geomatrix, 2006a) and in Section 2.4. Borings GMX-20A and GMX-21A were installed in May 2007 to assess attenuation of toluene following the source removal completed in 2006. Groundwater analytical results from the 2006-2007 investigations are summarized in Table 2, and boring logs for GMX-1 through GMX-19 are included in Appendix C. Borings GMX-20 and GMX-21 were not logged. As noted on the boring logs, 10 of the 23 borings were installed on the West Parcel.

The work completed to date has characterized the extent of toluene contamination in the area of concern. Figure 4 shows the concentrations of toluene in groundwater samples collected from the 2006-2007 boreholes. Concentrations of toluene in groundwater decreased between December 2006 and May 2007, but as of May 2007, concentrations were still above the final groundwater cleanup level of 1.0 mg/L. Based on the physical nature of toluene and the only known potential source for the toluene release in this area, the extent of toluene-affected soil and groundwater is limited to the vadose zone and the upper portion of the saturated zone. Results from the 2001 samples collected at depths of 30 and 45 feet are not consistent with the physical properties of toluene and the likely source of the toluene release. Based on the description of the 2001 sampling program, it is likely that the reported toluene contamination at depth is due to drag-down by the sampling probe. The anomalous detection of toluene at depth in push probe F18 is discussed further in Section 2.7.

2.6 CLEANUP STANDARDS

In a letter dated December 20, 2006, EPA established final cleanup standards for the East Parcel. The standards are based on "unrestricted use" of the property. The final East Parcel groundwater cleanup standard for toluene is 1.0 mg/L (EPA, 2006). The final East Parcel soil cleanup level for toluene is 0.8 mg/kg.

2.7 CONCEPTUAL SITE MODEL

The source of the toluene has not been positively identified; however, the toluene transfer line is the most likely source of the toluene contamination identified in the soils and groundwater within the area addressed by this Work Plan. The toluene transfer line is the only known source for toluene near the West Parcel/East Parcel boundary, based on an extensive review of historical plant drawings and previous site investigation reports. No other potential toluene sources or uses have been identified near this area. The time of the toluene release is unknown.

While site-specific residual saturation concentrations for toluene are not readily available in the literature, the concentrations detected in soil samples from the toluene source area shown in Figure 3 are within the range of available literature values of residual saturations for gasoline-range hydrocarbons; toluene is a gasoline-range hydrocarbon and is a common constituent of gasoline, although at the former Rhone Poulenc site it was used as a solvent.

A cross-section (located as shown on Figure 5) presenting the conceptual site model for the distribution of toluene in the subsurface is shown on Figure 6. This cross-section is based on the logs from borings located along the centerline of the toluene-affected area addressed in this Work Plan. This cross-section includes results from PID readings, soil analyses, and groundwater analyses from samples taken along the cross-section. Figure 6 shows that toluene is generally distributed within the vadose zone near the toluene pipeline and within the subsurface intertidal region.

The conceptual site model for the toluene release addressed by this Work Plan is as follows (Figure 6).

- Toluene was released into the subsurface and exceeded residual saturation levels in the vicinity of the release, causing downward flow through the generally silty soils present in the upper portion of the vadose zone. While the released toluene may have spread laterally along contacts between different soils, it is likely that the toluene generally flowed downward, toward the water table.

- Once toluene reached the groundwater, it would spread within more permeable sandy units, and less in lower permeability silts; considerable smearing may have occurred as a result of the tidally induced water table fluctuations.

- Toluene that reached the higher permeability, saturated sands present at 12 to 13 feet in depth may be present as a separate hydrocarbon phase at the top of the water table, since toluene is less dense than water. This was the case in a portion of the excavated area on the East Parcel.

- Although free product was known to be present over a small area along the East Parcel/West Parcel boundary, the toluene would migrate in the dissolved phase in groundwater.

- Migration of toluene-affected groundwater is impacted by tidal variation in groundwater level, which results in slower groundwater velocities but an overall flow direction downgradient toward Slip No. 6. Figure 6 shows the typical tidal range based on water levels measured in monitoring well DM-8 from July 4, 2006, to October 4, 2006.

A schematic cross-section summarizing this conceptual site model is shown on Figure 6. Given this conceptual model, it is likely that the toluene release has affected only the upper 4 feet of the sandy unit. This conclusion is based on the elevation of the sand/silt contact compared to the characteristic tidal variations in groundwater elevation seen at monitoring Well DM-8, as shown in Figures 4 and 5 of the Final Operations and Maintenance (O&M) Report, 2003-2006 (Geomatrix, 2007a). While construction of the barrier wall in 2003 has undoubtedly affected groundwater flow and elevation conditions in the toluene-affected area, the effects of these changes have probably not redistributed toluene since toluene was already present in residual saturation prior to construction of the barrier wall. .

Toluene was reported in a deep groundwater sample collected in this area during the summer 2001 geoprobe investigation at geoprobe location F18(AGI, 2001). The F18 sample location is within the area that was excavated in 2006; the depth of the sample (40 feet bgs) is well below the depth of the excavation, which extended to the water table. Free-phase toluene was observed at the water table within this excavation. The excavation removed all of the soil that was saturated with toluene, although some residual toluene remained in the open excavation.

For the three groundwater samples collected at F18, the highest toluene concentration was noted in the deepest groundwater sample. This observation is inconsistent with the buoyancy of free-phase toluene, and the likely release scenario. Since toluene would be present as a light nonaqueous-phase liquid (LNAPL) floating on the water table, dissolved toluene concentrations would be expected to decrease with depth, even in a tidal environment. At the time the samples were collected from F18, the AGI field staff were apparently unaware that toluene LNAPL was present in the sampling area. Based on a review of the sampling notes presented in the report, groundwater samples were collected by repeatedly driving the sampler to the target sampling depths, which likely resulted in drag-down of contamination, a well-known concern with geoprobe sampling of groundwater at multiple depths.

To summarize:

- The extent of toluene in the subsurface was defined by the “GMX” series of borings and the deep “compressor” area and “maintenance area” excavations.
- The most likely source of toluene in the source area is the former toluene transfer line. The location of this line was confirmed during site redevelopment activities, and the location of the line is consistent with the location of the toluene source area.
- The exact path of toluene migration in the subsurface is not known, but the combination of (1) lower permeability silt overlying a high-permeability sand and (2) large tidal fluctuations likely resulted in considerable smearing of the toluene in locations away from the original source area.
- The geoprobe borings completed by Geomatrix in 2007 have defined the extent of the area affected by toluene.

3.0 CORRECTIVE MEASURES IMPLEMENTATION DESIGN

Because toluene is readily biodegradable under aerobic conditions, affected groundwater will be treated in situ using a combination of active biosparging and active vent wells. Biosparging involves injecting air into the groundwater to provide oxygen to encourage microbial degradation of hydrocarbon components in the groundwater and capillary fringe. The vacuum pump-assisted vent wells screened across the capillary fringe zone will draw air into the capillary fringe and vadose zones, direct contaminated vapors to vapor treatment units, and vent the treated air to the atmosphere. A conceptual diagram of a typical air sparge and soil vapor extraction system is shown in Figure 7. More detailed description of typical air sparge and soil venting systems include the U.S. Army Corps of Engineers' "Engineering and Design-Soil Vapor Extraction and Bioventing" (U.S. Army Cops of Engineers, 2002) and the EPA's (1994) guide on "How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites: a Guide for Corrective Action Plan Reviewers." While groundwater is tidally influenced, it is expected that the air flow rate from the vent wells will be controlled by the vacuum pump. Monitoring will be conducted to confirm attainment of the groundwater cleanup standard.

3.1 DESIGN SCOPE

The biosparging and vent well system was designed to increase dissolved oxygen concentrations in groundwater and the capillary fringe, which will increase the rate of microbial degradation of toluene. The sparge system may also volatilize toluene; however, the biosparging and vent well system is not designed as a traditional soil vapor extraction system, which would promote rapid volatilization; the design is intended to promote biodegradation by creating aerobic conditions with minimal air and soil gas flow rates. The vent well vacuum pump is designed to withdraw approximately the same volume of air as injected by the biosparge wells.

At this time it is expected that no other nutrients or biological augmentation will be needed (Section 5.1). The enhanced bioremediation design will address the toluene-affected soil and groundwater, as discussed in Sections 2.4 and 2.5.

3.2 BIOSPARGE WELL NETWORK

To implement biosparging, a total of seven biosparge wells will be installed in the area of toluene-affected groundwater. A biosparge compressor will be used to inject air at low pressure into the well screens (below the water table) to enhance biodegradation of the remaining toluene. Air distribution to the wells will be provided via aboveground piping.

3.2.1 Biosparge Well Locations

The locations of biosparge wells were selected to provide adequate aeration coverage and to avoid the existing storm drain and sewer lines on both parcels (Figure 8). Four biosparge wells will be located on the West Parcel, within 30 feet of the existing East/West Parcel boundary. Biosparge well AS-1 will be located next to Boring GMX-15, AS-2 close to Boring GMX-12, AS-4 south of Boring GMX-11, and AS-7 very close to Boring GMX-5 (Figure 8). Three additional wells will be installed on the East Parcel — near Borings GMX-20, GMX-2, and GMX-8 (Figure 8). These locations were selected to achieve overlapping radii of influence that cover the areas with the highest toluene concentrations. The layout is based on an estimated radius of influence (ROI) of 30 feet for each sparge well. This estimated ROI is considered conservative, and it is expected that the actual ROI for each well will be greater. Field testing at the former Rhone-Poulenc site to assess the radius of influence has not been done. Based on Geomatrix’s experience at biosparge sites in the Puget Sound area, the measured ROI has been greater than 50 feet with similar soil conditions and similar biosparge well design. In addition, it should be noted that both the native material and the imported clean fill in the upper vadose zone are less permeable than the underlying aquifer soils within the air injection zone. The presence of the lower permeable materials above the injection zone should increase the ROI within the intertidal/capillary fringe zones that extend into the lower permeability material overlying the sand aquifer.

3.2.2 Biosparge Well Design

The wells will consist of 2-inch-diameter polyvinyl chloride (PVC) with 2 feet of screen set at a depth of at least 25 feet bgs in the underlying saturated sand unit. This depth will ensure that air will be injected several feet below the groundwater level at low tide and provide a substantial depth at high tide to achieve a large ROI within the intertidal and capillary fringe zones where the most highly contaminated groundwater is present. Biosparge well completion details are shown on Figure 9. The placement of the well screens relative to site hydrogeology and toluene concentrations is shown on Figure 10.

3.2.3 Aeration System and Piping

The aeration system will consist of (1) an electric-powered air compressor (multiple compressors may be used); (2) a 2-inch-diameter galvanized steel pipe manifold with a temperature gauge, pressure relief valve, pressure gauge, and flow element; and (3) piping to each biosparging well. A Process and Instrumentation Diagram (P&ID) for the biosparge system is shown on Figure 11.

The compressor(s) will be capable of delivering 10 standard cubic feet per minute (scfm) at up to 15 pounds per square inch gauge (psig) pressure. The compressor(s) will be sized to provide twice the anticipated oxygen demand. The oilless, rotary-vane compressor(s) will be anchored to a wooden platform. Cover will be provided to protect the compressors from the elements. This cover will be constructed from a length of oversize plastic, corrugated culvert. The bottom of the culvert will be bolted to the wooden platform. The culvert will be split lengthwise, with hinges placed on one side and a lockable hasp placed on the other. The hinges will allow the cover to be opened to access the compressor(s), which will be mounted inside the culvert. The open ends of the culvert will extend at least 12 inches beyond the compressor. The compressors will be approximately 9 inches high, 7 inches wide, and 17 inches long; the cover will be constructed from a piece of 24-inch diameter plastic culvert about 30 inches in length. One cover will be provided for each compressor. Piping will enter the culvert through the ends or through holes cut into the sides. This design will protect the compressor(s) from rainfall and debris and allow for air inflow, piping access, heat dissipation, and maintenance access.

Each well will connect directly into the manifold with a header containing a ball valve, needle valve, and pressure gauge to allow the flow rate to each well to be controlled by manually setting the valves. The conveyance piping to each biosparge well will be constructed of high-density polyethylene (HDPE) or PVC installed on grade. The casing for each biosparge well will be connected to the aeration piping with a tee, piping adaptors, and a screw cap for access to each well.

The biosparge compressor, distribution manifold, and piping running to the biosparge wells will be located on the West Parcel and will be protected from site traffic by 4-foot-tall temporary fencing to prevent traffic from entering the area where the wells will be located. The piping for the East Parcel wells will be situated inside an 8-foot-tall fenced enclosure (temporary fencing) with a locked gate providing access from the East Parcel.

Power will be run to the fenced area shown on Figure 8 from either the groundwater treatment system building on the West Parcel or from a new electric service line from an existing transformer vault on the East Parcel. The compressor(s) will have thermal and electric overload protection and will be connected to an autodialer as well as an hour meter. A wireless autodialer system will be used if power is taken from the East Parcel transformer vault. If power is taken from the West Parcel groundwater treatment building, the existing autodialer will be used to monitor and alarm the biosparge system. In either case, if the system shuts down due to power loss or thermal/electric overload, the system engineer will be contacted automatically by an autodialer.

The biosparge system will be operated continuously and will be monitored per the system operation and monitoring plan described in Section 5.0.

3.3 VENT WELLS

Two vent wells will be installed on the East Parcel and five vent wells will be installed on the West Parcel to collect and vent air injected in the biosparge wells. The vent wells will promote air flow from the biosparging wells distributed over the impacted area to the vent wells for vapor treatment (as appropriate) and release to the atmosphere. The vent wells will be screened across the water table and intertidal/capillary fringe zone; the well screens will extend into the vadose zone during all portions of the tidal cycle. Prior to operation of the biosparge system, the vent wells will be connected to a manifold that will direct the air through GACs. Air flow from the vent wells will be induced using a vacuum pump. These vent wells will support distribution of injected air within the intertidal/capillary fringe zone and promote aerobic biodegradation. GACs will be used to control emissions from the vent wells as appropriate to comply with Puget Sound Clean Air Agency (PSCAA) regulatory requirements and to control cross-media transfer of contaminants. A P&ID for the vent well system is shown on Figure 12.

3.3.1 Vent Well Locations

Five vent wells will be located on the eastern portion of the West Parcel (Figure 8). These wells will be completed with above-grade stickup, similar to the biosparge wells. Vent Wells 3 and 4 will be placed into a centrally located area expected to have higher permeability backfill (structural fill, i.e. gravel), which was placed in this area during backfill after excavation of affected soils in 2006. Since air should flow preferentially in deposits of higher permeability, these wells should effectively recover air injected into the biosparge wells. Vent Wells 1, 2, and 7 will be placed in natural fill within the projected ROI of the nearby biosparge wells to collect injected air for treatment before release to the atmosphere.

Vent Wells 5 and 6 will be located on the East Parcel, as shown on Figure 8. These wells will also have a stickup surface completion. These wells will be placed into areas backfilled with material which has a lower permeability than the adjacent natural fill. The wells were placed within the projected ROI of the nearby biosparge wells to collect injected air.

3.3.2 Vent Well Design

The vent wells will consist of 2-inch-diameter schedule 40 PVC with 15 feet of 0.010 machine slotted screen spanning the intertidal/capillary fringe zone and extending into the vadose zone (Figure 10); the screened interval has been selected to ensure a portion of the screen extends above the water table under high tide conditions and that the screen spans the intertidal/capillary fringe zone. The approximate screen interval will be from 5 to 20 feet bgs. The wells will also collect volatilized toluene. The wellhead will be fitted with pipe fittings and screw cap to direct air flow to a collection system and to allow access to the well, as shown on Figure 9.

3.3.3 Vent Well Collection System

The vent well collection system will consist of (1) an electric, rotary-vane vacuum pump with a water knockout pot; (2) a 2-inch-diameter galvanized steel pipe manifold with a temperature gauge, vacuum relief valve, pressure gauge, and flow element; (3) two GAC adsorber units containing 1,000 pounds (lb) of activated carbon; (4) sample taps for sampling vent air at the GAC inlet, between the GAC vessels, and at the GAC discharge; and (5) collection piping from each vent well. The elements of the collection system are shown schematically on Figure 12.

The vacuum pump will be capable of pulling 10 scfm under vacuum conditions. The vacuum pump has been sized to balance the flow of vent gas with the air injected to the biosparge wells. The vacuum pump will be capable of maintaining air flow under the maximum vacuum conditions that would occur during falling tidal cycles in the vent well. The oilless, rotary-vane vacuum pump will be anchored to a platform under a cover to protect the pump from the elements. This cover will be designed as described above for the biosparge compressor(s). The cover will protect the vacuum pump from rainfall and debris and will allow for heat dissipation and access for maintenance.

Each vent well will connect directly into the manifold with a header containing a ball valve, needle valve, and pressure/vacuum gauge, as shown on Figure 12. The conveyance piping to each vent well will be constructed of HDPE or PVC installed on grade. The casing for each vent well will be connected to the vent well collection piping with a tee, piping adaptors, and a screw cap for access to each well.

This piping will be protected from vehicular traffic on the West Parcel by 4-foot-tall temporary fencing (see Figure 8). The vacuum pump and control manifold will be situated inside the temporary fencing on the West Parcel; fencing will be temporary. The fencing will prevent inadvertent access.

Power will be run from either the groundwater treatment system building on the West Parcel or from a new electric service line from an existing transformer vault on the East Parcel, as discussed above for the biosparge system. The vacuum pump will have thermal and electric overload protection and will be connected to an autodialer as well as an hour meter to record run time. The alarm system for the vent well system will be the same as discussed above for the biosparge system, with alarms issued in the event of shutdown due to power loss or thermal/electric overload; the system engineer will be contacted automatically in the event of alarm conditions.

The vent well collection system will be operated continuously and will be manually monitored monthly as discussed in Section 5.0. The vent well system will also be checked remotely to confirm that the vacuum pump is operational. The system will also be checked and restarted as needed, based on system alarms. The planned O&M program is considered appropriate for the vent well system based on its simplicity and the remote alarm and monitoring capabilities of the autodialer.

3.4 COST ESTIMATE

The approximate cost for the CMI has been estimated and is presented in Appendix D. It is anticipated that this CMI can be implemented and groundwater will be below cleanup levels within 6 months. Therefore, O&M costs will include 4 quarters of groundwater monitoring in addition to the 6 months of operation. It is estimated that the implementation cost for the design presented in this plan is approximately $139,400.

4.0 CORRECTIVE MEASURES IMPLEMENTATION AND CONSTRUCTION PLANS

This section outlines construction-related plans that will be needed to implement this work plan.

4.1 PERMITTING

Permitting requirements for the proposed biosparge and vent systems are minimal. The major permit that may be required for installation of the systems is the PSCAA Notice of Construction (NOC) process. Minor permits required for installation of the remedial system will be the "start-cards" for the biosparge and vent wells.

The PSCAA permitting process requires an NOC and an Order of Approval before construction begins for facilities capable of emitting more than 15 lb/day or 1,000 lb/year of toluene. A notice of completion is also required 30 days after completion of construction of the remedial equipment, prior to beginning operations. PSCAA monitoring requirements typically consist of monthly sampling of air prior to entering control units and sampling of air vented to the atmosphere.

Since it is not possible to accurately estimate toluene concentrations in soil gas that will be recovered from the vent wells, the toluene concentration will be measured during startup of the remediation systems. If the recovered toluene exceeds the PSCAA criteria, an NOC will be prepared and submitted to PSCAA. This approach has been developed in consultation with PSCAA staff.

4.2 COMMUNITY RELATIONS PLAN

Community relations are an important part of preconstruction. The purpose of community relations is to provide stakeholders the opportunity for improved cooperation and communication in the RCRA permitting process. This plan is being implemented in accordance with the EPA partial determination of corrective action complete without controls for the East Parcel dated December 20, 2006.

Based on experience with previous, more extensive remedial actions conducted at the site and a review of the EPA guidance on establishing the level of community concern for public participation for a RCRA facility, it is anticipated that the level of interest, and therefore public concern for this facility, will be low.

EPA guidance includes a discussion of the type of RCRA action, community member's relationships with the facility and the regulatory agency, and the larger community context. Community interviews were not conducted, nor are they anticipated to be conducted, for this plan. The community concerns at the site are anticipated to be the potential release of toluene to Slip 6 and the Duwamish Waterway.

The community adjacent to the site is characterized by heavy industrial use. Neighbors include the current lessee of the former Kenworth Truck Company property and the West Parcel; Insurance Auto Auctions, Inc. (IAAI); the Boeing Aircraft Company; the King County International Airport; the Museum of Flight; and other medium to heavy industrial businesses located in the immediate area. None of these parties has shown any interest in previous corrective actions implemented at the former Rhone-Poulenc site. The Museum of Flight, as the current owner of the East Parcel, however, has a vested interest in the corrective measure presented in this CMI Work Plan. Therefore, Respondents will maintain open communications with the Museum of Flight and its contractors to share data and to address concerns.

Specifically, the Respondents will do the following to ensure the community is informed about the work covered by this work plan.

- Provide information on issues of interest to ensure the community understands actions being taken.
- Maintain positive contact with the community and EPA.
- Provide the community opportunities for involvement.
- Provide accurate and timely information on site activities.

Public participation activities will include the following.

- Designate EPA and Container Properties contact persons to respond to questions from the community.
- Identify an information repository for the community.
- Coordinate with the EPA and provide informational bulletins or fact sheets on issues regarding applicable activities at the site.
- Notify the community regarding the progress made at the facility.
- Distribute relevant documents to the current mailing list of interested stakeholders and any others identified during the CMI. Additional interested stakeholders may

include immediate neighbors, appropriate local special interest groups, appropriate members of local government, and news media.

4.3 PRECONSTRUCTION ACTIVITIES

Personnel, materials, and equipment will be mobilized to the site in accordance with the project schedule and sequence of construction activities. Key personnel responsible for field supervision and management, health and safety, and construction quality assurance will be identified prior to mobilization. These key personnel will be present throughout the construction period. Field personnel employed at the site will be trained and qualified for their assignments. Where required for specific activities, worker training in Hazardous Waste Operations and Emergency Response (HAZWOPER) and specialty certifications (e.g., heavy equipment operation) will be verified and documented prior to the worker's arrival at the site. EPA will be provided notice of construction at least 14 calendar days in advance.

Site preparation will include the following activities.

- Utility locating, using the Utility Notification Center, will be performed prior to starting site work. In addition, a private utility locate service will be conducted by Applied Professional Services (APS) to confirm the location of the northeast-southwest trending sewer line.

- Site security will be established during mobilization and maintained for the duration of the construction activities. Geomatrix will secure those portions of the site where specific work activities are occurring, ensuring that only trained, authorized personnel enter the work zone. Specific activities will include:

    - Delineation of exclusion, contamination reduction, and support zones for each construction activity, as appropriate;

    - Installation of temporary fencing, barriers, and signs to mark work areas and prevent access by nonworkers.

- Temporary waste accumulation areas will be constructed as needed during construction. Waste storage areas used for containerized hazardous and nonhazardous waste solids and liquids will be constructed with nominal 20-mil liners or equivalent and perimeter berms; alternatively, wastes may be accumulated in covered bulk storage containers or boxes. Containerized wastes will not be held on the site for longer than 90 days from the "out of service" date (i.e., when wastes are first placed in the drum or container).

- Decontamination stations for personnel and equipment will be set up within the contamination reduction zone established for each construction area or activity. All equipment and vehicles that enter the exclusion zone or come into contact with wastes will be cleaned prior to exiting the work zone. Personnel will comply with sequential decontamination procedures defined in the Health and Safety Plan (Appendix E).

- Local horizontal and vertical survey controls will be established at the site by a registered land surveyor. Survey control points and station/grade stakes will be established along the alignment of proposed construction and protected through the construction period. At the completion of construction, the location of permanent construction features, including the biosparge wells, vent wells, compressor, vacuum pump, associated piping, and monitoring wells, and new utilities, will be documented.

4.4 CONSTRUCTION

Construction plans for the corrective measures are outlined in this section.

4.4.1 Biosparge System

Seven biosparge wells will be installed by Cascade under supervision of a licensed Geomatrix geologist. These wells will be installed as shown on Figure 8 and described in Section 3.2. Piping connecting the wells will be installed by Clearcreek. A tee will be used to connect the wells to the biosparge piping to allow individual access to each biosparge well.

Biosparge wells will be constructed as follows.

- Well Identification—The drilling subcontractor will submit well construction notifications (start cards) to the Washington State Department of Ecology (Ecology) at least 72 hours before beginning well construction. Each well will be uniquely numbered and coordinated with the site's current well numbering system. The well installation will be documented in accordance with Washington Administrative Code (WAC) 173-160 using Ecology's required format. This documentation will be provided to Ecology within 30 days of well installation.

- Well Construction—New biosparging wells will be constructed in accordance with WAC 173-160-500 through –550 and as described in Section 3.2. Well screens, filter packs, development, and well seals will comply with current Ecology guidelines.

- Well Installation Documentation—Well installation will be documented in accordance with WAC 173-160-560 using Ecology's required format. This documentation will be provided to Ecology within 30 days of well construction. An experienced geologist or engineer will be present during the well installation to observe soil conditions, verify correct screen placement and construction, document as-constructed features of the monitoring well, and verify proper development of the well.

After the biosparge wells have been installed and allowed to cure for at least 48 hours, the seven biosparge wells will be developed. Development water will be managed by transporting drummed water to the existing groundwater pretreatment system located on the West Parcel. The development water will be pretreated in the existing system and discharged to the King County sewer system for final treatment within the King County sewage treatment system.

4.4.2 Vent Wells

Vent wells will be constructed in accordance with the design presented in Section 3.3. The construction procedures and documentation will be the same as described for biosparging wells in Section 4.4.1.

4.4.3 Groundwater Monitoring System

Three groundwater monitoring wells will be installed to monitor groundwater quality in and downgradient of the treatment area, as shown on Figure 8. One groundwater monitoring well will be installed in the toluene source area in the West Parcel as shown in Figure 8. Section 5.3 outlines the groundwater monitoring program in more detail. The drilling and sampling program for groundwater monitoring will be as follows.

- Utility clearance will be conducted prior to drilling, as described in Section 4.3.
- The monitoring wells will be equipped with 5-foot long screens, and the top of the screen will be placed immediately below the silt unit/sand unit contact at a depth of approximately 14 to 16 feet. The actual screen placement will be determined in the field based on lithologic observations. The two downgradient wells will be spaced approximately 25 feet apart near the property boundary (Figure 8). Figure 9 shows the design of the groundwater monitoring wells, and Figure 10 shows the relationship of the monitoring well screen intervals to the site hydrogeology.
- Groundwater samples will be collected from these wells using dedicated bladder pumps like those used for performance monitoring. The monitoring well sampling procedures specified in the Interim Measures Performance Monitoring Plan (Geomatrix, 2007b) and the Interim Measures Performance Monitoring Plan Quality Assurance Project Plan (QAPP) (URS, 2002b) will be followed for sampling these monitoring wells. The samples from the wells will be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8021B.

Groundwater samples will be collected from these wells on a quarterly basis after commencing operation of the biosparge system. Details from the monitoring events will be included in an East Parcel quarterly monitoring report, similar to that specified in the approved Interim Measures Performance Monitoring Plan (Geomatrix, 2007b)

4.4.4 Waste Handling, Transportation, and Disposal

Drill cuttings from the installation of wells will be placed directly in drums. The soil will be segregated, where possible, based on field screening as the soil is returned to the surface by the auger. The drill cuttings will be disposed of in accordance with federal and state laws and regulations. In accordance with the waste classification assigned to soils previously excavated from this area, the drums will be sealed, labeled, and stored on site until shipment to a landfill as nonhazardous solid waste. Samples of the cuttings will be taken and analyzed as necessary for acceptance by the disposal facility.

4.5 SYSTEM DECOMMISSIONING/WELL ABANDONMENT

Biosparge and vent wells will be abandoned after toluene concentrations attain the cleanup standard (1 mg/L) for four consecutive quarters and only with prior EPA approval. Operation of the biosparge/vent system will continue until groundwater monitoring results indicate that the cleanup standard has been attained. The active remediation system will then be shut down. Groundwater monitoring will continue for an additional four quarters to assess rebound of toluene levels. If toluene levels rebound, the biosparge/vent system will be re-activated. If the toluene levels are in compliance with the cleanup standard for four consecutive quarters of groundwater monitoring, a formal request to permanently shut down and dismantle the remediation and monitoring system will be submitted to EPA. The three monitoring wells will be abandoned after approval by EPA.

Construction activities during abandonment will include the following elements, as appropriate.

- Well Identification—Well identification will be performed in accordance with WAC 173-160. The drilling subcontractor will submit well construction notifications (start cards) to Ecology at least 72 hours before beginning well abandonment. The well number and location will be verified by comparing field markings with the drawings; any discrepancies between field observations and records will be resolved before proceeding with abandonment.

- Well Decommissioning—If the well was designed and constructed as a resource protection well in accordance with WAC 173-160-500, the well casing annulus will be filled from its bottom to the ground surface with a nonshrinking cement-bentonite grout. If the well has an aboveground protective casing, the casing will be removed or cut off at least 6 inches below finished grade. Flush-mount wells will be similarly removed or cut off. The ground surface will be compacted and graded for positive drainage away from the former well; if located in an area of existing concrete or asphalt, a surface patch matching the adjacent surfaces will be constructed.

- Well Removal—The well will be abandoned by either of the following two methods, as required by WAC 173-160-415.
  - The casing will be perforated from its bottom to within 5 feet of the ground surface and pressure grouted with a nonshrinking cement-bentonite mix. Perforations of the casing will be at least four equidistant cuts per row, each cut at least 1.5 inches long, and at least one row per foot. The casing annulus will then be filled with the grout from its bottom to the ground surface. Removal of the protective casing, the well casing, and surface restoration may then occur in the same manner described for decommissioning of a resource protection well.
  - The well's protective surface casing will be removed, and the well casing will be mechanically pulled from the ground, while grout is added via the casing as it is removed. Surface restoration may then occur in the same manner described for decommissioning of a resource protection well.
- Documentation of Well Abandonment—Well abandonment will be documented in accordance with WAC 173-160-560 using Ecology's required format. This documentation will be provided to Ecology within 30 days of well abandonment. An experienced geologist or engineer will be present during the well abandonment to observe the work, document as-constructed features of the monitoring well, and verify correct sealing of the well.

4.6 HEALTH AND SAFETY

The site-specific HASP developed in accordance with 29 CFR 1910.120 – Hazardous Waste Operations will be used (Appendix E). This site-specific plan addresses the chemical and physical hazards associated with the chemicals of concern and site location. The HASP addresses the following topics: site description, responsibilities of key personnel, on-site hazards (chemical and physical), air monitoring, personal protective equipment (PPE), site control, decontamination, and emergency response.

5.0 OPERATION, MONITORING, INSPECTION, AND MAINTENANCE PLAN

Routine monitoring, inspection, operation, and maintenance will be necessary to attain the corrective measures objectives for both the East and West Parcels. Site security will also be provided and maintained to minimize the potential for inadvertent access to the site by the general public. This section describes the plans to accomplish these tasks, which will be implemented after completing CMI construction.

5.1 CMI SYSTEM COMMISSIONING AND STARTUP

The system is designed to promote aerobic degradation of toluene. The procedures for commissioning and startup of the CMI are to verify that the system was properly constructed and that the system will create the appropriate conditions for aerobic degradation of toluene. Since the system operates in a tidally influenced groundwater zone, baseline readings of subsurface conditions may not stabilize as may occur in nontidal groundwater aquifers. Thus, startup and commissioning procedures will be considered complete once trends have been documented establishing that aerobic conditions have been created. Commissioning will consist of inspecting the system after construction is complete and confirming that equipment and controls operate properly. Startup will be complete after the system has operated continuously through at least two tidal cycles and all vent wells show aerobic conditions.

5.1.1 System Inspection and Commissioning

Before the biosparge compressor and vent well vacuum pump are activated, all piping and manifolds will be inspected for proper installation, all equipment will be checked and adjusted per manufacturer’s guidelines, and notification of startup to regulatory authorities will be confirmed. The GAC absorbers will be installed prior to beginning operation of either the compressor or the vacuum pump. Initial readings for pressure, flow, and temperature will be recorded and checked against expected design conditions. Controls and valves will be checked for proper operation. It is expected that commissioning will take less than 1 day to complete.

In addition, before the air sparge or vent well system compressors are activated, baseline conditions will be measured in the vent, sparge, and monitoring wells. Water levels and dissolved oxygen levels will be measured in the vent wells, sparge wells, and groundwater monitoring wells. Soil vapor samples will be collected from the vent wells using Microseeps methods and analyzed for BTEX (Microseeps Method AM4.02) and for both oxygen and carbon dioxide (Microseeps Method AM20GAX). PID readings will also be taken from each vent well when the baseline soil vapor samples are collected. The PID will be calibrated using 100 parts per million (ppm) toluene calibration gas.

5.1.2 System Startup

After commissioning, the startup operations will be initiated. Startup operations will include activation of system components and adjusting controls so that the system performs as designed. Since the system includes a soil venting subsystem and an air sparge subsystem, the two subsystems must be balanced to ensure proper distribution of sparge air and proper collection of soil vent gas. Additionally, the systems must be adjusted so that they operate acceptably during tidally induced groundwater elevation changes. PID readings (calibrated using 100 ppm toluene calibration gas) will be used to monitor toluene concentrations in soil vapor for routine operations; compound-specific toluene measurements will be used for estimating emissions and for compliance purposes (details are discussed in Section 5.3.3). It is expected that startup of the vent system will commence the same day that commissioning occurs.

The vent subsystem will be started first. Valves in the vent wells will be checked initially to ensure that all valves are fully open. The vacuum pump will then be turned on and vacuum readings will be checked and recorded for each vent well. The vent well valves will be adjusted until the vacuum reading for each well is approximately the same. Vacuum, total flow, PID, and temperature readings will then be recorded until readings have stabilized (i.e., three consecutive readings taken at intervals of at least 5 minutes agree within ± 20%, or a clear trend has been demonstrated). PID readings will be taken at the influent to the lead GAC unit; vacuum readings will be taken at each vent well and at the influent to the lead GAC unit; vacuum, flow, and temperature measurements will be taken from the effluent from the lag GAC unit.

Once conditions have stabilized within the vent well system, the biosparge subsystem will be started. Prior to startup of the compressor, the sparge well valves will be checked to ensure they are fully open. The biosparge compressor will then be turned on, and sparge well pressures will be recorded. The sparge well valves will then be adjusted so that the pressures for the sparge wells are approximately equal (pressure will be used as an indicator of the flow to each well). The sparge well pressures will be checked to ensure that the pressure is greater than the hydrostatic pressure in each well (calculated using baseline water level readings). After balancing pressures in the sparge wells, readings for total flow, system pressure, sparge well pressure, and system temperature will be taken until readings have stabilized (i.e., three consecutive readings taken at intervals of at least 5 minutes agree within ± 20%, or a clear trend has been demonstrated).

After stabilization of the biosparge subsystem, balancing of the vent system will be checked and adjusted, if necessary, as described above. PID readings will be taken for each vent well, at the inlet to the lead GAC unit, at the exit of the lead GAC unit, and at the exit from the lag GAC unit. If the PID readings indicate that the GAC units are functional (i.e., actively reducing PID readings), initial BTEX samples will be collected for the influent, between, and effluent of the GAC units. If the PID readings indicate that the GAC units are not functioning properly, the system will be shut down and the problem will be investigated and resolved.

After both subsystems are in stable operation under initial conditions, on-site system checks will be conducted at least daily until startup operations are concluded. During each site visit, pressure, vacuum, total flow, and temperature readings will be taken for both subsystems. Daily system checks will include inspections during high and low tide conditions to verify that the systems evenly distribute sparge air and collect vent gas under both tidal extremes. Valves for the sparge wells and vent wells will be adjusted as appropriate to balance flows under both tidal extremes. During startup operations, DO will be measured at least daily in the seven vent wells to check the effectiveness of adjustments to flow.

The system will be considered to be fully operational when at least two successive checks at high and low tide do not require significant adjustments and DO levels in the seven vent wells are indicative of aerobic conditions (as demonstrated by trends of DO readings compiled during startup). Under these conditions it will be concluded that operations are stable and startup operations will be concluded. It is expected that startup operations will be completed in less than 1 week.

5.2 CMI SYSTEM OPERATIONS AND MAINTENANCE

Routine operations and maintenance will commence after completing startup operations. On-site inspections will be conducted weekly for 1 month. If the results of the four weekly inspections indicate that the system requires minimal adjustment and is stable, on-site inspections will be reduced to once monthly for the remainder of system operations. If the first month of on-site inspections indicate that significant adjustments or changes are needed to maintain proper flow distribution (both for sparge air and for vent gas), weekly on-site inspections will be extended for an additional month. Once stable operation requiring minimal adjustment has been achieved, on-site inspections will be performed once monthly and remote system checks using the autodialer will be conducted weekly.

During each on-site inspection, the technician will record hours of operation, air flow, temperature, and pressure/vacuum readings and inspect the system for proper operation. For the regular site inspections, the technician will record readings and observations on log sheets and in a logbook dedicated to this project. The vent well collection system will be sampled and monitored per PSCAA operating requirements and using a PID. In addition to system readings and vapor sampling, dissolved oxygen (DO) levels will be measured once monthly in the three monitoring wells and the seven vent wells to assist in identifying areas in need of higher air flow rates.

Monitoring these elements will (1) quantify the total flow injected into the formation, (2) quantify the approximate flow to each biosparge well, and (3) verify that aeration is adequate and sufficiently distributed to the treatment area. During on-site system checks, DO will be measured by lowering a submersible DO probe into the monitoring and vent wells. The vent well vacuum pump will be shut down prior to measuring DO in the wells; it will be restarted after DO monitoring. On-site monitoring will also allow adjustments in the rate of air flow to each well so that air flow is distributed among the wells as needed to achieve aeration of the full treatment area. This on-site monitoring frequency is considered appropriate for this simple, conservatively designed biosparge system. In addition to the regular on-site checks, remote checks will be conducted weekly to confirm that the compressor and vacuum pump are operational. In the event that the autodialer issues an alarm, an on-site system check will be conducted as soon as possible. The cause of the alarm will be identified and corrected and the system will be restarted.

The technician will make adjustments to the aeration and vent systems as appropriate to ensure proper distribution of air to the biosparge wells. Flow will be adjusted by opening or closing the needle valves for each biosparge or vent well.

Maintenance or other corrective action beyond routine process adjustments will be performed as needed and in a timely manner to maintain continuous operation of both the biosparge and vent well systems to the extent practicable. Piping, fittings, and valves will be inspected for obvious leaks, cracks, damage, and obstructions. The compressor(s) and vacuum pump will be checked for proper operation and maintained in accordance with manufacturer’s instructions. Security fencing and signage will also be checked. Equipment will be inspected for defects, signs of wear, damage, or excess pressure/vacuum. Each inspection and any maintenance needs will be logged using the dedicated logbook and inspection forms. Maintenance actions will also be noted in the logbook. Draft inspection forms are contained in Appendix F. These forms will be modified as necessary to aid in more efficient operations of the system as experience dictates. No items will be removed from the forms without prior approval from EPA.

After construction is complete and the biosparge wells have been developed, a water sample will be collected from the monitoring well located close to AS-2 for analysis of nutrients. This well was selected because it is located in the source area and will reflect nutrient levels present in the area of the most contaminated groundwater. Analysis of the sample from this monitoring well will include total organic carbon (TOC) (EPA Method 415.1), nitrate/nitrite-nitrogen (EPA Method 353.2), ammonia-nitrogen (EPA Method 350.1), and soluble reactive phosphorus (EPA Method 365.2). Field measurements will be taken for pH, specific conductance, and temperature. This well will be sampled using the bladder pump installed in the monitoring well. Since this sample will be used only to characterize nutrient requirements, sample handling and preservation may differ from the methods specified in the QAPP. However, the well will be purged in accordance with the QAPP prior to sample collection. Purge water will be managed in accordance with the Performance Monitoring Plan (Geomatrix, 2007b).

Based on the maximum toluene concentrations that have been observed in the groundwater within the treatment area and assuming 50% will be used for biomass production, a minimum level of nutrients would be approximately 2 mg/kg of nitrogen and 0.4 mg/kg of phosphorus. If necessary, based on the results of the analysis, nutrients will be added to each sparge well using commercially available liquid fertilizer as a source of nutrients. If it is necessary to add nutrients, EPA will be notified by letter or email. A description of the planned nutrient addition, including a listing of the nutrients to be added, the material to be used for nutrient addition, and the method of addition, will be provided to EPA for review and approval. Nutrients would be added only after approval from EPA.

5.3 PERFORMANCE MONITORING

Both groundwater monitoring and soil vapor emissions monitoring will be required for successful operation of the treatment system.

Groundwater performance monitoring is necessary to demonstrate that groundwater has attained the cleanup standard. Performance monitoring will include the following elements.

- Collection of groundwater samples from three groundwater monitoring wells. Methods for installation and sampling of the groundwater monitoring wells are outlined in Section 4.4.3.

- The water samples will be analyzed for BTEX by EPA Method 8021B. This monitoring will track changes in groundwater chemistry and attainment of the cleanup standard.

No water quality samples will be collected from biosparge or vent wells unless required for operational reasons. Groundwater monitoring will be conducted quarterly after commencing operation of the biosparge system. It is anticipated that quarterly sampling will continue until the cleanup objectives for groundwater on the East Parcel have been achieved, as approved by EPA.

Emissions of contaminated soil vapors to the atmosphere are regulated by PSCAA, which normally requires monthly monitoring for compliance. In addition, EPA has required that soil vapors be controlled to prevent cross-media transfer of pollutants.

5.3.1 Groundwater Monitoring Quality Assurance Project Plan

East Parcel groundwater samples will be collected and analyzed in accordance with the Interim Measures Performance Monitoring Plan Quality Assurance Project Plan for the Former Rhone-Poulenc Site (URS, 2002b). The QAPP outlines procedures to be used for sample handling and custody, analytical methods, quality control (QC) (including field QC sample requirements [field blanks, trip blanks, field duplicates, and matrix spike samples] and lab QC samples), equipment maintenance, instrument calibration, data management, assessments and response actions, and data quality review.

Key elements of the QAPP are highlighted below.

- Due to the possibility of sample effervescence upon preservation, BTEX samples will not be preserved and this will be marked on the sample chain-of-custody (COC) record.

- Sample identification numbers will include the site name (former Rhone-Poulenc or RP), the sample date (mmddyy), and a sample sequence number. For example, a sample ID of RP101406-03 would identify the third sample collected on October 14, 2006. The sampling sequence number will not include the monitoring well number or indicators of field blanks, field duplicates, etc. A master sampling log that documents the sequence numbers and the corresponding wells will be maintained by the field personnel.

- Field blanks will be collected and analyzed at the rate of 5%. Field blanks will be submitted blind to the laboratory with sample numbers that are indistinguishable from primary samples. Field blanks will consist of store-bought distilled water transferred directly into sample containers in the field.

- Field duplicate samples will be submitted to the lab at a frequency of 10% of the field samples and will be collected from locations with suspected high contamination levels. Field duplicates will be submitted blind to the laboratory with sample numbers that are indistinguishable from primary samples.

- Trip blanks will be included in each cooler of samples shipped to the lab for analysis of volatile organic compounds (VOCs), and the trip blanks will be analyzed for VOCs.

- A matrix spike (MS) sample will be analyzed for each analytical batch. Only MS samples from this investigation will be analyzed and not MS samples from other projects. MS samples should not be collected from locations with potentially high concentrations of target analytes that may mask the added MS compounds. Samples for use by the lab as MS or laboratory duplicates will be identified on the COC form and additional sample volume will be provided to the laboratory.

The following modifications will be made to the QAPP for the CMI performance monitoring sampling events.

- BTEX will be analyzed by EPA Method 8021B (low level) only.

- The method reporting limit (MRL) for benzene, toluene, ethylbenzene, and o-xylene will be 0.25 µg/). The MRL for m,p-xylene will be 0.50 µg/L. These MRLs will be specified by Geomatrix on the COC form. Analytical data will be reported with a standard laboratory data and QC package.

5.3.2 Groundwater Data Management Plan

All East Parcel groundwater sample results will be managed in accordance with the QAPP for the former Rhone-Poulenc site (URS, 2002b). The QAPP includes requirements for data reduction, laboratory data deliverables, and electronic data management. The laboratory will deliver final data within approximately 30 days of the end of sampling, unless a shorter turnaround time is requested of the laboratory. The lab will be instructed to provide a full data package at the end of each sampling event, including initial and continuing calibration sample results, and electronic data deliverables (EDDs) in Microsoft Excel format.

Geomatrix will validate the chemical data within approximately 30 days of receipt from the laboratory. After validation, Geomatrix will enter sampling results into the parent database. Data transfer will be performed using EDDs, beginning with laboratory reports and including data validation activities. Following data entry, the data will be transferred to the Geomatrix Project Manager for use in production of reports for EPA.

ARI will complete all analyses as described in Section 5.2.1 and present the following, at a minimum, in a report to Geomatrix within approximately 30 days of the last day of sampling, unless a shorter turnaround time is requested.

- Case narrative: The case narrative should describe the analytical methods used and discuss any irregularities encountered during sample analyses and any resulting data qualification.
- Analyte concentrations: A summary of analytical results should be presented for each sample.
- Method reporting limits: Method reporting limits achieved by the laboratory should be presented with the analyte concentrations.
- Laboratory data qualifier codes and a summary of code definition: Data qualifiers should appear next to analyte concentrations, and associated definitions should be summarized in the report.
- Lab QC results: Results for method and calibration blanks, matrix spike/matrix spike duplicates (MS/MSD), laboratory spike/laboratory spike duplicates (LS/LD), and surrogate recoveries should be provided with the final results.
- EDD version of results: A full set of results should be provided in electronic database format.

Data validation will be performed on any analytical data for this project, and the data validator will enter validation qualifiers and comments into the dataset as necessary. The validator will then use the validated EDD along with the validation report to upload it into the database. The data will then be considered final.

Field data will be provided to the project manager for use in the reporting stages and for eventual filing with other field forms.

5.3.3 Soil Vapor Performance Monitoring

Operation of a soil and groundwater remediation system that vents contaminated air to the atmosphere requires a PSCAA permit, as noted in Section 4.1. PSCAA monitoring usually requires influent and effluent monitoring across the emissions control devices on a monthly basis.

Baseline samples of soil vapor will be taken from each vent well during commissioning and startup operations as noted in Section 5.1.1. These samples will be analyzed for BTEX (Microseeps Method AM4.02), Carbon Dioxide (Microseeps Method AM20GAX), and Oxygen (Microseeps Method AM20GAX). Sampling and analysis for BTEX will be conducted monthly from the influent to the lead GAC, from in-between GAC units, and from the effluent of the lag GAC unit.

The respondents propose to follow the monitoring requirements specified in the PSCAA permit until influent concentrations fall below PSCAA permit requirements for three consecutive monitoring periods. At that time the PSCAA permit provisions will no longer apply to operation of the vent system. If both the vent well and biosparge systems are still being operated, the GAC units and vacuum pump will be maintained in the flow train; monitoring of vapor concentrations will be performed using a PID (calibrated on 100 ppm toluene calibration gas). Monthly measurements will be taken from the GAC unit inlet, between the two GAC units, and from the final discharge. If the final discharge measurement taken from the exhaust duct exceeds 50% of the current Occupational Safety & Health Administration/Washington Industrial Safety and Health Act (OSHA/WISHA) permissible exposure limit (PEL) for toluene (i.e., 50 ppm), the GAC in the lag unit will be considered spent and GAC will be replaced as described above. If the inlet PID measurement for at least two consecutive monthly readings is below 50 ppm, the GAC units will be removed from the flow train (assuming continued operation of the vent system). Active venting will be maintained until at least two consecutive PID readings taken from the vent manifold are below 5 ppm; at that point, active venting will be discontinued and only passive venting will be conducted. The 5 ppm level was chosen since it is considered the lowest PID reading that can reliably be attained under field conditions for a typical PID unit.

5.4 SITE SECURITY

The CMI project area (see Figure 8) includes portions of the East and West Parcels; security considerations are different for each parcel. The West Parcel is an active vehicle storage lot that is secured by electric fencing; this area is not accessible to the general public. The East Parcel is owned by the Museum of Flight and is used as overflow parking. The CMI project area within the East Parcel will be surrounded by an 8-foot-tall, barbed-wire-topped chain-link fence, but other portions of the East Parcel could be accessible by the general public. Security for each portion of the cleanup area is described below.

5.4.1 East Parcel Security

The East Parcel is sporadically open to the public for parking purposes. The CMI Project Area on the East Parcel will be surrounded by 8-foot-tall temporary chain-link fencing. Access to the biosparge and vent systems will require entrance through the main gate along East Marginal Way or through an IAAI gate located near the northeast corner of the East Parcel. Direct access to the biosparge and vent wells will be through a padlocked man gate in the temporary fencing surrounding the portion of the CMI Project Area located on the East Parcel (as shown on Figure 8). This gate will be kept locked at all times when the systems are unattended. Warning signs saying “Authorized Personnel Only, KEEP OUT” (or equivalent) will be posted on the temporary fencing in order to keep unauthorized personnel from entering the treatment area.

5.4.2 West Parcel Security

The West Parcel is managed by IAAI and is secure 24 hours a day, 7 days a week. The biosparge wells and piping located on the West Parcel will be located above grade; therefore, the wells and piping could be damaged due to vehicular traffic. In order to protect the piping, system controls, and connections to the wells, the area surrounding the wells will be protected with 4-foot-tall temporary fencing (or equivalent) for protection from vehicular traffic (as shown on Figure 8). Warning signs saying “Authorized Personnel Only, KEEP OUT” (or equivalent) will be posted in order to keep unauthorized site personnel from entering the treatment area. Since the existing IAAI security system is in place to prevent the public from entering the West Parcel, no further security will be provided for the portion of the treatment area extending onto the West Parcel.

6.0 SCHEDULE AND REPORTING

This section outlines the project schedule and reporting requirements.

6.1 PROJECT SCHEDULE

The project schedule is presented in Table 3 and is based upon elapsed time from approval of the CMI Work Plan by EPA. It should be noted that the implementation schedule will also depend upon the availability of subcontractors. As noted in Section 5.2, toluene concentrations in monitoring wells located downgradient of the treatment area will be monitored quarterly following startup of the biosparge system. The biosparge system will be started no later than 20 days following commissioning of the system. Operation of the biosparge system will be stopped after results from quarterly monitoring events demonstrate attainment of the cleanup standard and as approved by EPA.

6.2 REPORTING

Corrective measures activities will be reported to EPA in accordance with Section VII of the Order. EPA project staff will be notified immediately in accordance with Sections 6.2 to 6.4 of the Order if unexpected materials are encountered and/or unexpected events occur during the implementation of this work plan. Reports to be submitted are described below.

6.2.1 Monthly Reports

Progress on implementing the corrective measure, or in conducting investigations or analyses supporting the corrective measure, will be described in the regular monthly reports prepared and submitted to EPA. The description will include activities completed, anticipated activities for the following month, and other pertinent information.

6.2.2 Other Reports

Other reports or technical memoranda will be prepared as appropriate during the course of the corrective measures to summarize additional investigations or testing undertaken to support design and construction. These may include results of additional soil or groundwater sampling, or other similar data. At minimum, the following reports will be prepared: Construction Report (including as-built drawings), quarterly monitoring reports, annual Operation and Maintenance Reports, and a Closure Report.

7.0 REFERENCES

AGI, 2001, Summer 2001 Geoprobe Investigation Report, Former Rhone-Poulenc, Inc. Marginal Way Facility, Tukwila, Washington: Prepared for RCI Environmental, October 8.

CH2M HILL, 1995, RCRA Facility Investigation (RFI) Report for the Marginal Way Facility, Tukwila, Washington, May.

EPA (U.S. Environmental Protection Agency), 1994, How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites: a Guide for Corrective Action Plan Reviewers, 51 0-B-95-007, October 1994 (http:I/www.epa.govlswerustl/pubs/tums.htm).

EPA , 2006, Letter to Gary Dupuy (Geomatrix), RE: Final Decisions Regarding Corrective Action for the East Parcel Administrative Order on Consent for Corrective Action (Order) Under the Resource Conservation and Recovery Act (RCRA), from Richard Albright, December 20.

Geomatrix, 2006a, East Parcel Soil Characterization and Voluntary Interim Measure Report, Former Rhone-Poulenc East Marginal Way Facility, Tukwila, Washington: Prepared for Container Properties, LLC, September 29.

Geomatrix, 2006b, Final East Parcel Corrective Measures Study, Former Rhone-Poulenc East Marginal Way Facility, Tukwila, Washington: Prepared for Container Properties, LLC, October 31.

Geomatrix, 2007a, Final Operations and Maintenance (O&M) Report, 2003-2006, Former Rhone-Poulenc Site, Tukwila, Washington: Prepared for Container Properties, LLC, September (revised).

Geomatrix, 2007b, Interim Measures Performance Monitoring Plan, Former Rhone-Poulenc Site, Tukwila, Washington: Prepared for Container Properties, LLC, September 17 (revised).

URS, 2002a, Interim Measures Construction Work Plan, Former Rhone-Poulenc Site, Tukwila, Washington: Prepared for Container Properties, L.L.C., October 25.

URS, 2002b, Interim Measures Performance Monitoring Plan Quality Assurance Project Plan for the Former Rhone-Poulenc Site, Tukwila, Washington: Prepared for Container Properties, L.L.C., September 3.

U.S. Army Corps of Engineers, 2002, Engineering and Design - Soil Vapor Extraction and Bioventing, EM 1110-1-400 1, June (http://www.usace.army.mil/usace-docs/eng-manuals/em1110-1-4001/toc.htm).

TABLES

TABLE 1

TOLUENE CONCENTRATIONS IN SOIL

Former Rhone Poulenc Site
Tukwila, Washington

Boring Location	Depth (feet)	Sample Date	Toluene Concentration (mg/kg)[1]
GMX-1	4	8/24/06	440
GMX-1	8	8/24/06	5,600
GMX-2	2.5	8/24/06	43
GMX-2	8	8/24/06	20,000
GMX-2	8	8/24/06	23,000
GMX-3	2	8/24/06	0.022 U
GMX-3	5.5	8/24/06	0.022 U
GMX-4	2	8/24/06	0.021
GMX-4	4	8/24/06	2
GMX-6	13	8/26/06	0.012 U
GMX-7	13	8/26/06	0.012 U
GMX-8	9	8/26/06	1,600
GMX-10	9	8/26/06	0.025
GMX-15	14	10/13/06	30,000
GMX-16	10.5	10/13/06	8,000
GMX-19	14.8	10/13/06	0.230

Notes:

1. All units are in milligrams per kilogram (mg/kg).
2. U = Toluene was not detected in the sample at the detection limit indicated to the left of the U.

TABLE 2

EAST PARCEL DIRECT-PUSH GROUNDWATER ANALYTICAL RESULTS

Former Rhone-Poulenc Site
Tukwila, Washington

Concentration in milligrams per liter (mg/L)

Sample ID (Well Number)	Depth (feet)	Date Collected	Volatile Organic Compounds			
			Benzene	**Toluene**	**Ethylbenzene**	**Xylene**
Final Groundwater Cleanup Standard				1		
RP082406-18 (GMX-1)	8 to 13	8/24/2006	<0.25 U[1]	**32** [2]	<0.25 U	<0.5 U
RP082406-14 (GMX-2)	8 to 13	8/24/2006	<1 U	**90**	<1 U	<2 U
RP082406-11 (GMX-3)	10 to 15	8/24/2006	<0.001 U	<0.001 U	<0.001 U	<0.002 U
RP082406-07 (GMX-4)	7 to 12	8/24/2006	<0.001 U	0.0032	<0.001 U	<0.002 U
RP082406-03 (GMX-5)	13 to 18	8/24/2006	<0.05 U	**4.1**	<0.05 U	<0.1 U
RP082406-04 (GMX-5A [field duplicate])	13 to 18	8/24/2006	<0.05 U	**3.6**	<0.05 U	<0.1 U
RP082606-02 (GMX-6)	11 to 16	8/26/2006	<0.001 U	<0.001 U	<0.001 U	<0.002 U
RP082606-04 (GMX-7)	11 to 16	8/26/2006	<0.001 U	<0.001 U	<0.001 U	<0.002 U
RP082606-08 (GMX-10)	11 to 16	8/26/2006	<0.001 U	<0.001 U	<0.001 U	<0.002 U
GMX-15-GW (GMX-15)	15.2 to 17	10/13/2006	<2 U	**300**	<2 U	<4 U
EPE121406-1 (GMX-20)	10 to 15	12/14/2006	<2 U	**210**	<2 U	<4 U
EPE121406-2 (GMX-21)	14 to 19	12/14/2006	<0.05 U	**8.1**	<0.05 U	<0.1 U
GMX-20A-051507 (GMX-20A)	15 to 20	5/15/2007	<0.5 U	**68**	<0.5 U	<1.5 U
GMX-21A-051507 (GMX-21A)	14 to 19	5/15/2007	<0.12 U	**14**	<0.12 U	<0.37 U

Notes:
1. U = Analyte not detected at detection limit indicated.
2. Results in **bold** exceed final groundwater cleanup standard.

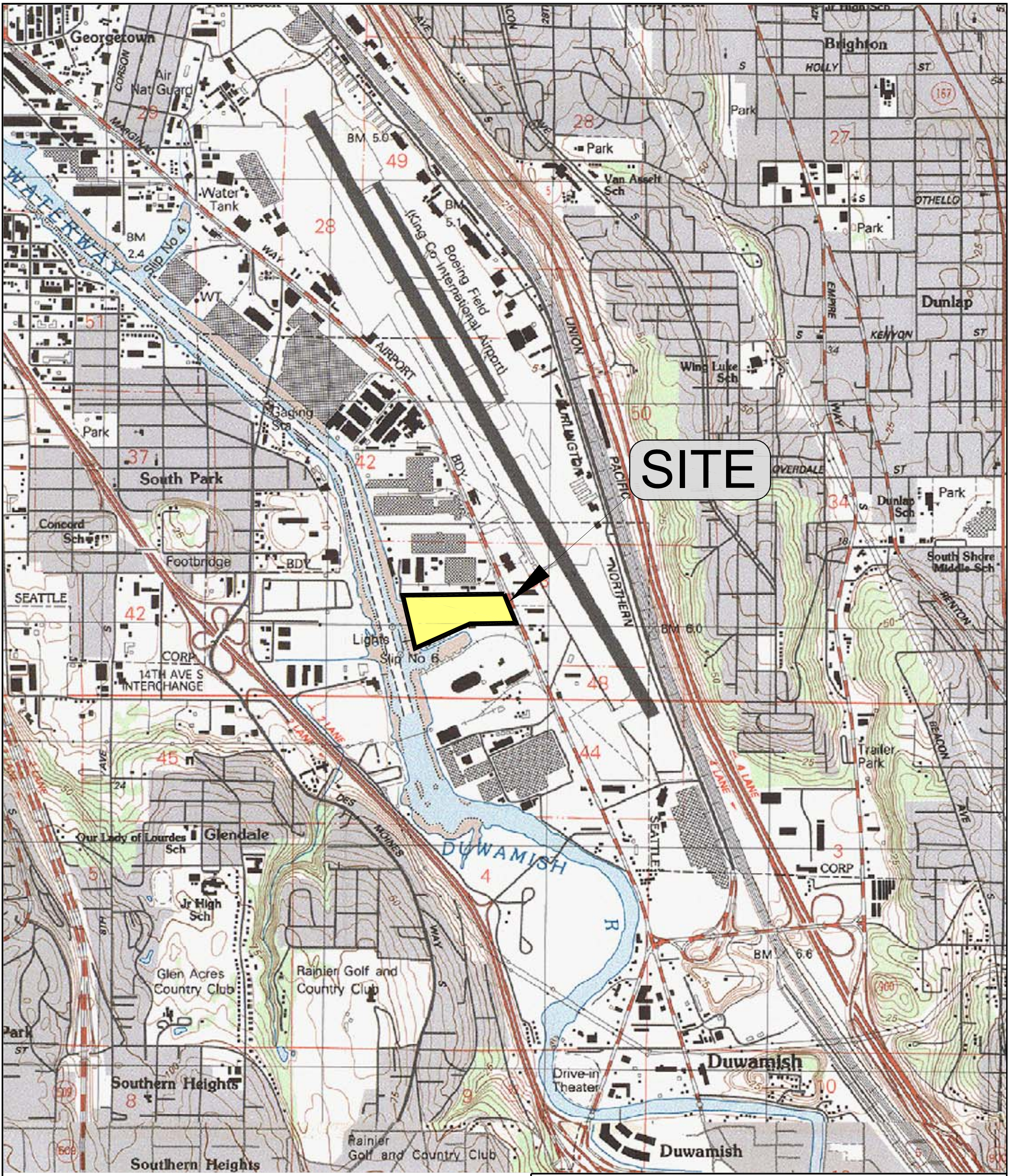
TABLE 3

EAST PARCEL CORRECTIVE MEASURES IMPLEMENTATION SCHEDULE

Former Rhone-Poulenc Site
Tukwila, Washington

Item		Schedule
1	Commence CMI construction and other provisions of CMI Work Plan	90 days after EPA approval of the CMI Work Plan
2	Complete CMI construction	30 days after commencing construction
3	Commence operation of biosparge and vent systems	20 days after commissioning of the system
4	East Parcel CMI Construction Report	60 days after completion of CMI construction.
5	Groundwater monitoring	90 days after startup of biosparge system; repeat quarterly until cleanup standard attained
6	Quarterly Monitoring Reports	60 days after completion of groundwater sampling.
7	Annual Operation and Maintenance Reports	March 15 of the year following.
8	Closure Report	60 days after all systems have been dismantled and wells have been abandoned.
9	Biosparge and vent system shutdown and abandonment	30 days after receipt of EPA authorization

FIGURES



Reference: USGS Topographic Quadrangle Map, South Seattle, Washington, Photo Revised 1968

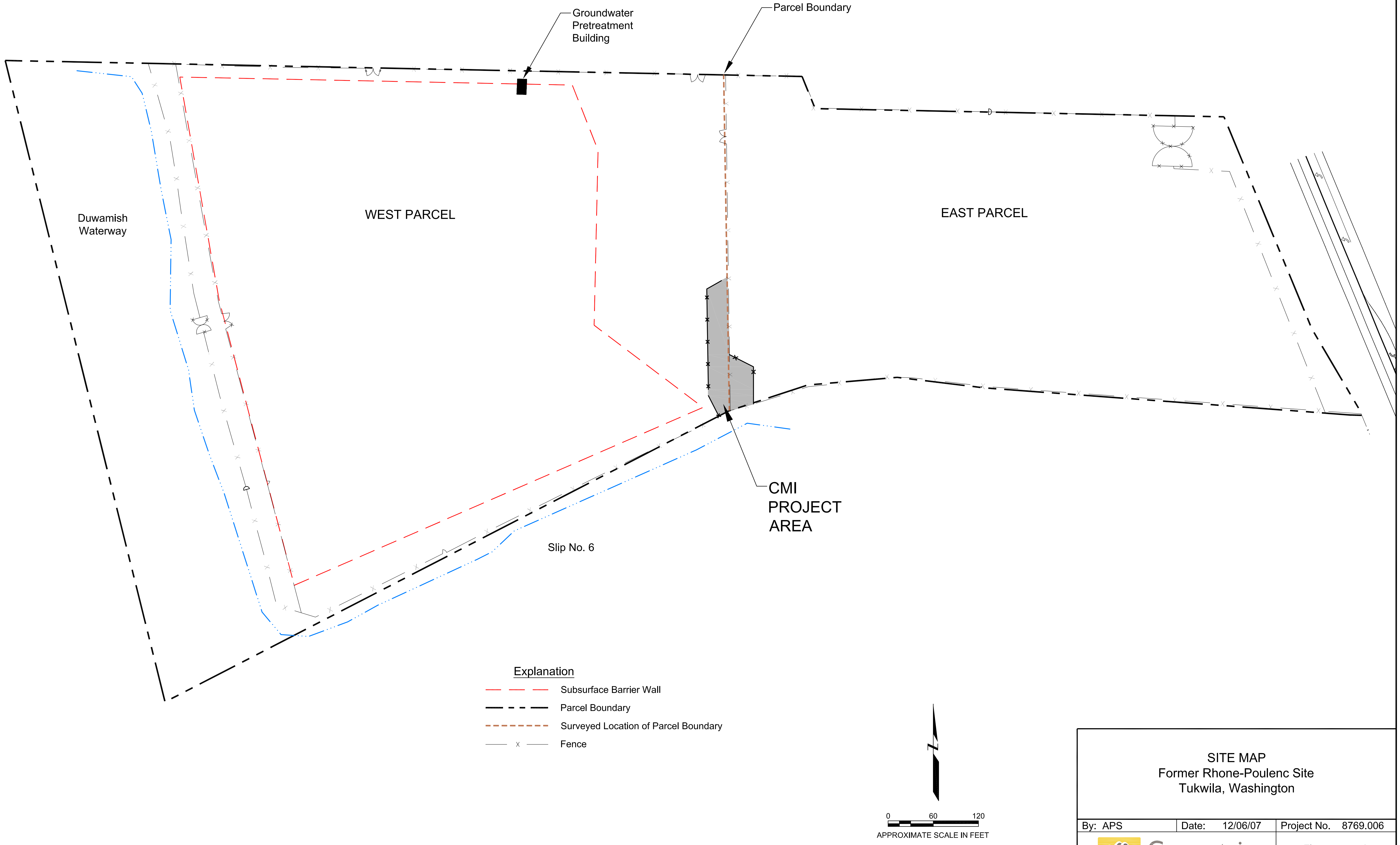
0 2000

SCALE (FEET)

SITE VICINITY MAP
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 12/06/07	Project No. 8769
Geomatrix		Figure 1

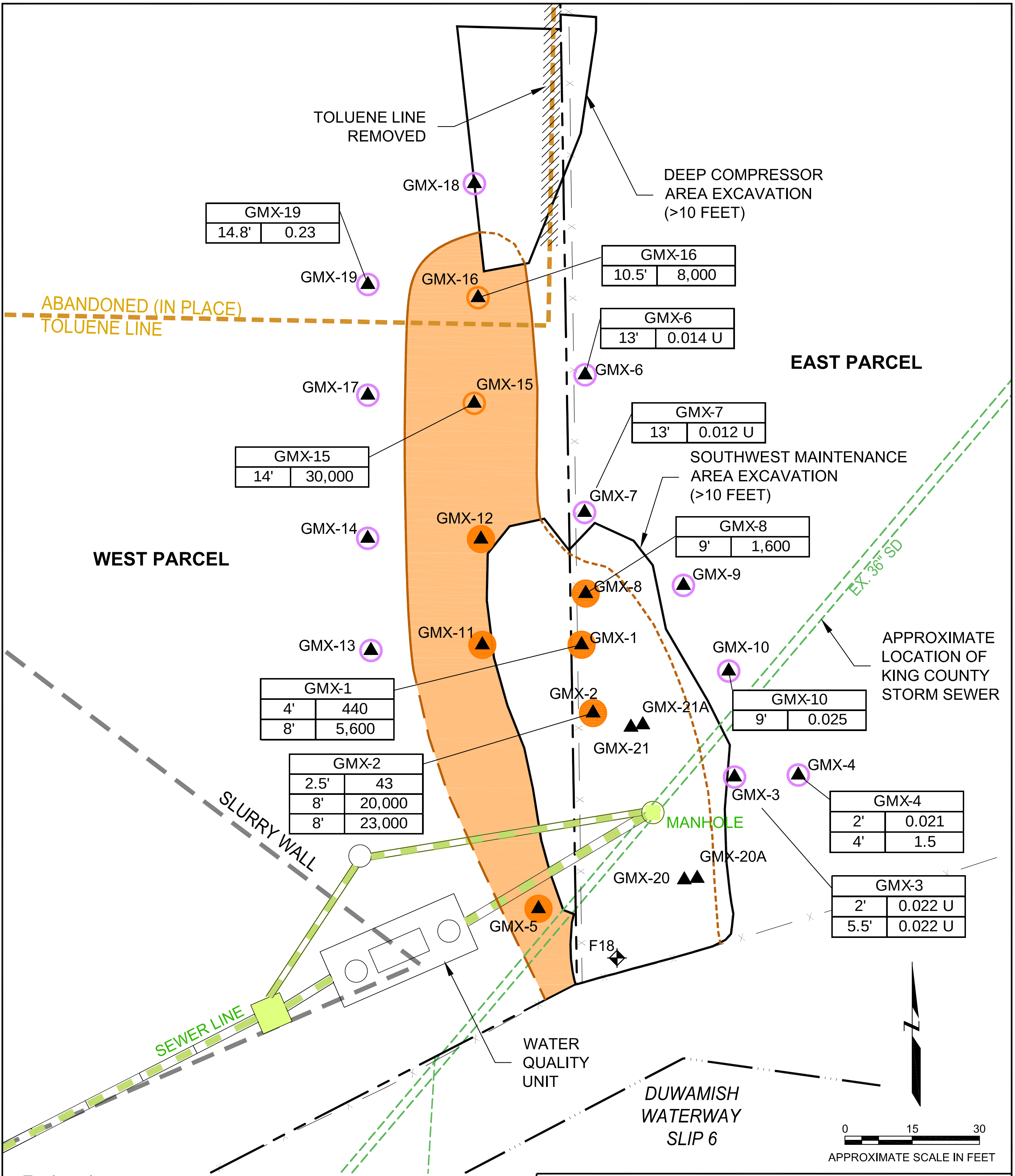
Plot Date: 12/06/07 - 4:13pm, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: Figure 1_SiteVicinity.dwg



SITE MAP
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 12/06/07	Project No. 8769.006
Geomatrix		Figure 2

Plot Date: 12/06/07 - 4:14pm, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: SiteMap-CMS.dwg



Explanation

- ▲ Direct Push Boring
- ✦ Approximate location of Geoprobe installed during Summer 2001 Geoprobe Investigation
- ● Photo ionization detector (PID) headspace reading > 1000 ppm
- ○ Photo ionization detector (PID) headspace reading > 100 ppm
- ○ Photo ionization detector (PID) headspace reading < 10 ppm
- Approximate current extent of toluene-affected soils (dashed where uncertain)
- Approximate historic extent of toluene-affected soils

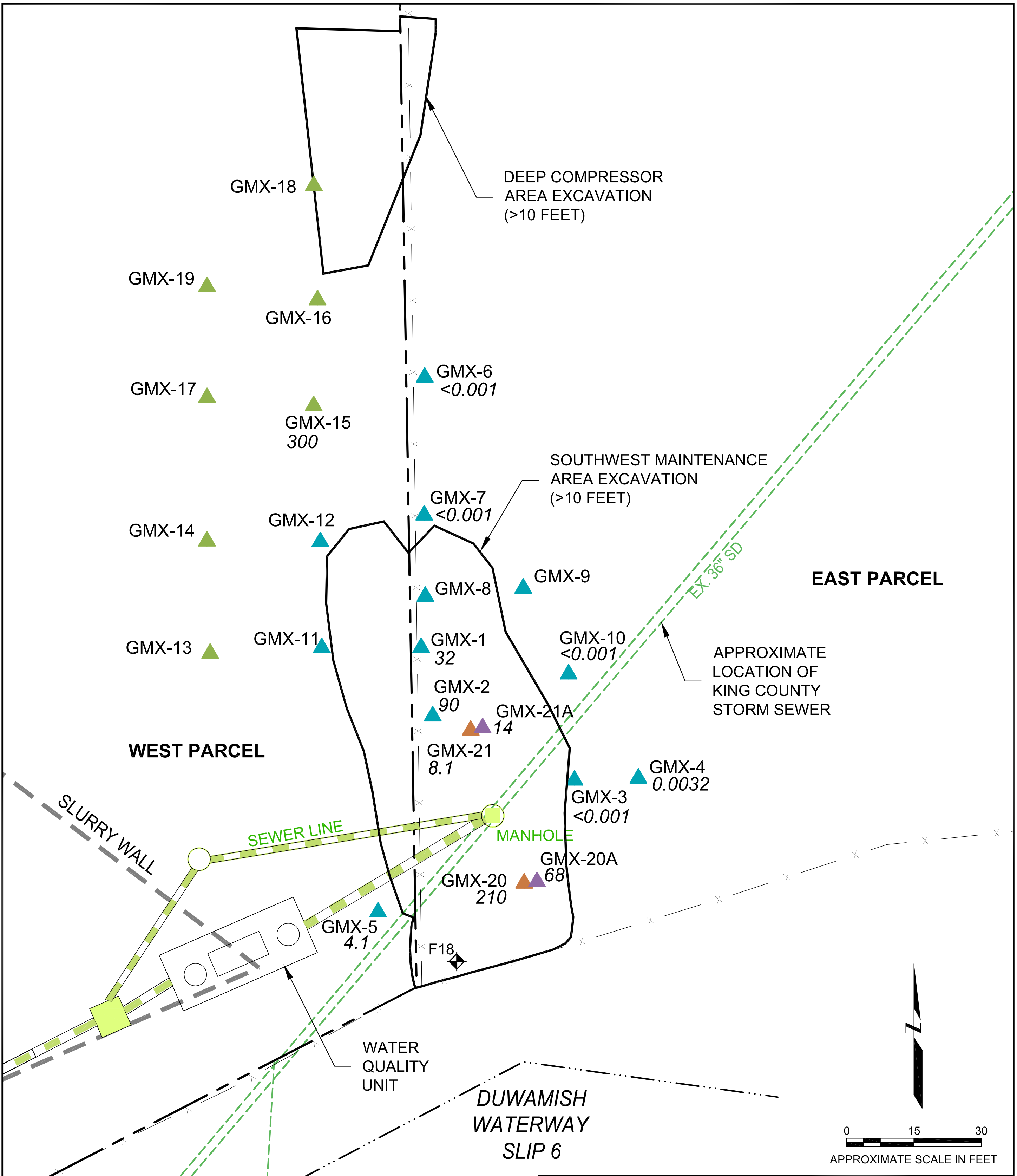
Key

Direct Push Boring I.D.	
Depth bgs	Units in mg/kg (ppm)

TOLUENE CONCENTRATIONS IN SOIL
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 12/07/07	Project No. 8769
Geomatrix		Figure 3

Plot Date: 12/07/07 - 10:13am, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenance_TolueneSoils.dwg



Explanation

▲ Direct Push Boring (8/2006)

▲ Direct Push Boring (10/2006)

▲ Direct Push Boring (12/2006)

▲ Direct Push Boring (5/2007)

8.1 Toluene concentration in mg/L

✦ Approximate location of Geoprobe installed during Summer 2001 Geoprobe Investigation

< indicates toluene not detected at detection limit indicated.

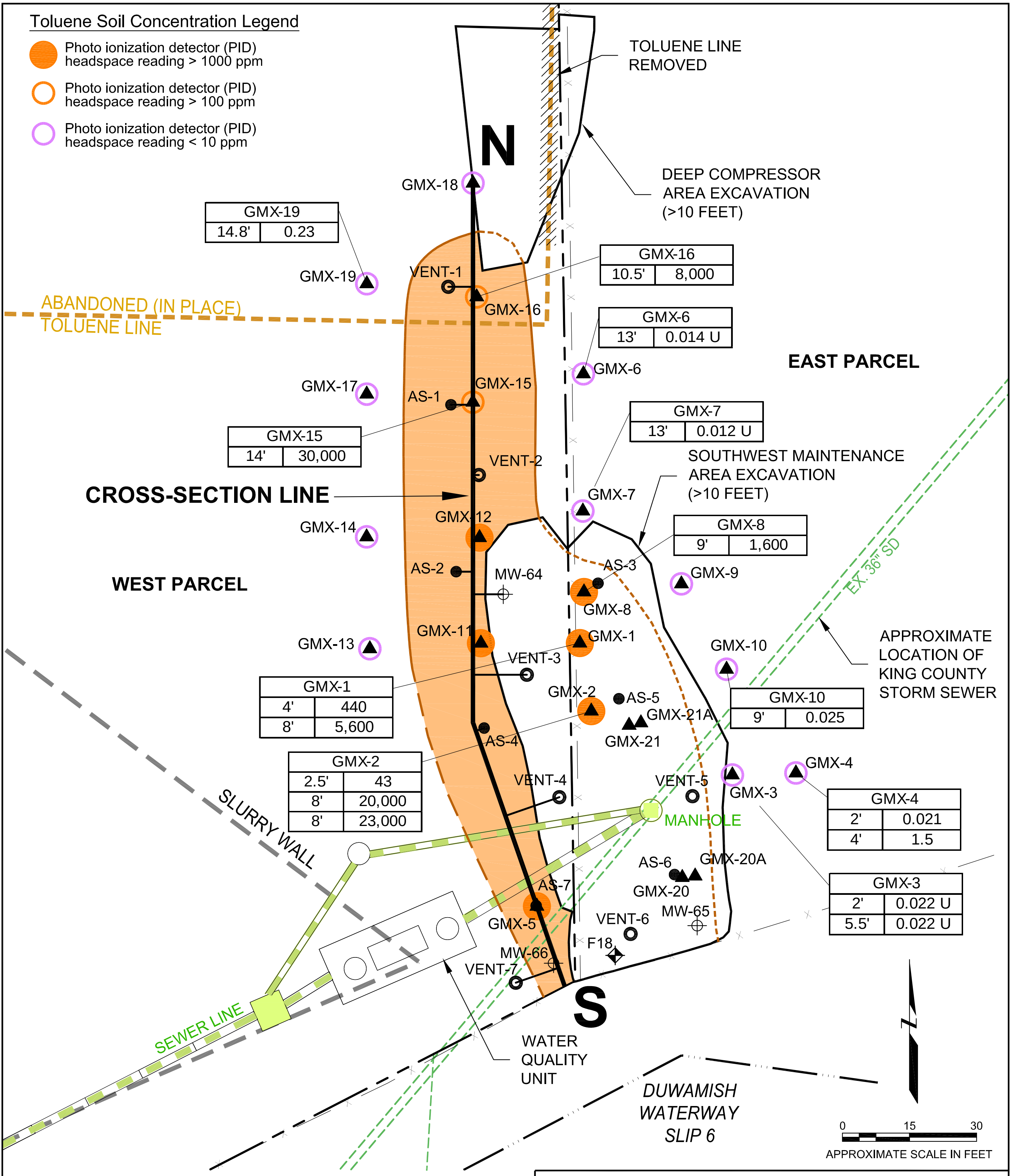
GROUNDWATER TOLUENE CONCENTRATIONS
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS
Date: 12/07/07
Project No. 8769

Geomatrix

Figure 4

Plot Date: 12/07/07 - 10:12am, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenanceAreaSamples061907.dwg



Explanation

- ▲ Existing Direct Push Boring
- ● Proposed Biosparging location
- ○ Proposed Vent Well location
- ⌖ Proposed Groundwater Monitoring Well location
- ✦ Approximate Location of Geoprobe installed during Summer 2001 Geoprobe Investigation
- Approximate current extent of toluene-affected soils (dashed where uncertain)
- Approximate historic extent of toluene-affected soils

Key

Direct Push Boring I.D.	
Depth bgs	Units in mg/kg (ppm)

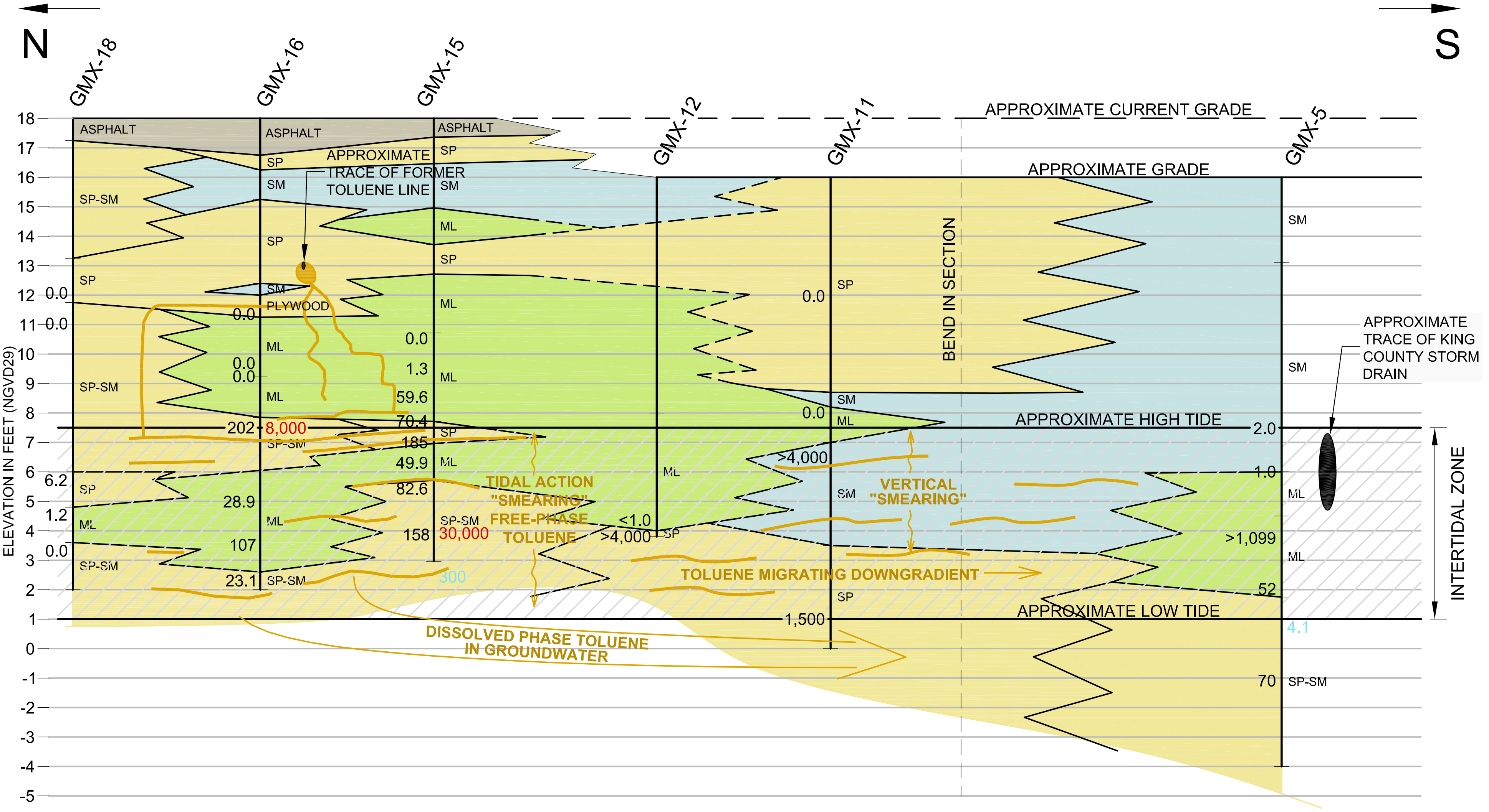
CROSS-SECTION LOCATION
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS | Date: 12/11/07 | Project No. 8769

Geomatrix

Figure 5

Plot Date: 12/11/07 - 1:46pm, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenance_Cross-Sect-120507.dwg

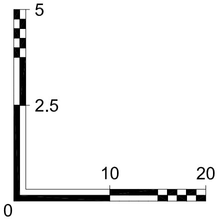


KEY TO SOIL TYPES

🟨	SP / SP-SM = POORLY GRADED SANDS TO SILTY AND POOR-GRADED SAND MIXTURES
🟦	SM = SILTY SAND
🟩	ML = SILT

EXPLANATION

<30,000	TOLUENE SOIL SAMPLE CONCENTRATION IN mg/kg
<300	TOLUENE GROUNDWATER SAMPLE CONCENTRATION IN mg/L
158	PID READINGS IN ppm
〰	CONCEPTUAL REPRESENTATION OF TOLUENE PATHWAYS



APPROXIMATE SCALE IN FEET
VERTICAL EXAGGERATION = 4X

NOTE: TIDAL RANGE BASED ON JULY 4, 2006 TO OCTOBER 4, 2006 DM-8 WATER LEVELS

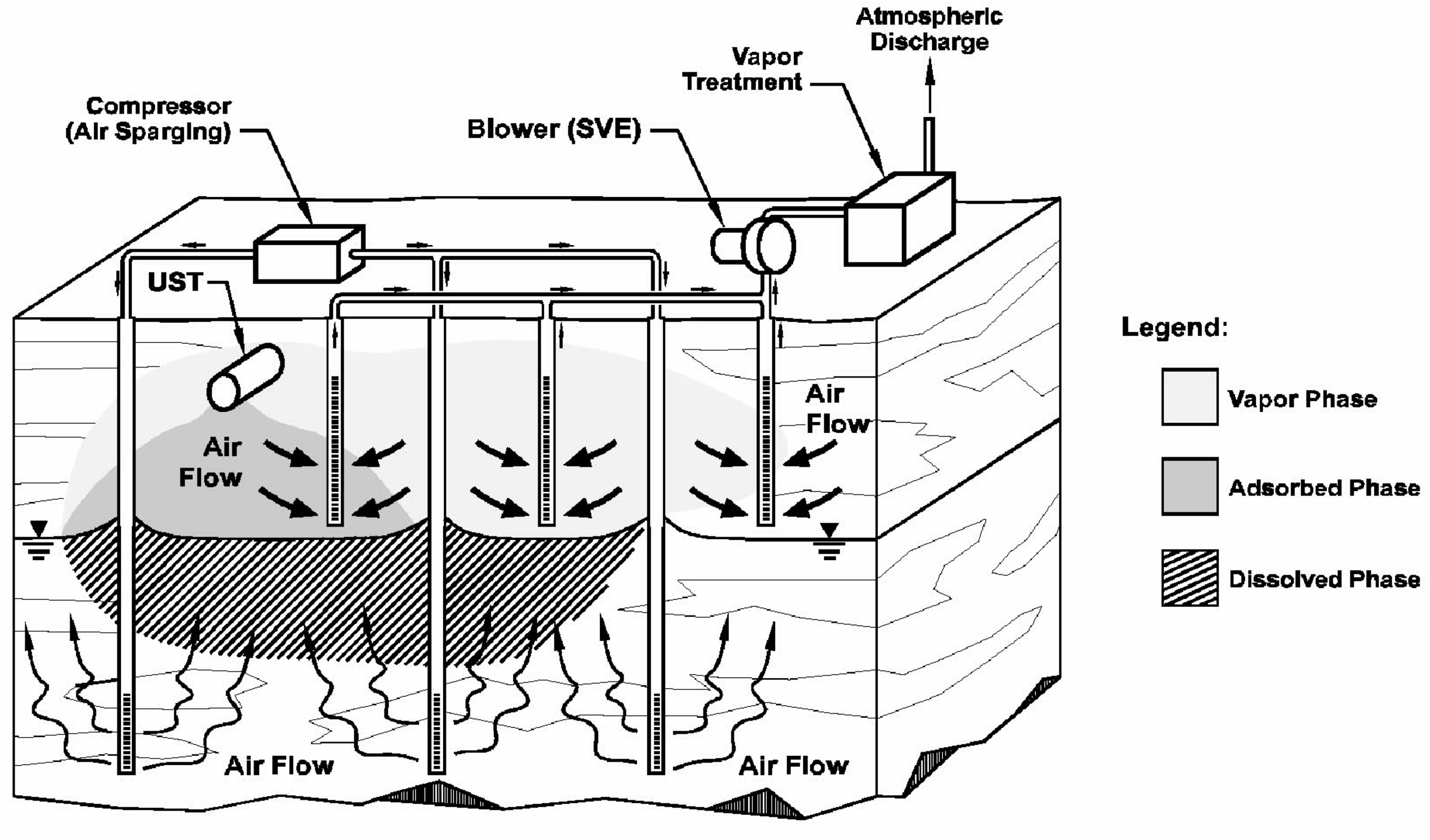
CONCEPTUAL SITE MODEL CROSS-SECTION
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS
Date: 12/11/07
Project No. 8769

Geomatrix

Figure 6

Plot Date: 12/11/07 - 1:35pm, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenance_Cross-Sect-120507.dwg

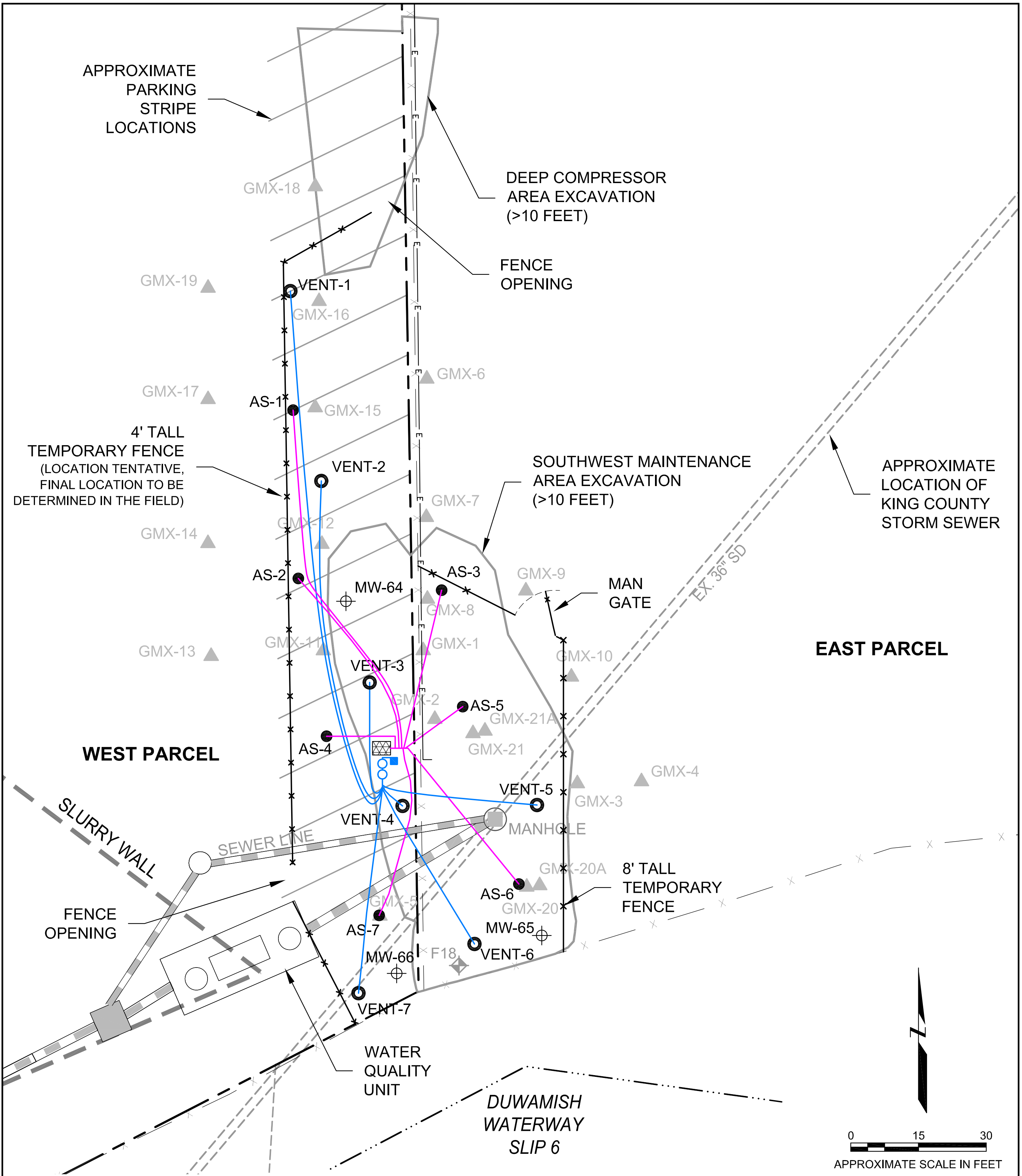


Source: EPA, 1994

CONCEPTUAL DIAGRAM OF TYPICAL AIR SPARGING SYSTEM WITH SVE
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 12/11/07	Project No. 8769
Geomatrix		Figure 7

Plot Date: 12/11/07 - 1:38pm, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenanceBioSparge-Vent.dwg



Explanation

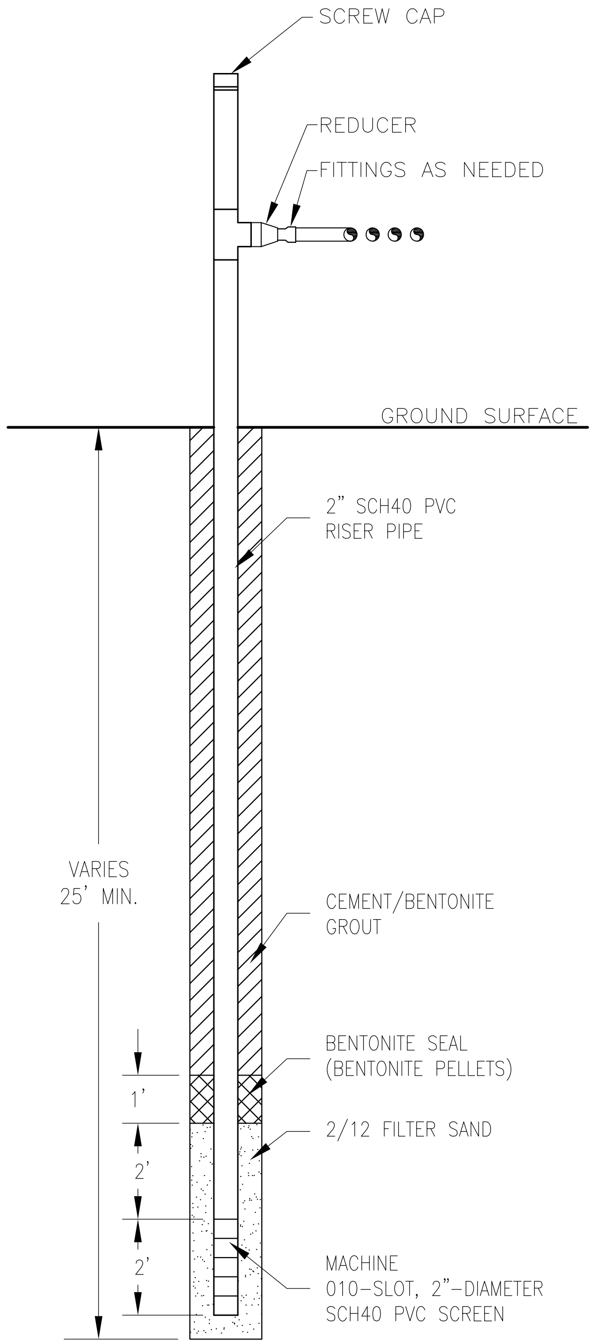
AS ●	Proposed Biosparging location
VENT ◎	Proposed Vent Well location
GMX-1 ▲	Existing Direct Push Boring
⌖	Proposed Groundwater Monitoring Well location
○	Granulated Activated Carbon Unit (GAC)
■	Vacuum Pump
▨	Biosparge compressor(s)
——	Sparge line
——	Vent line
——E——	Power above ground
— — —	Property line
— x —	Existing Fence
—x—	Temporary Fence

PROPOSED BIOSPARGING, MONITORING, AND VENT WELL LOCATIONS

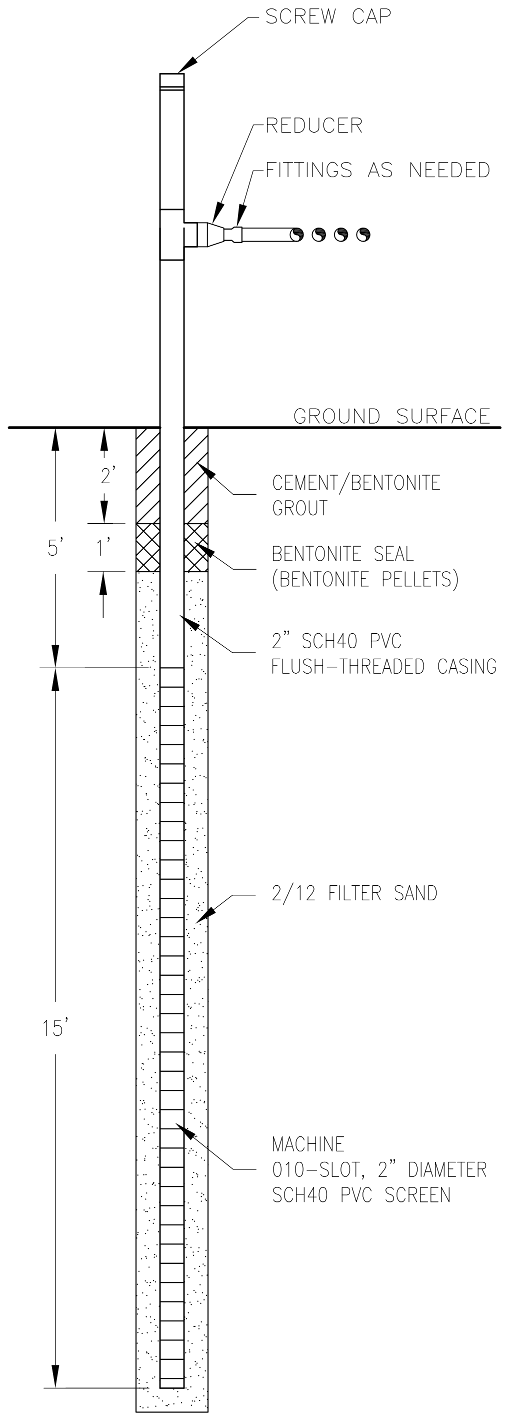
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 12/07/07	Project No. 8769
Geomatrix		Figure 8

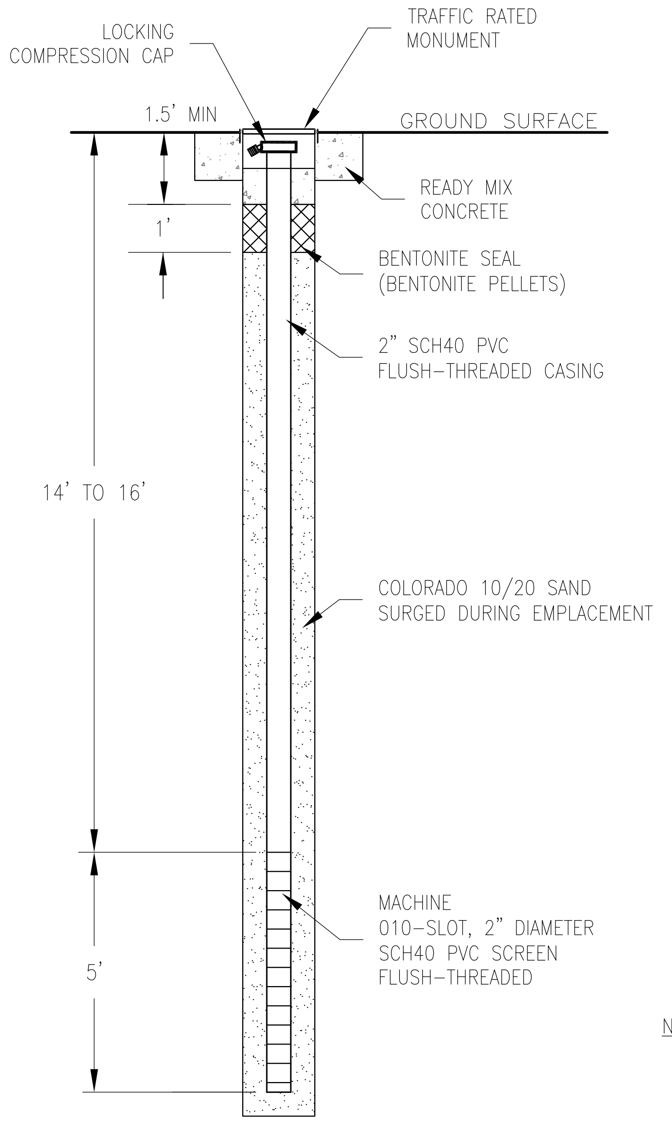
Plot Date: 12/07/07 - 10:10am, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenanceBioSparge-Vent.dwg



TYPICAL BIOSPARGE WELL DETAIL



TYPICAL VENT WELL DETAIL



NOTE:

SCREEN DEPTH OF MONITORING WELL MAY BE ADJUSTED BASED ON DEPTH TO SILT/SAND LITHOLOGIC CONTACT.

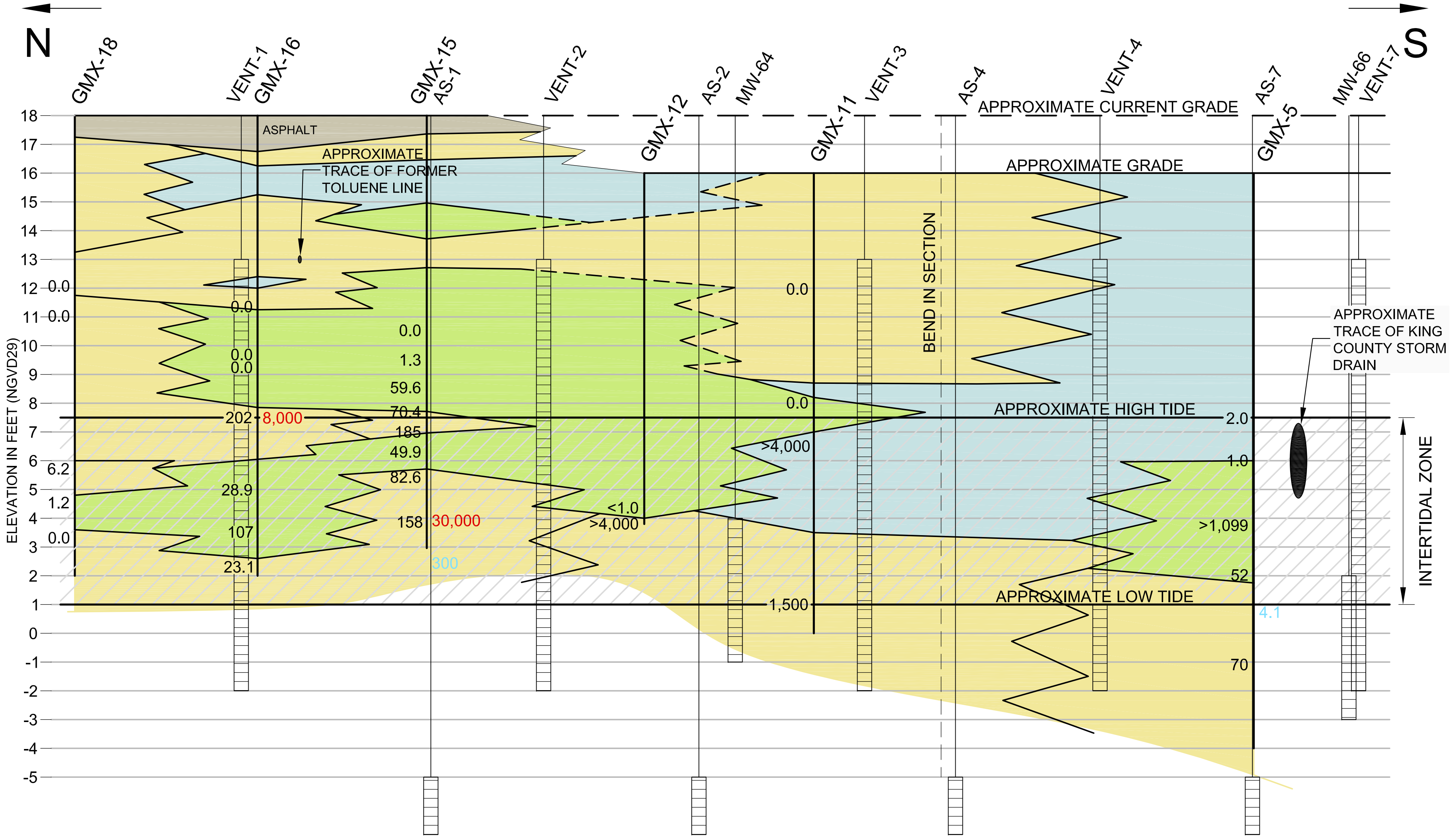
TYPICAL MONITORING WELL DETAIL

0 2 4
APPROXIMATE SCALE IN FEET

TYPICAL BIOSPARGING, VENT WELL, AND
MONITORING WELL DETAILS
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 12/10/07	Project No. 8769
Geomatrix		Figure 9

Plot Date: 12/10/07 - 2:26pm, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenanceBioSparge-Vent.dwg



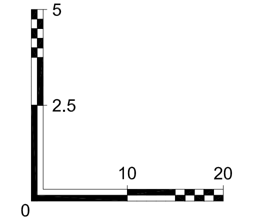
KEY TO SOIL TYPES

🟨	SP / SP-SM = POORLY GRADED SANDS TO SILTY AND POOR-GRADED SAND MIXTURES
🟦	SM = SILTY SAND
🟩	ML = SILT

NOTE: TIDAL RANGE BASED ON JULY 4, 2006 TO OCTOBER 4, 2006 DM-8 WATER LEVELS

EXPLANATION

30,000	TOLUENE SOIL SAMPLE CONCENTRATION IN mg/kg
300	TOLUENE GROUNDWATER SAMPLE CONCENTRATION IN mg/L
158	PID READINGS IN ppm
▤	PROPOSED SCREEN INTERVALS FOR BIOSPARGE AND BIOVENT WELLS



APPROXIMATE SCALE IN FEET
VERTICAL EXAGGERATION = 4X

CONCEPTUAL SITE MODEL CROSS-SECTION AND PROPOSED WELL LOCATIONS

Former Rhone-Poulenc Site
Tukwila, Washington

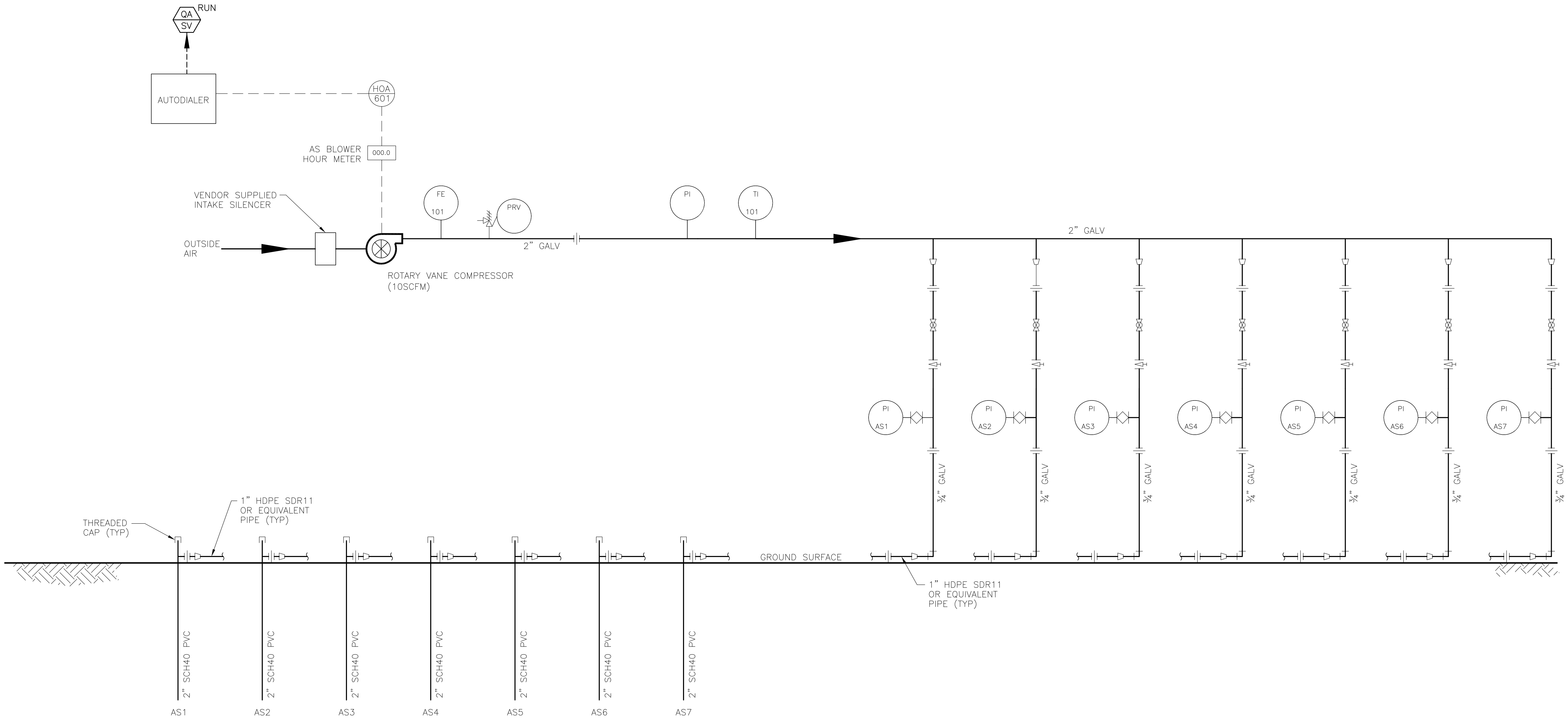
By: APS
Date: 12/11/07
Project No. 8769

Geomatrix

Figure **10**

Plot Date: 12/11/07 - 1:44pm, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenance_Cross-Sect_ProposedWells-120507.dwg

Plot Date: 12/07/07 - 10:18am, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenanceBioSparge-Vent.dwg



PIPING SYMBOLS

UNION
CAP
REDUCER
BALL VALVE
NEEDLE VALVE

EQUIPMENT SYMBOLS

ROTARY VANE COMPRESSOR

INSTRUMENT LEGEND

FIELD MOUNTED
CONTROL PANEL MOUNTED
PRV — PRESSURE RELIEF VALVE
QA SV — EVENT ALARM

INSTRUMENT LEGEND CON'T

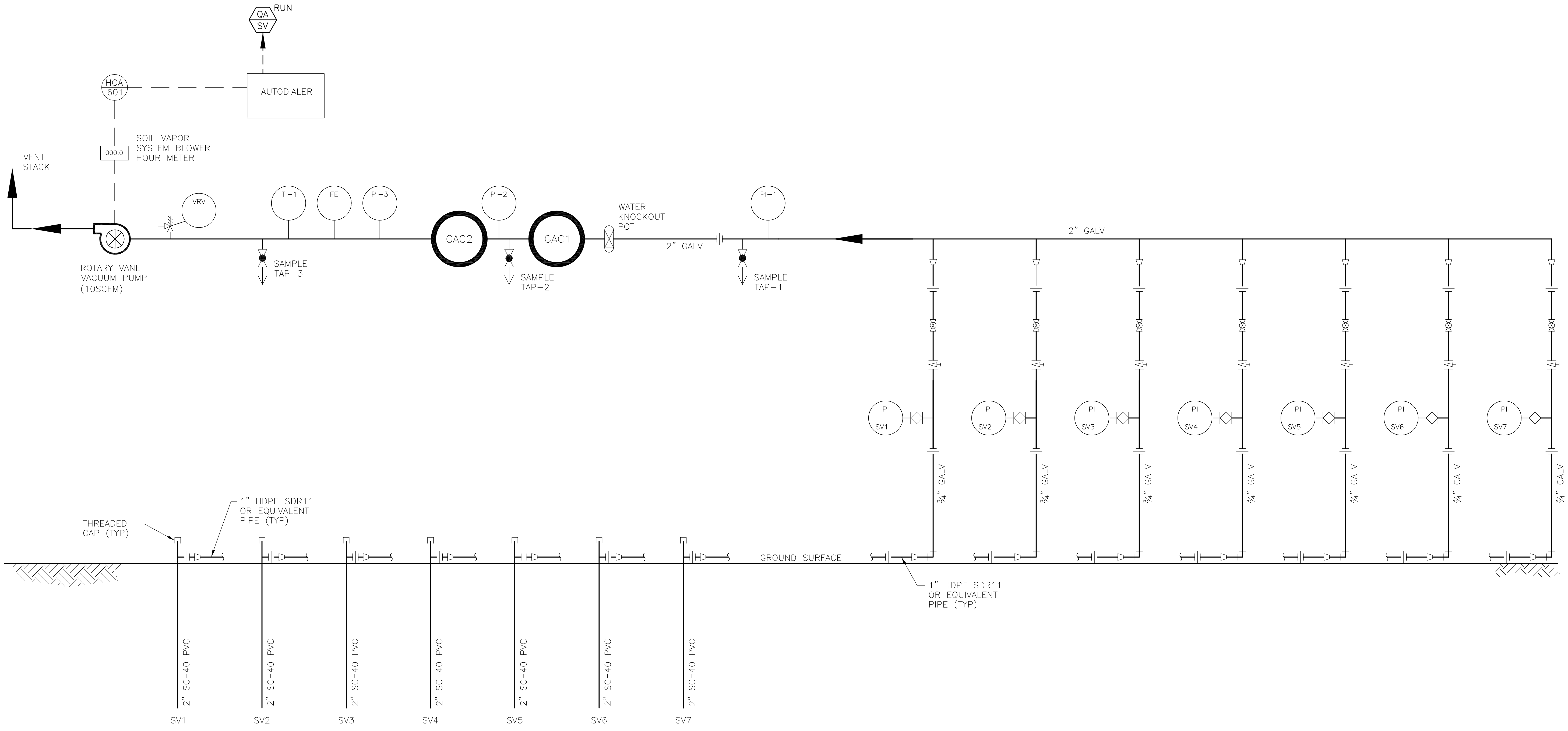
PI — PRESSURE INDICATOR
TI — TEMPERATURE INDICATOR
FE — FLOW ELEMENT
HOA — HAND OFF AUTO

GENERAL NOTES

HDPE	HIGH DENSITY POLYETHYLENE
GALV	GALVANIZED STEEL
TYP	TYPICAL
PVC	POLYVINYL CHLORIDE
SCH	SCHEDULE
AS	AIR SPARGING

BIOSPARGE SYSTEM
PIPING AND INSTRUMENTATION DIAGRAM
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 12/07/07	Project No. 8769
Geomatrix		Figure 11



PIPING SYMBOLS

- UNION
- CAP
- REDUCER
- BALL VALVE
- NEEDLE VALVE

EQUIPMENT SYMBOLS

- ROTARY VANE VACUUM PUMP

INSTRUMENT LEGEND

- FIELD MOUNTED
- CONTROL PANEL MOUNTED
- VRV — VACUUM RELIEF VALVE
- QA SV — EVENT ALARM

INSTRUMENT LEGEND CON'T

PI	PRESSURE INDICATOR
TI	TEMPERATURE INDICATOR
FE	FLOW ELEMENT
HOA	HAND OFF AUTO

GENERAL NOTES

HDPE	HIGH DENSITY POLYETHYLENE
GALV	GALVANIZED STEEL
TYP	TYPICAL
PVC	POLYVINYL CHLORIDE
SCH	SCHEDULE
SV	SOIL VAPOR

SOIL VAPOR COLLECTION SYSTEM
PIPING AND INSTRUMENTATION DIAGRAM
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS
Date: 12/07/07
Project No. 8769

Geomatrix

Figure 12

Plot Date: 12/07/07 - 10:18am, Plotted by: astenberg
Drawing Path: S:\8769_2006\044_EP-CMIWP\, Drawing Name: FormerMaintenanceBioSparge-Vent.dwg

APPENDIX A

Analytical Results Packages

Geomatrix

Memorandum

TO:	Larry McGaughey	**DATE:**	September 7, 2006
FROM:	Tasya Gray	**PROJ. NO.:**	8769.006
CC:	Project File	**PROJ. NAME:**	Former Rhone-Poulenc Site

SUBJECT: **East Parcel Redevelopment Soil Sampling**
Summary Data Quality Review – SDGs JU16, JU19, JU45, and JU46

This memorandum presents a summary data quality review of 12 primary soil samples, 8 primary water samples, 2 field duplicate samples, and 3 trip blanks collected on August 24 and 26, 2006. The samples were submitted to Analytical Resources, Incorporated (ARI), a Washington State Department of Ecology (Ecology)-accredited laboratory, located in Tukwila, Washington. The samples were analyzed for the following analyses:

- Benzene, toluene, ethylbenzene and total xylenes (BTEX) by EPA Method 8021
- Total organic carbon (TOC) by Plumb, 1981 Method

The analyses were performed in general accordance with methods specified in U.S. Environmental Protection Agency's (EPA) Test Methods for Evaluating Solid Waste (SW-846), January 1995 and associated revisions.

Laboratory sample delivery groups (SDGs) associated with the August 2006 sampling events are listed below. The samples associated with each SDG are presented in the table at the end of this memorandum.

Laboratory SDG	Date(s) Collected
JU16	August 24, 2006
JU19	August 24, 2006
JU45	August 26, 2006
JU46	August 26, 2006

Upon receipt by ARI, the sample jar information was compared to the chain-of-custody form. Discrepancies were noted by the laboratory and addressed with Geomatrix personnel prior to sample analyses. The temperatures of the coolers were recorded as part of the check-in procedure. The coolers were within the acceptable range of 4 +/- 2 °C with the exception of SDGs JU16 and JU19 which were 9°C and 10°C, respectively. The sample coolers did contain ice and no data were qualified due to these exceedances.

Data review is based on method performance criteria and quality control (QC) criteria as documented in the May 2006 Soil Sampling Quality Assurance Project Plan (QAPP). The laboratory provided validatable packages containing summarized sample results and associated QA/QC data as well as instrument printouts and sample preparation and injection log pages as required by the QAPP. The data review conducted on these SDGs included a review of summarized results and QA/QC data per the requirements set forth in Section D1 of the QAPP. The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the quality control data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used. Hold times, calibration verification, method blanks, surrogate recoveries, laboratory control samples (LCS), matrix spike/matrix spike duplicate (MS/MSD) results, laboratory duplicate results, field QC results, and reporting limits were reviewed to assess compliance with applicable methods and the QAPP. If data qualification was required, data were qualified in general accordance with the definitions and use of qualifying flags outlined in the following EPA documents: USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, October 1999.

The following qualifiers may be added to the data:

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

- J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

- UJ: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

- R: The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

ORGANIC ANALYSES

Samples were analyzed for BTEX and TOC by the methods identified in the introduction to this report, and were evaluated for the following criteria.

1. Holding Times – Acceptable

2. Initial Calibration – Acceptable

3. Calibration Verification – Acceptable

4. Blanks – Acceptable except as noted:

   A trip blank was listed on the chain-of-custody but was inadvertently not included with SDG JU19; however, all method blanks were non-detect and there was at least one soil and groundwater sample included in the SDG that were non-detect, indicating there was not a cooler contamination issue. No data were qualified. No equipment blanks were collected during this sampling event, because all sampling equipment used to collect BTEX samples was dedicated (EPA Method 5035).

5. Surrogates – Acceptable

6. LCS – Acceptable

7. Laboratory Duplicates – Acceptable except as noted:

   Laboratory duplicates were not included in the data package for SDGs JU16, JU19, JU45, or JU46, but the LCS duplicates showed good relative percent differences (RPDs).

8. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable except as noted:

   MS/MSDs were not included in data packages JU16, JU19, or JU46. Results were evaluated based on the LCS where available.

   The MS/MSD performed on sample RP082606-01 in SDG JU45 showed recoveries in the MS and MSD above the control limits for all analytes except benzene in the MS. The associated sample results were all non-detect though, so no data was qualified.

   The project frequency requirement of one MS/MSD for every 20 samples was achieved with MS/MSD volume collected at additional sites included in this sampling event.

9. Field Duplicates – Acceptable except as noted:

   During this sampling event, soil field duplicate sample RP082406-15 was collected with primary sample RP082406-13 for SDG JU19. Water field duplicate sample

RP082406-04 was collected with primary sample RP082406-03 for SDG JU16. This meets the project frequency requirement of 10% or 1 for every 10 samples, with the exception of field duplicates for TOC analysis. The RPDs for all duplicates were below the project specific control limit of 30%, as shown in the table below.

Sample ID/ Field Duplicate ID	**Analyte**	**Primary Result (µg/kg)**	**Duplicate Result (µg/kg)**	**RPD (%)**
RP082406-13/ RP082406-15	toluene	18,000	20,000	11
Sample ID/ Field Duplicate ID	**Analyte**	**Primary Result (µg/L)**	**Duplicate Result (µg/L)**	**RPD (%)**
RP082406-03/RP082406-04	toluene	4.1	3.6	13

10. Reporting Limits – Acceptable

    Due to elevated toluene levels in some samples, reporting limits are elevated for other constituents in multiple samples from SDGs JU16, JU19, and JU45.

11. Other –

    TOC analysis was not requested on the original chains-of-custody for SDGs JU16 and JU19; this analysis was requested after samples were submitted for samples RP082406-05 and RP082406-16.

OVERALL ASSESSMENT OF DATA

The ARI SDGs JU16, JU19, JU45, and JU46 are 100 percent complete. The data usability is based on EPA's guidance documents and the QAPP referenced in the introduction to this report. Few problems were identified and analytical performance was generally within specified limits. The data are acceptable and meet the project's data quality objectives.

Sample ID	**SDG**	**Laboratory ID**	**Qualified Analyte**	**Qualified Result**	**Units**	**Qualifier Reason**
RP082406-05	JU16	JU16A	none			
RP082406-06	JU16	JU16B	none			
RP082406-07	JU16	JU16C	none			
RP082406-04	JU16	JU16D	none			
RP082406-03	JU16	JU16G	none			

Sample ID	**SDG**	**Laboratory ID**	**Qualified Analyte**	**Qualified Result**	**Units**	**Qualifier Reason**
RP082406-08 (trip blank)	JU16	JU16H	none			
RP082406-09	JU19	JU19A	none			
RP082406-10	JU19	JU19B	none			
RP082406-11	JU19	JU19C	none			
RP082406-12	JU19	JU19D	none			
RP082406-13	JU19	JU19E	none			
RP082406-14	JU19	JU19F	none			
RP082406-15	JU19	JU19G	none			
RP082406-16	JU19	JU19H	none			
RP082406-17	JU19	JU19I	none			
RP082406-18	JU19	JU19J	none			
RP082606-01	JU45	JU45A	none			
RP082606-02	JU45	JU45B	none			
RP082606-03	JU45	JU45C	none			
RP082606-04	JU45	JU45D	none			
RP082606-05	JU45	JU45E	none			
RP082606-06 (trip blank)	JU45	JU45F	none			
RP082606-07	JU46	JU46A	none			
RP082606-08	JU46	JU46B	none			
RP082606-09 (trip blank)	JU46	JU46C	none			

Analytical Resources, Incorporated
Analytical Chemists and Consultants

GEOMATRIX
Received
SEP 15 2006
SEATTLE

14 September 2006

Zanna Satterwhite
Geomatrix
600 University Suite 1020
Seattle, WA 98101

RE: Client Project: Former Rhone Poulenc, 8769.006
ARI Job Numbers: JU16, JU19, JU45, JU46

Dear Zanna:

Please find enclosed the final data package for samples for the project referenced above. ARI received eleven soil samples and five water samples on August 24, 2006. Three soil samples, two water samples and one trip blank were received on August 26, 2006. One soil sample, one water sample and one trip blank were received on August 28, 2006. All samples were received intact. It was noted upon sample receipt that the trip blank was not received on August 24, 2006. It was also noted that the time on the vials for sample RP082406-07 was recorded as "1054".

Two soil samples were placed on hold as specified. The remaining samples were analyzed for BETX by method 8021B as requested.

Please refer to the case narrative for anomalies associated with these samples.

A copy of this package will be kept on file at ARI. If you have questions or problems, please feel free to contact me at any time.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
markh@arilabs.com

Enclosures

cc: files JU16, JU19, JU45, JU46

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Documentation

Prepared
for

Geomatrix Consultants

Project: FRP , 8769.006

ARI Job Nos.:JU16, JU19, JU45 & JU46

Prepared
By

Analytical Resources, Inc.

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: JU16
Turn-around Requested: 24-hour (see comments)
ARI Client Company: Geomatrix
Phone: 206-342-1772
Client Contact: Zanna Satterwhite
Client Project Name: Former Rhone-Poulenc
Client Project #: 8769.006
Samplers: Z. Satterwhite
Page: 1 of 1
Date: 8/24/06
Ice Present? Y
No. of Coolers: 1
Cooler Temps: 9.0°

Sample ID	Date	Time	Matrix	No. Containers	BETX 8021			HOLD FOR ANALYSIS					Notes/Comments
RP082406-05	8/24/06	1026	S	4x40mL 1x2oz				X					*
RP082406-06	↓	1030	S	4x40mL 1x2oz				X					*
RP082406-07	↓	1055	W	4x40mL ~~1x2oz~~ ZS	X								*
RP082406-04	↓	0934	W	3x40mL	↓								SA **
RP082406-01	↓	0840	S	4x40mL 1x2oz	↓								*
RP082406-02	↓	0845	S	4x40mL 1x2oz	↓								*
RP082406-03	↓	0934	W	3x40mL ~~1x2oz~~ ZS	↓								*
RP082406-08	↓	1100	W	3x40mL	↓								** (Trip Blank)

ZS 8/24/06

Comments/Special Instructions
* 24 HR TA
** 48 HR TA

Relinquished by: (Signature) ZS	Received by: (Signature) Emily Odachowski	Relinquished by: (Signature)	Received by: (Signature)
Printed Name: Zanna Satterwhite	Printed Name: Emily Odachowski	Printed Name:	Printed Name:
Company: Geomatrix	Company: ARI	Company:	Company:
Date & Time: 8/24/06 1152	Date & Time: 8/24/06 1152	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Cooler Receipt Form

ANALYTICAL RESOURCES INCORPORATED

ARI Client: GEOMATRIX
Project Name:
COC NO.:
Delivered By: EO
Tracking NO.:
Date: 8/24/06
ARI Job No.:
Lims NO.:

Preliminary Examination Phase:

1. Were intact, properly signed and dated custody seals attached To the outside of the cooler? .... YES [✓ NO]
2. Were custody papers included with the cooler .... [✓ YES] NO
3. Were custody papers properly filled out (ink, signed etc.)? .... [✓ YES] NO
4. Complete custody forms and attach all shipping documents .... [✓ OK] NA

Cooler Accepted BY: Emily Odachawski Date: 8/24/06 Time: 1156

Log-IN Phase:

5. Was a temperature blank include in the cooler? .... YES [✓ NO]
6. Record Cooler Temperature .... 9 °C
7. What kind of packing material was used? .... —
8. Was sufficient ice used (if appropriate)? .... [✓ YES] NO
9. Were all bottles sealed in separate plastic bags? .... YES [✓ NO]
10. Did all bottles arrive in good condition (unbroken)? .... [✓ YES] NO
11. Were all bottle labels complete and legible? .... [✓ YES] NO
12. Did all bottle labels and tags agree with custody papers? .... YES [✓ NO]
13. Were all bottles used correct for the requested analyses? .... [✓ YES] NO
14. Do any of the analyses (bottles) require preservative? (If so, Preservation checklist must be attached) .... YES [✓ NO]
15. Were all VOA vials free of air bubbles? .... YES [✓ NO]
16. Was sufficient amount of sample sent in each bottle? .... [✓ YES] NO
17. Notify Project Manager of any discrepancies or concerns .... [✓ OK] NA

Cooler Opened By: Emily Odachawski Date: 8/24/06 Time 1156

Explain any discrepancies or negative responses:

RP 082406-07 time on vials = 1054

RP082406-04 1/3 pea bubble

TB 2/3 w/ peabubbles

8/24/06

0016F Cooler Receipt Form Revision7(1/10/01)

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: JL19
Turn-around Requested: 24-hr (see comments)
ARI Client Company: Geomatrix
Phone: 206 342 1772
Client Contact: Zanna Satterwhite
Client Project Name: Former Rhone-Poulenc
Client Project #: 8769.006
Samplers: Zanna Satterwhite
Page: 1 of 2
Date: 8/24/06
Ice Present? Y
No. of Coolers: 1
Cooler Temps: 10

Sample ID	Date	Time	Matrix	No. Containers	BTEX (8021)								Notes/Comments
RP082406-09	8/24/06	1136	S	4x40ml 1x2oz	X								*
RP082406-10		1140	S	4x40ml 1x2oz	X								*
RP082406-11		1202	W	3x40ml	X								*
RP082406-12		1240	S	4x40ml 1x2oz	X								*
RP082406-13		1245	S	4x40ml 1x2oz	X								*
RP082406-14		1300	W	3x40ml	X								*
RP082406-15		1245	S	4x40ml 1x2oz	X								** 2A
RP082406-16		1321	S	4x40ml 1x2oz	X								*
RP082406-17		1326	S	4x40ml 1x2oz	X								*
RP082406-18		1351	W	3x40ml	X								*

Comments/Special Instructions
* 24 hr TAT
** 48 hr TAT

Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)	(Signature)	(Signature)	(Signature)
Printed Name: Zanna Satterwhite	Printed Name: BOB CONGLETON	Printed Name:	Printed Name:
Company: Geomatrix	Company: ARI	Company:	Company:
Date & Time: 8/24/06	Date & Time: 8/24/06 1445	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: JL19
Turn-around Requested: 24-hr
ARI Client Company: Geomatrix
Phone: 206 342 1772
Client Contact: Zanna Sattenwhite
Client Project Name: Former Rhone-Poulenc
Client Project #: 8769.006
Samplers: Zanna Sattenwhite

Page: 2 of 2
Date: 8/24/06
Ice Present? Y
No. of Coolers: 1
Cooler Temps: 10

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: BTEX (8021)								Notes/Comments
RP082406 -19	8/24/06		W	3x40ml	X								** Trip Blank

ZS 8/24/06

Comments/Special Instructions
*24 hr TAT
** 48 hr TAT

Relinquished by: (Signature)	Received by: (Signature) Bob Cong	Relinquished by: (Signature)	Received by: (Signature)
Printed Name: Zanna Sattenwhite	Printed Name: BOB CONGLETON	Printed Name:	Printed Name:
Company: Geomatrix	Company: ARI	Company:	Company:
Date & Time: 8/24/06	Date & Time: 8/24/06 1445	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Cooler Receipt Form

ANALYTICAL RESOURCES INCORPORATED

ARI Client: GMX
Project Name:
COC NO.:
Delivered By: HAND
Tracking NO.:
Date:
ARI Job No.: JU19
Lims NO.:

Preliminary Examination Phase:

1. Were intact, properly signed and dated custody seals attached To the outside of the cooler? YES [✓ NO]
2. Were custody papers included with the cooler [✓ YES] NO
3. Were custody papers properly filled out (ink, signed etc.)? [✓ YES] NO
4. Complete custody forms and attach all shipping documents OK [✓ NA]

Cooler Accepted BY: Bob Cong Date: 8/24/06 Time: 1445

Log-IN Phase:

5. Was a temperature blank include in the cooler? YES [✓ NO]
6. Record Cooler Temperature 10.0 °C
7. What kind of packing material was used? ICE
8. Was sufficient ice used (if appropriate)? YES NO Recently sampled
9. Were all bottles sealed in separate plastic bags? YES [✓ NO]
10. Did all bottles arrive in good condition (unbroken)? [✓ YES] NO
11. Were all bottle labels complete and legible? [✓ YES] NO
12. Did all bottle labels and tags agree with custody papers? YES [✓ NO] *
13. Were all bottles used correct for the requested analyses? [✓ YES] NO
14. Do any of the analyses (bottles) require preservative? (If so, Preservation checklist must be attached) YES [✓ NO]
15. Were all VOA vials free of air bubbles? [✓ YES] NO
16. Was sufficient amount of sample sent in each bottle? [✓ YES] NO
17. Notify Project Manager of any discrepancies or concerns [✓ OK] NA

Cooler Opened By: Date 8/24/06 Time 1445

Explain any discrepancies or negative responses:

*- DID NOT RECEIVE TRIP BLANK SAMPLE.

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: SU45
Turn-around Requested: Rush 24 hour if poss
Page: 1 of
ARI Client Company: Geomatrix
Phone: 206-~~4~~342-1772
Date: 8/26/06
Ice Present? Y
Client Contact: Zanna Satterwhite
No. of Coolers: 1
Cooler Temps: 5.6
Client Project Name: Former Rhone-Poulenc
Client Project #: 8769.006
Samplers: J. D. Long

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: EPA 8021 BTEX								Notes/Comments
RP082606-01	8/26/06	0845	S	1-2oz 3 40mL	X								preserved soil
RP082606-02	↓	0920	W	3 40mL	X								
RP082606-03		1015	S	1-2oz 3 40mL	X								preserved soil
RP082606-04		1025	W	3 40mL	X								
RP082606-05		1110	S	1-2oz 3 40mL	X								
RP082606-06	8/26/06	1140	W	3 40mL	X								48 HRTA

Comments/Special Instructions:
24 HR TAT if possible

Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
Printed Name: John D Long	Printed Name: Brian Keesel	Printed Name:	Printed Name:
Company: GMX	Company: ARI	Company:	Company:
Date & Time: 8/26/06 1200	Date & Time: 8/26/06 1200	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Cooler Receipt Form

ANALYTICAL
RESOURCES
INCORPORATED

ARI Client: GMX
Project Name: FRP
COC NO.: —
Delivered By: Hand
Tracking NO.: —
Date: 8/26/02
ARI Job No.: JC45
Lims NO.:

Preliminary Examination Phase:

1. Were intact, properly signed and dated custody seals attached To the outside of the cooler? .... YES [✓ NO]
2. Were custody papers included with the cooler .... [✓ YES] NO
3. Were custody papers properly filled out (ink, signed etc.)? .... [✓ YES] NO
4. Complete custody forms and attach all shipping documents .... [✓ OK] NA

Cooler Accepted BY: Date: 8/26/02 Time: 1200

Log-IN Phase:

5. Was a temperature blank include in the cooler? .... YES NO
6. Record Cooler Temperature .... 5.6 °C
7. What kind of packing material was used? .... BW
8. Was sufficient ice used (if appropriate)? .... [✓ YES] NO
9. Were all bottles sealed in separate plastic bags? .... YES [✓ NO]
10. Did all bottles arrive in good condition (unbroken)? .... [✓ YES] NO
11. Were all bottle labels complete and legible? .... [✓ YES] NO
12. Did all bottle labels and tags agree with custody papers? .... [✓ YES] NO
13. Were all bottles used correct for the requested analyses? .... [✓ YES] NO
14. Do any of the analyses (bottles) require preservative? (If so, Preservation checklist must be attached) .... YES [✓ NO]
15. Were all VOA vials free of air bubbles? .... [✓ YES] NO
16. Was sufficient amount of sample sent in each bottle? .... [✓ YES] NO
17. Notify Project Manager of any discrepancies or concerns .... [✓ OK] NA

Cooler Opened By: Date: 8/26/02 Time 1200

Explain any discrepancies or negative responses:

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: JG46
Turn-around Requested: 24-hr
ARI Client Company: Geomatrix
Phone: 206 342-1772
Client Contact: Zanna Satterwhite
Client Project Name: Former Rhone Poulenc
Client Project #: 4764.006
Samplers: JD Long

Page: 1 of 1
Date: 8/26/06
Ice Present? Y
No. of Coolers: 1
Cooler Temps: 5.9

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: EPA 8021 BTEX								Notes/Comments
RP082606-07	8/26/06	1245	S	1 2oz 2 40mL	X								soil preserved - methanol
RP082606-08	↓	1300	W	3 40mL	X								water preserved HCl
RP082606-09	↓	1330	W	3 40mL	X								" " "

ZAS 8/27/06

Comments/Special Instructions

Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature) John D. Long	(Signature) Zan S	(Signature) Zan S	(Signature)
Printed Name: John D. Long	Printed Name: Zanna Satterwhite	Printed Name: Zanna Satterwhite	Printed Name: BRIAN KELLEC
Company: Geomatrix	Company: Geomatrix	Company: Geomatrix	Company: ARI
Date & Time: 8/27/2006 1500	Date & Time: 8/27/2006 1500	Date & Time: 8/27/06 0704	Date & Time: ~~8/27/06 0708~~ 8/28/06 0704

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Cooler Receipt Form

ANALYTICAL RESOURCES INCORPORATED

ARI Client: GMX
Project Name: FRP
COC NO.: —
Delivered By: Hand
Tracking NO.: —
Date: 8/28/06
ARI Job No.: JU46
Lims NO.:

Preliminary Examination Phase:

1. Were intact, properly signed and dated custody seals attached To the outside of the cooler? .... YES [✓ NO]
2. Were custody papers included with the cooler .... [✓ YES] NO
3. Were custody papers properly filled out (ink, signed etc.)? .... [✓ YES] NO
4. Complete custody forms and attach all shipping documents .... [✓ OK] NA

Cooler Accepted BY: Date: 8/28/06 Time: 0704

Log-IN Phase:

5. Was a temperature blank include in the cooler? .... YES [✓ NO]
6. Record Cooler Temperature .... 5.9 °C
7. What kind of packing material was used? .... —
8. Was sufficient ice used (if appropriate)? .... [✓ YES] NO
9. Were all bottles sealed in separate plastic bags? .... YES [✓ NO]
10. Did all bottles arrive in good condition (unbroken)? .... [✓ YES] NO
11. Were all bottle labels complete and legible? .... [✓ YES] NO
12. Did all bottle labels and tags agree with custody papers? .... [✓ YES] NO
13. Were all bottles used correct for the requested analyses? .... [✓ YES] NO
14. Do any of the analyses (bottles) require preservative? (If so, Preservation checklist must be attached) .... YES [✓ NO]
15. Were all VOA vials free of air bubbles? .... YES [✓ NO]
16. Was sufficient amount of sample sent in each bottle? .... [✓ YES] NO
17. Notify Project Manager of any discrepancies or concerns .... [✓ OK] NA

Cooler Opened By: Date: 8/28/06 Time 0704

Explain any discrepancies or negative responses:

Peabubbles In

Case Narrative

Prepared
for

Geomatrix Consultants

Project: FRP , 8769.006

ARI Job Nos.:JU16, JU19, JU45 & JU46

Prepared
By

Analytical Resources, Inc.

Case Narrative

Geomatrix
Client Project: Former Rhone Poulenc; 8769.006
ARI Job Numbers: JU16, JU19, JU45, JU46
Soil/Water
14 September, 2006

BTEX Analysis (8021BMod)

No analytical complications were noted for this analysis.

Data Summary Package

Prepared
for

Geomatrix Consultants

Project: FRP , 8769.006

ARI Job Nos.:JU16, JU19, JU45 & JU46

Prepared
By

Analytical Resources, Inc.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Case Narrative

Geomatrix
Client Project: Former Rhone Poulenc; 8769.006
ARI Job Numbers: JU16, JU19, JU45, JU46
Soil/Water
14 September, 2006

BTEX Analysis (8021BMod)

No analytical complications were noted for this analysis.

BETX

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-05
SAMPLE

Lab Sample ID: JU16A
LIMS ID: 06-15513
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 22:07
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 59 mg-dry-wt
Percent Moisture: 24.9%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	21	< 21 U
108-88-3	**Toluene**	**21**	**21**
100-41-4	Ethylbenzene	21	< 21 U
	m,p-Xylene	43	< 43 U
95-47-6	o-Xylene	21	< 21 U

BETX Surrogate Recovery	
Trifluorotoluene	91.3%
Bromobenzene	103%

BETX values reported in μg/kg (ppb)

0016

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-06
SAMPLE

Lab Sample ID: JU16B
LIMS ID: 06-15514
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/25/06 05:18
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 63 mg-dry-wt
Percent Moisture: 21.4%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	20	< 20 U
108-88-3	**Toluene**	**20**	**1,500**
100-41-4	Ethylbenzene	20	< 20 U
	m,p-Xylene	40	< 40 U
95-47-6	o-Xylene	20	< 20 U

BETX Surrogate Recovery	
Trifluorotoluene	91.4%
Bromobenzene	106%

BETX values reported in µg/kg (ppb)

0017

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-07
SAMPLE

Lab Sample ID: JU16C
LIMS ID: 06-15515
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 18:41
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	**Toluene**	**1.0**	**3.2**
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery	
Trifluorotoluene	85.8%
Bromobenzene	103%

BETX values reported in µg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-04
SAMPLE

Lab Sample ID: JU16D
LIMS ID: 06-15516
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 20:09
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 50.0

CAS Number	Analyte	RL	Result
71-43-2	Benzene	50	< 50 U
108-88-3	**Toluene**	**50**	**3,600**
100-41-4	Ethylbenzene	50	< 50 U
	m,p-Xylene	50	< 50 U
95-47-6	o-Xylene	50	< 50 U

BETX Surrogate Recovery

Trifluorotoluene	90.8%
Bromobenzene	103%

BETX values reported in μg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-03
SAMPLE

Lab Sample ID: JU16G
LIMS ID: 06-15519
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 17:13
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 50.0

CAS Number	**Analyte**	**RL**	**Result**
71-43-2	Benzene	50	< 50 U
108-88-3	**Toluene**	**50**	**4,100**
100-41-4	Ethylbenzene	50	< 50 U
	m,p-Xylene	50	< 50 U
95-47-6	o-Xylene	50	< 50 U

BETX Surrogate Recovery	
Trifluorotoluene	90.5%
Bromobenzene	104%

BETX values reported in µg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-08
SAMPLE

Lab Sample ID: JU16H
LIMS ID: 06-15520
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/26/06 17:02
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	**Analyte**	**RL**	**Result**
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery	
Trifluorotoluene	88.4%
Bromobenzene	98.3%

BETX values reported in µg/L (ppb)

0021

BETX SOIL SURROGATE RECOVERY SUMMARY

ARI Job: JU16
Matrix: Soil

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082406-05	91.3%	103%	0
MB-082406	91.3%	107%	0
LCS-082406	103%	101%	0
LCSD-082406	101%	103%	0
RP082406-06	91.4%	106%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(82-128)	(53-147)
(BBZ) = Bromobenzene	(82-123)	(60-153)

Log Number Range: 06-15513 to 06-15514

BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: JU16
Matrix: Water

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
RP082406-07	85.8%	103%	0
RP082406-04	90.8%	103%	0
RP082406-03	90.5%	104%	0
MB-082606	80.2%	93.2%	0
LCS-082606	105%	102%	0
LCSD-082606	95.6%	94.9%	0
RP082406-08	88.4%	98.3%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(80-126)	(72-124)
(BBZ) = Bromobenzene	(81-119)	(79-119)

Log Number Range: 06-15515 to 06-15520

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-09
SAMPLE

Lab Sample ID: JU19A
LIMS ID: 06-15547
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 21:37
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 57 mg-dry-wt
Percent Moisture: 22.7%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	22	< 22 U
108-88-3	Toluene	22	< 22 U
100-41-4	Ethylbenzene	22	< 22 U
	m,p-Xylene	44	< 44 U
95-47-6	o-Xylene	22	< 22 U

BETX Surrogate Recovery	
Trifluorotoluene	84.9%
Bromobenzene	100%

BETX values reported in μg/kg (ppb)

0024

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-10
SAMPLE

Lab Sample ID: JU19B
LIMS ID: 06-15548
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 22:36
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 57 mg-dry-wt
Percent Moisture: 24.7%

CAS Number	**Analyte**	**RL**	**Result**
71-43-2	Benzene	22	< 22 U
108-88-3	Toluene	22	< 22 U
100-41-4	Ethylbenzene	22	< 22 U
	m,p-Xylene	44	< 44 U
95-47-6	o-Xylene	22	< 22 U

BETX Surrogate Recovery	
Trifluorotoluene	93.8%
Bromobenzene	105%

BETX values reported in μg/kg (ppb)

0025

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-11
SAMPLE

Lab Sample ID: JU19C
LIMS ID: 06-15549
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/24/06 22:26
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery

Trifluorotoluene	76.3%
Bromobenzene	83.2%

BETX values reported in μg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-12
SAMPLE

Lab Sample ID: JU19D
LIMS ID: 06-15550
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 23:06
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 12 mg-dry-wt
Percent Moisture: 25.0%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	100	< 100 U
108-88-3	**Toluene**	**100**	**43,000**
100-41-4	Ethylbenzene	100	< 100 U
	m,p-Xylene	200	< 200 U
95-47-6	o-Xylene	100	< 100 U

BETX Surrogate Recovery

Trifluorotoluene	90.0%
Bromobenzene	104%

BETX values reported in µg/kg (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-13
SAMPLE

Lab Sample ID: JU19E
LIMS ID: 06-15551
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 23:35
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 0.028 mg-dry-wt
Percent Moisture: 10.8%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	44,000	< 44,000 U
108-88-3	**Toluene**	**44,000**	**20,000,000**
100-41-4	Ethylbenzene	44,000	< 44,000 U
	m,p-Xylene	88,000	< 88,000 U
95-47-6	o-Xylene	44,000	< 44,000 U

BETX Surrogate Recovery

Trifluorotoluene	87.1%
Bromobenzene	100%

BETX values reported in μg/kg (ppb)

0028

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-14
SAMPLE

Lab Sample ID: JU19F
LIMS ID: 06-15552
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 17:42
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1000

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1,000	< 1,000 U
108-88-3	**Toluene**	**1,000**	**90,000**
100-41-4	Ethylbenzene	1,000	< 1,000 U
	m,p-Xylene	1,000	< 1,000 U
95-47-6	o-Xylene	1,000	< 1,000 U

BETX Surrogate Recovery	
Trifluorotoluene	87.3%
Bromobenzene	103%

BETX values reported in μg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-15
SAMPLE

Lab Sample ID: JU19G
LIMS ID: 06-15553
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/29/06 00:05
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 0.027 mg-dry-wt
Percent Moisture: 12.2%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	47,000	< 47,000 U
108-88-3	**Toluene**	**47,000**	**23,000,000**
100-41-4	Ethylbenzene	47,000	< 47,000 U
	m,p-Xylene	94,000	< 94,000 U
95-47-6	o-Xylene	47,000	< 47,000 U

BETX Surrogate Recovery	
Trifluorotoluene	88.4%
Bromobenzene	102%

BETX values reported in µg/kg (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-16
SAMPLE

Lab Sample ID: JU19H
LIMS ID: 06-15554
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/25/06 03:49
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 1.1 mg-dry-wt
Percent Moisture: 22.9%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1,100	< 1,100 U
108-88-3	**Toluene**	**1,100**	**440,000**
100-41-4	Ethylbenzene	1,100	< 1,100 U
	m,p-Xylene	2,200	< 2,200 U
95-47-6	o-Xylene	1,100	< 1,100 U

BETX Surrogate Recovery	
Trifluorotoluene	86.8%
Bromobenzene	101%

BETX values reported in µg/kg (ppb)

0031

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-17
SAMPLE

Lab Sample ID: JU19I
LIMS ID: 06-15555
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/29/06 01:33
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 0.12 mg-dry-wt
Percent Moisture: 24.5%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	10,000	< 10,000 U
108-88-3	**Toluene**	**10,000**	**5,600,000**
100-41-4	Ethylbenzene	10,000	< 10,000 U
	m,p-Xylene	21,000	< 21,000 U
95-47-6	o-Xylene	10,000	< 10,000 U

BETX Surrogate Recovery	
Trifluorotoluene	82.2%
Bromobenzene	100%

BETX values reported in µg/kg (ppb)

0032

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082406-18
SAMPLE

Lab Sample ID: JU19J
LIMS ID: 06-15556
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Date Analyzed: 08/28/06 20:39
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 250

CAS Number	Analyte	RL	Result
71-43-2	Benzene	250	< 250 U
108-88-3	**Toluene**	**250**	**32,000**
100-41-4	Ethylbenzene	250	< 250 U
	m,p-Xylene	250	< 250 U
95-47-6	o-Xylene	250	< 250 U

BETX Surrogate Recovery	
Trifluorotoluene	95.4%
Bromobenzene	106%

BETX values reported in μg/L (ppb)

0033

BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: JU19
Matrix: Water

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082406	86.9%	101%	0
LCS-082406	91.4%	101%	0
LCSD-082406	102%	105%	0
RP082406-11	76.3%	83.2%	0
RP082406-14	87.3%	103%	0
RP082406-18	95.4%	106%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(80-126)	(72-124)
(BBZ) = Bromobenzene	(81-119)	(79-119)

Log Number Range: 06-15549 to 06-15556

BETX SOIL SURROGATE RECOVERY SUMMARY

ARI Job: JU19
Matrix: Soil

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082406-09	84.9%	100%	0
RP082406-10	93.8%	105%	0
RP082406-12	90.0%	104%	0
RP082406-13	87.1%	100%	0
RP082406-15	88.4%	102%	0
MB-082406	91.3%	107%	0
LCS-082406	103%	101%	0
LCSD-082406	101%	103%	0
RP082406-16	86.8%	101%	0
RP082406-17	82.2%	100%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(82-128)	(53-147)
(BBZ) = Bromobenzene	(82-123)	(60-153)

Log Number Range: 06-15547 to 06-15555

ANALYTICAL
RESOURCES
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ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: RP082606-01
SAMPLE

Lab Sample ID: JU45A
LIMS ID: 06-15729
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/26/06

Date Analyzed: 08/26/06 20:28
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 93 mg-dry-wt
Percent Moisture: 20.2%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	14	< 14 U
108-88-3	Toluene	14	< 14 U
100-41-4	Ethylbenzene	14	< 14 U
	m,p-Xylene	27	< 27 U
95-47-6	o-Xylene	14	< 14 U

BETX Surrogate Recovery	
Trifluorotoluene	82.6%
Bromobenzene	96.9%

BETX values reported in µg/kg (ppb)

0036

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082606-02
SAMPLE

Lab Sample ID: JU45B
LIMS ID: 06-15730
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/26/06

Date Analyzed: 08/26/06 19:00
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	**Analyte**	**RL**	**Result**
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery

Trifluorotoluene	77.7%
Bromobenzene	99.1%

BETX values reported in µg/L (ppb)

0037

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: RP082606-03
SAMPLE

Lab Sample ID: JU45C
LIMS ID: 06-15731
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/26/06

Date Analyzed: 08/26/06 19:59
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 100 mg-dry-wt
Percent Moisture: 27.2%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	12	< 12 U
108-88-3	Toluene	12	< 12 U
100-41-4	Ethylbenzene	12	< 12 U
	m,p-Xylene	25	< 25 U
95-47-6	o-Xylene	12	< 12 U

BETX Surrogate Recovery

Trifluorotoluene	82.3%
Bromobenzene	99.1%

BETX values reported in µg/kg (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082606-04
SAMPLE

Lab Sample ID: JU45D
LIMS ID: 06-15732
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/26/06

Date Analyzed: 08/26/06 19:29
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery

Trifluorotoluene	90.2%
Bromobenzene	103%

BETX values reported in μg/L (ppb)

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: RP082606-05
SAMPLE

Lab Sample ID: JU45E
LIMS ID: 06-15733
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/26/06

Date Analyzed: 08/29/06 02:02
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 0.44 mg-dry-wt
Percent Moisture: 21.1%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	2,800	< 2,800 U
108-88-3	**Toluene**	**2,800**	**1,600,000**
100-41-4	Ethylbenzene	2,800	< 2,800 U
	m,p-Xylene	5,700	< 5,700 U
95-47-6	o-Xylene	2,800	< 2,800 U

BETX Surrogate Recovery	
Trifluorotoluene	87.6%
Bromobenzene	103%

BETX values reported in µg/kg (ppb)

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: RP082606-06
SAMPLE

Lab Sample ID: JU45F
LIMS ID: 06-15734
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/26/06

Date Analyzed: 08/28/06 16:43
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery

Trifluorotoluene	96.9%
Bromobenzene	104%

BETX values reported in µg/L (ppb)

BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: JU45
Matrix: Water

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082606	80.2%	93.2%	0
LCS-082606	105%	102%	0
LCSD-082606	95.6%	94.9%	0
RP082606-02	77.7%	99.1%	0
RP082606-04	90.2%	103%	0
RP082606-06	96.9%	104%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(80-126)	(72-124)
(BBZ) = Bromobenzene	(81-119)	(79-119)

Log Number Range: 06-15730 to 06-15734

BETX SOIL SURROGATE RECOVERY SUMMARY

ARI Job: JU45
Matrix: Soil

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082606	86.6%	106%	0
LCS-082606	106%	99.4%	0
LCSD-082606	101%	100%	0
RP082606-01	82.6%	96.9%	0
RP082606-01 MS	84.7%	94.8%	0
RP082606-01 MSD	93.3%	100%	0
RP082606-03	82.3%	99.1%	0
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082606-05	87.6%	103%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(82-128)	(53-147)
(BBZ) = Bromobenzene	(82-123)	(60-153)

Log Number Range: 06-15729 to 06-15733

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: RP082606-01
MATRIX SPIKE

Lab Sample ID: JU45A
LIMS ID: 06-15729
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/26/06

Date Analyzed MS: 08/27/06 00:53
MSD: 08/27/06 01:22
Instrument/Analyst MS: PID2/PKC
MSD: PID2/PKC

Purge Volume: 5.0 mL

Sample Amount MS: 93 mg-dry-wt
MSD: 93 mg-dry-wt

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Benzene	< 13.5 U	368	339	109%	410	339	121%	10.8%
Toluene	< 13.5 U	3140	2760	114%	3420	2760	124%	8.5%
Ethylbenzene	< 13.5 U	584	504	116%	622	504	123%	6.3%
m,p-Xylene	< 27.0 U	2110	1900	111%	2240	1900	118%	6.0%
o-Xylene	< 13.5 U	780	659	118%	825	659	125%	5.6%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	MS	MSD
Trifluorotoluene	84.7%	93.3%
Bromobenzene	94.8%	100%

0044

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: RP082606-07
SAMPLE

Lab Sample ID: JU46A
LIMS ID: 06-15735
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU46-Geomatrix
Project: Former Rhone Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/28/06

Date Analyzed: 08/29/06 02:32
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 75 mg-dry-wt
Percent Moisture: 23.9%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	33	< 33 U
108-88-3	Toluene	33	< 33 U
100-41-4	Ethylbenzene	33	< 33 U
	m,p-Xylene	67	< 67 U
95-47-6	o-Xylene	33	< 33 U

BETX Surrogate Recovery	
Trifluorotoluene	92.5%
Bromobenzene	107%

BETX values reported in μg/kg (ppb)

ANALYTICAL
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ORGANICS ANALYSIS DATA SHEET
BETX by Method EPA 602M
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Sample ID: RP082606-08
SAMPLE

Lab Sample ID: JU46B
LIMS ID: 06-15736
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU46-Geomatrix
Project: Former Rhone Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/28/06

Date Analyzed: 08/28/06 21:08
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery

Trifluorotoluene	88.7%
Bromobenzene	104%

BETX values reported in μg/L (ppb)

0046

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method EPA 602M
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Sample ID: RP082606-09
SAMPLE

Lab Sample ID: JU46C
LIMS ID: 06-15737
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU46-Geomatrix
Project: Former Rhone Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/28/06

Date Analyzed: 08/28/06 16:14
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery	
Trifluorotoluene	110%
Bromobenzene	107%

BETX values reported in μg/L (ppb)

0047

BETX SOIL SURROGATE RECOVERY SUMMARY

ARI Job: JU46
Matrix: Soil

QC Report No: JU46-Geomatrix
Project: Former Rhone Poulenc
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082606-07	92.5%	107%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(82-128)	(53-147)
(BBZ) = Bromobenzene	(82-123)	(60-153)

Log Number Range: 06-15735 to 06-15735

BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: JU46
Matrix: Water

QC Report No: JU46-Geomatrix
Project: Former Rhone Poulenc
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082606-08	88.7%	104%	0
RP082606-09	110%	107%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(80-126)	(72-124)
(BBZ) = Bromobenzene	(81-119)	(79-119)

Log Number Range: 06-15736 to 06-15737

FORM II BETX

ANALYTICAL
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INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: LCS-082406
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082406
LIMS ID: 06-15514
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/24/06 10:42
LCSD: 08/24/06 11:11
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 200 mg-dry-wt
LCSD: 200 mg-dry-wt

Analyte	**LCS**	**Spike Added-LCS**	**LCS Recovery**	**LCSD**	**Spike Added-LCSD**	**LCSD Recovery**	**RPD**
Benzene	196	205	95.6%	198	205	96.6%	1.0%
Toluene	1600	1670	95.8%	1600	1670	95.8%	0.0%
Ethylbenzene	304	305	99.7%	310	305	102%	2.0%
m,p-Xylene	1130	1140	99.1%	1140	1140	100%	0.9%
o-Xylene	410	398	103%	414	398	104%	1.0%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	**LCSD**
Trifluorotoluene	103%	101%
Bromobenzene	101%	103%

0050

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: LCS-082606
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082606
LIMS ID: 06-15520
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/26/06 14:20
LCSD: 08/26/06 14:49
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0 mL
LCSD: 1.0 mL

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	7.72	8.20	94.1%	7.22	8.20	88.0%	6.7%
Toluene	67.0	66.8	100%	58.9	66.8	88.2%	12.9%
Ethylbenzene	12.3	12.2	101%	10.7	12.2	87.7%	13.9%
m,p-Xylene	45.3	45.8	98.9%	39.1	45.8	85.4%	14.7%
o-Xylene	16.3	15.9	103%	14.3	15.9	89.9%	13.1%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	**LCSD**
Trifluorotoluene	105%	95.6%
Bromobenzene	102%	94.9%

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: LCS-082806
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082806
LIMS ID: 06-15513
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/28/06 13:15
LCSD: 08/28/06 13:44
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 100 mg-dry-wt
LCSD: 100 mg-dry-wt

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	383	410	93.4%	390	410	95.1%	1.8%
Toluene	3270	3340	97.9%	3230	3340	96.7%	1.2%
Ethylbenzene	609	610	99.8%	592	610	97.0%	2.8%
m,p-Xylene	2240	2290	97.8%	2190	2290	95.6%	2.3%
o-Xylene	797	795	100%	794	795	99.9%	0.4%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	**LCSD**
Trifluorotoluene	113%	109%
Bromobenzene	103%	102%

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-082406
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082406
LIMS ID: 06-15549
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/24/06 12:10
LCSD: 08/24/06 12:39
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0 mL
LCSD: 1.0 mL

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	6.40	8.20	78.0%	7.53	8.20	91.8%	16.2%
Toluene	56.4	66.8	84.4%	62.6	66.8	93.7%	10.4%
Ethylbenzene	11.0	12.2	90.2%	12.1	12.2	99.2%	9.5%
m,p-Xylene	40.6	45.8	88.6%	43.0	45.8	93.9%	5.7%
o-Xylene	14.7	15.9	92.5%	15.7	15.9	98.7%	6.6%

Reported in μg/L (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	91.4%	102%
Bromobenzene	101%	105%

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-082606
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082606
LIMS ID: 06-15729
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/26/06 11:47
LCSD: 08/26/06 12:16
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 200 mg-dry-wt
LCSD: 200 mg-dry-wt

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	197	205	96.1%	191	205	93.2%	3.1%
Toluene	1650	1670	98.8%	1610	1670	96.4%	2.5%
Ethylbenzene	295	305	96.7%	297	305	97.4%	0.7%
m,p-Xylene	1080	1140	94.7%	1060	1140	93.0%	1.9%
o-Xylene	398	398	100%	390	398	98.0%	2.0%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	106%	101%
Bromobenzene	99.4%	100%

0054

4

BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB082406W1

Lab Name: ANALYTICAL RESOURCES, INC Client: GEOMATRIX

SDG No.: JU16,JU19 Project No.: FRP

Date Analyzed : 08/24/06 Matrix: WATER

Time Analyzed : 1309 Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS082406W1	LCS082406W1	08/24/06
02	LCSD082406W1	LCSD082406W1	08/24/06
03	RP082406-11	JU19C	08/24/06
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FORM IV BETX/GAS

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: MB-082406
METHOD BLANK

Lab Sample ID: MB-082406
LIMS ID: 06-15549
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed: 08/24/06 13:09
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery	
Trifluorotoluene	86.9%
Bromobenzene	101%

BETX values reported in μg/L (ppb)

4

BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB082406S1

Lab Name: ANALYTICAL RESOURCES, INC   Client: GEOMATRIX

SDG No.: JU16,JU19   Project No.: FRP

Date Analyzed : 08/24/06   Matrix: SOIL

Time Analyzed : 1141   Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS082406S1	LCS082406S1	08/24/06
02	LCSD082406S1	LCSD082406S1	08/24/06
03	RP082406-16	JU19H	08/25/06
04	RP082406-06	JU16B	08/25/06
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ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: MB-082406
METHOD BLANK

Lab Sample ID: MB-082406
LIMS ID: 06-15514
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed: 08/24/06 11:41
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 200 mg-dry-wt

CAS Number	Analyte	RL	Result
71-43-2	Benzene	12	< 12 U
108-88-3	Toluene	12	< 12 U
100-41-4	Ethylbenzene	12	< 12 U
	m,p-Xylene	25	< 25 U
95-47-6	o-Xylene	12	< 12 U

BETX Surrogate Recovery	
Trifluorotoluene	91.3%
Bromobenzene	107%

BETX values reported in µg/kg (ppb)

0058

4

BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB0826W1

Lab Name: ANALYTICAL RESOURCES, INC

Client: GEOMATRIX

SDG No.: JU16,JU45

Project No.: FRP

Date Analyzed : 08/26/06

Matrix: WATER

Time Analyzed : 1518

Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS0826W1	LCS0826W1	08/26/06
02	LCSD0826W1	LCSD0826W1	08/26/06
03	RP082406-08	JU16H	08/26/06
04	RP082608-02	JU45B	08/26/06
05	RP082608-04	JU45D	08/26/06
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FORM IV BETX/GAS

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: MB-082606
METHOD BLANK

Lab Sample ID: MB-082606
LIMS ID: 06-15520
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed: 08/26/06 15:18
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery

Trifluorotoluene	80.2%
Bromobenzene	93.2%

BETX values reported in µg/L (ppb)

4

BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB082806S1

Lab Name: ANALYTICAL RESOURCES, INC   Client: GEOMATRIX

SDG No.: JU16,JU19,JU45,JU46   Project No.: FRP

Date Analyzed : 08/28/06   Matrix: SOIL

Time Analyzed : 1414   Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS082806S1	LCS082806S1	08/28/06
02	LCSD082706S1	LCSD082806S1	08/28/06
03	RP082606-09	JU46C	08/28/06
04	RP082608-06	JU45F	08/28/06
05	RP082406-03	JU16G	08/28/06
06	RP082406-14	JU19F	08/28/06
07	RP082406-11	JU19C	08/28/06
08	RP082406-07	JU16C	08/28/06
09	RP082406-04	JU16D	08/28/06
10	RP082406-18	JU19J	08/28/06
11	RP082606-08	JU46B	08/28/06
12	RP082406-09	JU19A	08/28/06
13	RP082406-05	JU16A	08/28/06
14	RP082406-10	JU19B	08/28/06
15	RP082406-12	JU19D	08/28/06
16	RP082406-13	JU19E	08/28/06
17	RP082406-15	JU19G	08/29/06
18	RP082406-17	JU19I	08/29/06
19	RP082608-05	JU45E	08/29/06
20	RP082606-07	JU46A	08/29/06
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FORM IV BETX/GAS

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: MB-082806
METHOD BLANK

Lab Sample ID: MB-082806
LIMS ID: 06-15513
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed: 08/28/06 14:14
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 100 mg-dry-wt

CAS Number	Analyte	RL	Result
71-43-2	Benzene	25	< 25 U
108-88-3	Toluene	25	< 25 U
100-41-4	Ethylbenzene	25	< 25 U
	m,p-Xylene	50	< 50 U
95-47-6	o-Xylene	25	< 25 U

BETX Surrogate Recovery	
Trifluorotoluene	83.0%
Bromobenzene	94.6%

BETX values reported in $\mu g/kg$ (ppb)

BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB0826S1

Lab Name: ANALYTICAL RESOURCES, INC

Client: GEOMATRIX

SDG No.: JU16,JU45

Project No.: FRP

Date Analyzed : 08/26/06

Matrix: SOIL

Time Analyzed : 1246

Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS0826S1	LCS0826S1	08/26/06
02	JLSD0826S1	LCSD0826S1	08/26/06
03	RP082608-03	JU45C	08/26/06
04	RP082608-01	JU45A	08/26/06
05	RP082608-01	JU45AMS	08/27/06
06	RP082608-01	JU45AMSD	08/27/06
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ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: MB-082606
METHOD BLANK

Lab Sample ID: MB-082606
LIMS ID: 06-15729
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed: 08/26/06 12:46
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Sample Amount: 200 mg-dry-wt

CAS Number	Analyte	RL	Result
71-43-2	Benzene	12	< 12 U
108-88-3	Toluene	12	< 12 U
100-41-4	Ethylbenzene	12	< 12 U
	m,p-Xylene	25	< 25 U
95-47-6	o-Xylene	12	< 12 U

BETX Surrogate Recovery

Trifluorotoluene	86.6%
Bromobenzene	106%

BETX values reported in μg/kg (ppb)

GENERAL CHEMISTRY

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Client ID: RP082406-05
ARI ID: 06-15513 JU16A

Analyte	Date	Method	Units	RL	Sample
Total Solids	08/25/06 082506#1	EPA 160.3	Percent	0.01	75.90
Total Organic Carbon	08/28/06 082806#1	Plumb,1981	Percent	0.020	0.256

RL	Analytical reporting limit
U	Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
JU16-Geomatrix Consultants

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Analyte	Date	Units	Blank
Total Solids	08/25/06	Percent	< 0.01 U
Total Organic Carbon	08/28/06	Percent	< 0.020 U

LAB CONTROL RESULTS-CONVENTIONALS
JU16-Geomatrix Consultants

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Analyte	Date	Units	LCS	Spike Added	Recovery
Total Organic Carbon	08/28/06	Percent	0.500	0.500	100.0%

STANDARD REFERENCE RESULTS-CONVENTIONALS
JU16-Geomatrix Consultants

ANALYTICAL
RESOURCES
INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Date	Units	SRM	True Value	Recovery
Total Organic Carbon NIST #8704	08/28/06	Percent	3.22	3.35	96.1%

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Analyte	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: JU16A Client ID: RP082406-05					
Total Solids	08/25/06	Percent	75.90	76.30 76.20	0.3%
Total Organic Carbon	08/28/06	Percent	0.256	0.250 0.273	4.6%

MS/MSD RESULTS-CONVENTIONALS
JU16-Geomatrix Consultants

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Analyte	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: JU16A Client ID: RP082406-05						
Total Organic Carbon	08/28/06	Percent	0.256	0.878	0.590	105.4%

SAMPLE RESULTS-CONVENTIONALS
JU19-Geomatrix Consultants

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: 08/24/06
Date Received: 08/24/06

Client ID: RP082406-16
ARI ID: 06-15554 JU19H

Analyte	Date	Method	Units	RL	Sample
Total Solids	08/25/06 082506#1	EPA 160.3	Percent	0.01	74.40
Total Organic Carbon	08/28/06 082806#1	Plumb,1981	Percent	0.020	0.358

RL	Analytical reporting limit
U	Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
JU19-Geomatrix Consultants

ANALYTICAL
RESOURCES
INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Analyte	Date	Units	Blank
Total Solids	08/25/06	Percent	< 0.01 U
Total Organic Carbon	08/28/06	Percent	< 0.020 U

LAB CONTROL RESULTS-CONVENTIONALS
JU19-Geomatrix Consultants

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Analyte	Date	Units	LCS	Spike Added	Recovery
Total Organic Carbon	08/28/06	Percent	0.500	0.500	100.0%

STANDARD REFERENCE RESULTS-CONVENTIONALS
JU19-Geomatrix Consultants

ANALYTICAL
RESOURCES
INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 08/29/06

Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Date	Units	SRM	True Value	Recovery
Total Organic Carbon NIST #8704	08/28/06	Percent	3.22	3.35	96.1%

Laboratory Data Package

Prepared
for

Geomatrix Consultants

Project: FRP , 8769.006

ARI Job Nos.:JU16, JU19, JU45 & JU46

Prepared
By

Analytical Resources, Inc.

ARI Data Reporting Qualifiers

Effective 11/22/04

Inorganic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Duplicate RPD is not within established control limits
B	Reported value is less than the CRDL but ≥ the Reporting Limit
N	Matrix Spike recovery not within established control limits
NA	Not Applicable, analyte not spiked
H	The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
L	Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Flagged value is not within established control limits
B	Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
J	Estimated concentration when the value is less than ARI's established reporting limits
D	The spiked compound was not detected due to sample extract dilution
NR	Spiked compound recovery is not reported due to chromatographic interference
E	Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
S	Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
NA	The flagged analyte was not analyzed for
NS	The flagged analyte was not spiked into the sample
M	Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
Y	The analyte reporting limit is raised due to a positive chromatographic interference. The compound is not detected above the raised limit but may be present at or below the limit
C	The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
P	The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

TOTAL SOLIDS

BETX/TPHG Total Solids-betxts
Data By: Joshua G. Rains
Created: 8/25/06

Worklist: 4495
Analyst: JGR
Comments:

ARI ID	Tare Wt (g)	Wet Wt (g)	Dry Wt (g)	% Solids
1. JU16A 06-15513	13.7	19.09	17.74	75.1
2. JU16B 06-15514	13.7	19.30	18.11	78.6
3. JU19A 06-15547	13.8	19.43	18.15	77.3
4. JU19B 06-15548	13.7	19.66	18.20	75.3
5. JU19D 06-15550	13.8	19.96	18.41	75.0
6. JU19E 06-15551	13.7	18.61	18.08	89.2
7. JU19G 06-15553	13.8	20.23	19.44	87.8
8. JU19H 06-15554	13.8	21.21	19.51	77.1
9. JU19I 06-15555	13.7	20.71	19.00	75.5

* - BETX TS Copied From VOA TS
% - BETX TS Copied From Metals TS
$ - BETX TS Copied From Extraction TS

BETX/TPHG Total Solids-betxts
Data By: Paul K. Campbell
Created: 8/29/06

Worklist: 5882
Analyst: PKC
Comments:

ARI ID	Tare Wt (g)	Wet Wt (g)	Dry Wt (g)	% Solids
1. JU45A 06-15729	1.11	13.10	10.68	79.8
2. JU45C 06-15731	1.08	15.04	11.24	72.8
3. JU45E 06-15733	1.12	8.17	6.68	78.9

* - BETX TS Copied From VOA TS
% - BETX TS Copied From Metals TS
$ - BETX TS Copied From Extraction TS

BETX/TPHG Total Solids-betxts
Data By: Paul K. Campbell
Created: 8/29/06

Worklist: 5948
Analyst: PKC
Comments:

ARI ID	Tare Wt (g)	Wet Wt (g)	Dry Wt (g)	% Solids
1. JU46A 06-15735	1.10	10.52	8.27	76.1

Worklist ID: 5948 Page: 1
* - BETX TS Copied From VOA TS
% - BETX TS Copied From Metals TS
$ - BETX TS Copied From Extraction TS

BETX Analysis
QC Summary Data

Prepared
for

Geomatrix Consultants

Project: FRP , 8769.006

ARI Job Nos.:JU16, JU19, JU45 & JU46

Prepared
By

Analytical Resources, Inc.

BETX SOIL SURROGATE RECOVERY SUMMARY

ARI Job: JU16
Matrix: Soil

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082406-05	91.3%	103%	0
MB-082406	91.3%	107%	0
LCS-082406	103%	101%	0
LCSD-082406	101%	103%	0
RP082406-06	91.4%	106%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(82-128)	(53-147)
(BBZ) = Bromobenzene	(82-123)	(60-153)

Log Number Range: 06-15513 to 06-15514

BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: JU16
Matrix: Water

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
RP082406-07	85.8%	103%	0
RP082406-04	90.8%	103%	0
RP082406-03	90.5%	104%	0
MB-082606	80.2%	93.2%	0
LCS-082606	105%	102%	0
LCSD-082606	95.6%	94.9%	0
RP082406-08	88.4%	98.3%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(80-126)	(72-124)
(BBZ) = Bromobenzene	(81-119)	(79-119)

Log Number Range: 06-15515 to 06-15520

BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: JU19
Matrix: Water

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082406	86.9%	101%	0
LCS-082406	91.4%	101%	0
LCSD-082406	102%	105%	0
RP082406-11	76.3%	83.2%	0
RP082406-14	87.3%	103%	0
RP082406-18	95.4%	106%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(80-126)	(72-124)
(BBZ) = Bromobenzene	(81-119)	(79-119)

Log Number Range: 06-15549 to 06-15556

BETX SOIL SURROGATE RECOVERY SUMMARY

ARI Job: JU19
Matrix: Soil

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082406-09	84.9%	100%	0
RP082406-10	93.8%	105%	0
RP082406-12	90.0%	104%	0
RP082406-13	87.1%	100%	0
RP082406-15	88.4%	102%	0
MB-082406	91.3%	107%	0
LCS-082406	103%	101%	0
LCSD-082406	101%	103%	0
RP082406-16	86.8%	101%	0
RP082406-17	82.2%	100%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(82-128)	(53-147)
(BBZ) = Bromobenzene	(82-123)	(60-153)

Log Number Range: 06-15547 to 06-15555

BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: JU45
Matrix: Water

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082606	80.2%	93.2%	0
LCS-082606	105%	102%	0
LCSD-082606	95.6%	94.9%	0
RP082606-02	77.7%	99.1%	0
RP082606-04	90.2%	103%	0
RP082606-06	96.9%	104%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(80-126)	(72-124)
(BBZ) = Bromobenzene	(81-119)	(79-119)

Log Number Range: 06-15730 to 06-15734

BETX SOIL SURROGATE RECOVERY SUMMARY

ARI Job: JU45
Matrix: Soil

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082606	86.6%	106%	0
LCS-082606	106%	99.4%	0
LCSD-082606	101%	100%	0
RP082606-01	82.6%	96.9%	0
RP082606-01 MS	84.7%	94.8%	0
RP082606-01 MSD	93.3%	100%	0
RP082606-03	82.3%	99.1%	0
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082606-05	87.6%	103%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(82-128)	(53-147)
(BBZ) = Bromobenzene	(82-123)	(60-153)

Log Number Range: 06-15729 to 06-15733

BETX SOIL SURROGATE RECOVERY SUMMARY

ARI Job: JU46
Matrix: Soil

QC Report No: JU46-Geomatrix
Project: Former Rhone Poulenc
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082606-07	92.5%	107%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(82-128)	(53-147)
(BBZ) = Bromobenzene	(82-123)	(60-153)

Log Number Range: 06-15735 to 06-15735

BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: JU46
Matrix: Water

QC Report No: JU46-Geomatrix
Project: Former Rhone Poulenc
Event: 8769.006

Client ID	TFT	BBZ	TOT OUT
MB-082806	83.0%	94.6%	0
LCS-082806	113%	103%	0
LCSD-082806	109%	102%	0
RP082606-08	88.7%	104%	0
RP082606-09	110%	107%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(80-126)	(72-124)
(BBZ) = Bromobenzene	(81-119)	(79-119)

Log Number Range: 06-15736 to 06-15737

FORM II BETX

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: RP082606-01
MATRIX SPIKE

Lab Sample ID: JU45A
LIMS ID: 06-15729
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: 08/26/06
Date Received: 08/26/06

Date Analyzed MS: 08/27/06 00:53
MSD: 08/27/06 01:22
Instrument/Analyst MS: PID2/PKC
MSD: PID2/PKC

Purge Volume: 5.0 mL

Sample Amount MS: 93 mg-dry-wt
MSD: 93 mg-dry-wt

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Benzene	< 13.5 U	368	339	109%	410	339	121%	10.8%
Toluene	< 13.5 U	3140	2760	114%	3420	2760	124%	8.5%
Ethylbenzene	< 13.5 U	584	504	116%	622	504	123%	6.3%
m,p-Xylene	< 27.0 U	2110	1900	111%	2240	1900	118%	6.0%
o-Xylene	< 13.5 U	780	659	118%	825	659	125%	5.6%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	MS	MSD
Trifluorotoluene	84.7%	93.3%
Bromobenzene	94.8%	100%

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-082406
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082406
LIMS ID: 06-15514
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/24/06 10:42
LCSD: 08/24/06 11:11
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 200 mg-dry-wt
LCSD: 200 mg-dry-wt

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	196	205	95.6%	198	205	96.6%	1.0%
Toluene	1600	1670	95.8%	1600	1670	95.8%	0.0%
Ethylbenzene	304	305	99.7%	310	305	102%	2.0%
m,p-Xylene	1130	1140	99.1%	1140	1140	100%	0.9%
o-Xylene	410	398	103%	414	398	104%	1.0%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	**LCSD**
Trifluorotoluene	103%	101%
Bromobenzene	101%	103%

ANALYTICAL
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INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-082406
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082406
LIMS ID: 06-15549
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU19-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/24/06 12:10
LCSD: 08/24/06 12:39
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0 mL
LCSD: 1.0 mL

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	6.40	8.20	78.0%	7.53	8.20	91.8%	16.2%
Toluene	56.4	66.8	84.4%	62.6	66.8	93.7%	10.4%
Ethylbenzene	11.0	12.2	90.2%	12.1	12.2	99.2%	9.5%
m,p-Xylene	40.6	45.8	88.6%	43.0	45.8	93.9%	5.7%
o-Xylene	14.7	15.9	92.5%	15.7	15.9	98.7%	6.6%

Reported in $\mu g/L$ (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	91.4%	102%
Bromobenzene	101%	105%

0093

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-082606
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082606
LIMS ID: 06-15729
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU45-Geomatrix Consultants
Project: Former Phone-Poulenc
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/26/06 11:47
LCSD: 08/26/06 12:16
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 200 mg-dry-wt
LCSD: 200 mg-dry-wt

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	197	205	96.1%	191	205	93.2%	3.1%
Toluene	1650	1670	98.8%	1610	1670	96.4%	2.5%
Ethylbenzene	295	305	96.7%	297	305	97.4%	0.7%
m,p-Xylene	1080	1140	94.7%	1060	1140	93.0%	1.9%
o-Xylene	398	398	100%	390	398	98.0%	2.0%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	106%	101%
Bromobenzene	99.4%	100%

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ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: LCS-082606
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082606
LIMS ID: 06-15520
Matrix: Water
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/26/06 14:20
LCSD: 08/26/06 14:49
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0 mL
LCSD: 1.0 mL

Analyte	**LCS**	**Spike Added-LCS**	**LCS Recovery**	**LCSD**	**Spike Added-LCSD**	**LCSD Recovery**	**RPD**
Benzene	7.72	8.20	94.1%	7.22	8.20	88.0%	6.7%
Toluene	67.0	66.8	100%	58.9	66.8	88.2%	12.9%
Ethylbenzene	12.3	12.2	101%	10.7	12.2	87.7%	13.9%
m,p-Xylene	45.3	45.8	98.9%	39.1	45.8	85.4%	14.7%
o-Xylene	16.3	15.9	103%	14.3	15.9	89.9%	13.1%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	**LCSD**
Trifluorotoluene	105%	95.6%
Bromobenzene	102%	94.9%

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ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
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Sample ID: LCS-082806
LAB CONTROL SAMPLE

Lab Sample ID: LCS-082806
LIMS ID: 06-15513
Matrix: Soil
Data Release Authorized:
Reported: 09/01/06

QC Report No: JU16-Geomatrix Consultants
Project: FRP
Event: 8769.006
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 08/28/06 13:15
LCSD: 08/28/06 13:44
Instrument/Analyst LCS: PID2/PKC
LCSD: PID2/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 100 mg-dry-wt
LCSD: 100 mg-dry-wt

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	383	410	93.4%	390	410	95.1%	1.8%
Toluene	3270	3340	97.9%	3230	3340	96.7%	1.2%
Ethylbenzene	609	610	99.8%	592	610	97.0%	2.8%
m,p-Xylene	2240	2290	97.8%	2190	2290	95.6%	2.3%
o-Xylene	797	795	100%	794	795	99.9%	0.4%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	113%	109%
Bromobenzene	103%	102%

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BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB082406W1

Lab Name: ANALYTICAL RESOURCES, INC   Client: GEOMATRIX

SDG No.: JU16,JU19   Project No.: FRP

Date Analyzed : 08/24/06   Matrix: WATER

Time Analyzed : 1309   Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS082406W1	LCS082406W1	08/24/06
02	LCSD082406W1	LCSD082406W1	08/24/06
03	RP082406-11	JU19C	08/24/06
04			
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BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB082406S1

Lab Name: ANALYTICAL RESOURCES, INC

Client: GEOMATRIX

SDG No.: JU16,JU19

Project No.: FRP

Date Analyzed : 08/24/06

Matrix: SOIL

Time Analyzed : 1141

Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS082406S1	LCS082406S1	08/24/06
02	LCSD082406S1	LCSD082406S1	08/24/06
03	RP082406-16	JU19H	08/25/06
04	RP082406-06	JU16B	08/25/06
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FORM IV BETX/GAS

BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB0826W1

Lab Name: ANALYTICAL RESOURCES, INC Client: GEOMATRIX

SDG No.: JU16,JU45 Project No.: FRP

Date Analyzed : 08/26/06 Matrix: WATER

Time Analyzed : 1518 Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS0826W1	LCS0826W1	08/26/06
02	LCSD0826W1	LCSD0826W1	08/26/06
03	RP082406-08	JU16H	08/26/06
04	RP082608-02	JU45B	08/26/06
05	RP082608-04	JU45D	08/26/06
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BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB082806S1

Lab Name: ANALYTICAL RESOURCES, INC Client: GEOMATRIX

SDG No.: JU16,JU19,JU45,JU46 Project No.: FRP

Date Analyzed : 08/28/06 Matrix: SOIL

Time Analyzed : 1414 Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS082806S1	LCS082806S1	08/28/06
02	LCSD082706S1	LCSD082806S1	08/28/06
03	RP082606-09	JU46C	08/28/06
04	RP082608-06	JU45F	08/28/06
05	RP082406-03	JU16G	08/28/06
06	RP082406-14	JU19F	08/28/06
07	RP082406-11	JU19C	08/28/06
08	RP082406-07	JU16C	08/28/06
09	RP082406-04	JU16D	08/28/06
10	RP082406-18	JU19J	08/28/06
11	RP082606-08	JU46B	08/28/06
12	RP082406-09	JU19A	08/28/06
13	RP082406-05	JU16A	08/28/06
14	RP082406-10	JU19B	08/28/06
15	RP082406-12	JU19D	08/28/06
16	RP082406-13	JU19E	08/28/06
17	RP082406-15	JU19G	08/29/06
18	RP082406-17	JU19I	08/29/06
19	RP082608-05	JU45E	08/29/06
20	RP082606-07	JU46A	08/29/06
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FORM IV BETX/GAS

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BETX/GAS METHOD BLANK SUMMARY

BLANK NO.

MB0826S1

Lab Name: ANALYTICAL RESOURCES, INC   Client: GEOMATRIX

SDG No.: JU16,JU45   Project No.: FRP

Date Analyzed : 08/26/06   Matrix: SOIL

Time Analyzed : 1246   Instrument ID : PID2

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, and MSD:

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED
01	LCS0826S1	LCS0826S1	08/26/06
02	JLSD0826S1	LCSD0826S1	08/26/06
03	RP082608-03	JU45C	08/26/06
04	RP082608-01	JU45A	08/26/06
05	RP082608-01	JU45AMS	08/27/06
06	RP082608-01	JU45AMSD	08/27/06
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BETX/GAS ANALYTICAL SEQUENCE

Lab Name: ANALYTICAL RESOURCES, INC
Client: GEOMATRIX
SDG No.: JU16,JU19,JU45,JU46
Project: FRP
Instrument ID: PID2
GC Detector: RTX 502-2 PID
Run Date: 07/27/06

THE ANALYTICAL SEQUENCE OF BLANKS, SAMPLES, AND STANDARDS, IS GIVEN BELOW:

METHOD SURROGATE RT
S1 : 6.44 S2 : 14.56

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01	ZZZZZ	ZZZZZ	07/27/06	0953	6.47	14.56
02	ZZZZZ	ZZZZZ	07/27/06	1022		
03	ZZZZZ	ZZZZZ	07/27/06	1051		
04	BTEX .25	BTEX .25	07/27/06	1121	6.41	14.55
05	BTEX .5	BTEX .5	07/27/06	1150	6.41	14.54
06	BTEX 5	BTEX 5	07/27/06	1220	6.42	14.55
07	BTEX 25	BTEX 25	07/27/06	1249	6.43	14.55
08	BTEX 100	BTEX 100	07/27/06	1319	6.44	14.55
09	BTEX 200	BTEX 200	07/27/06	1348	6.44	14.56
10	BTEX ICV	BTEX ICV	07/27/06	1417	6.43	14.56

		QC LIMITS
S1	= TFT(Surr)	(+/- 0.07 MINUTES)
S2	= BB(Surr)	(+/- 0.07 MINUTES)

* Values outside of QC limits.

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BETX/GAS ANALYTICAL SEQUENCE

Lab Name: ANALYTICAL RESOURCES, INC   Client: GEOMATRIX

SDG No.: JU16,JU19   Project: FRP

Instrument ID: PID2   GC Detector: RTX 502-2 PID

Run Date: 08/24/06

THE ANALYTICAL SEQUENCE OF BLANKS, SAMPLES, AND STANDARDS, IS GIVEN BELOW:

METHOD SURROGATE RT
S1 : 6.43   S2 : 14.54

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT	#	S2 RT	#
01	ZZZZZ	ZZZZZ	08/24/06	0914	6.43		14.56	
02	RT0824+BCAL	RT0824+BCAL	08/24/06	0943	6.43		14.56	
03	ZZZZZ	ZZZZZ	08/24/06	1012	6.45		14.56	
04	LCS082406S1	LCS082406S1	08/24/06	1042	6.43		14.55	
05	LCSD082406S1	LCSD082406S1	08/24/06	1111	6.43		14.54	
06	MB082406S1	MB082406S1	08/24/06	1141	6.42		14.55	
07	LCS082406W1	LCS082406W1	08/24/06	1210	6.45		14.56	
08	LCSD082406W1	LCSD082406W1	08/24/06	1239	6.43		14.55	
09	MB082406W1	MB082406W1	08/24/06	1309	6.42		14.55	
10	ZZZZZ	ZZZZZ	08/24/06	1900	6.43		14.56	
11	ZZZZZ	ZZZZZ	08/24/06	1929	6.46		14.57	
12	ZZZZZ	ZZZZZ	08/24/06	1958	6.44		14.55	
13	ZZZZZ	ZZZZZ	08/24/06	2028	6.42		14.55	
14	BCAL 2	BCAL2	08/24/06	2057	6.42		14.54	
15	ZZZZZ	ZZZZZ	08/24/06	2127	6.44		14.55	
16	ZZZZZ	ZZZZZ	08/24/06	2156	6.43		14.55	
17	RP082406-11	JU19C	08/24/06	2226	6.41		14.54	
18	ZZZZZ	ZZZZZ	08/24/06	2255	6.44		14.55	
19	ZZZZZ	ZZZZZ	08/24/06	2324	6.48		14.55	
20	ZZZZZ	ZZZZZ	08/24/06	2354	6.42		14.55	
21	ZZZZZ	ZZZZZ	08/25/06	0023	6.42		14.55	
22	ZZZZZ	ZZZZZ	08/25/06	0053	6.42		14.54	
23	ZZZZZ	ZZZZZ	08/25/06	0122	6.47		14.55	
24	ZZZZZ	ZZZZZ	08/25/06	0152	6.45		14.54	
25	ZZZZZ	ZZZZZ	08/25/06	0221	6.43		14.54	
26	BCAL 3	BCAL3	08/25/06	0250	6.43		14.55	
27	ZZZZZ	ZZZZZ	08/25/06	0320	6.43		14.55	
28	RP082406-16	JU19H	08/25/06	0349	6.43		14.54	
29	ZZZZZ	ZZZZZ	08/25/06	0419	6.44		14.54	
30	ZZZZZ	ZZZZZ	08/25/06	0448	6.43		14.54	
31	RP082406-06	JU16B	08/25/06	0518	6.41		14.53	
32	ZZZZZ	ZZZZZ	08/25/06	0547	6.42		14.55	

		QC LIMITS
S1	= TFT(Surr)	(+/- 0.07 MINUTES)
S2	= BB(Surr)	(+/- 0.07 MINUTES)

* Values outside of QC limits.

8

BETX/GAS ANALYTICAL SEQUENCE

Lab Name: ANALYTICAL RESOURCES, INC

Client: GEOMATRIX

SDG No.: JU16,JU19

Project: FRP

Instrument ID: PID2

GC Detector: RTX 502-2 PID

Run Date: 08/25/06

THE ANALYTICAL SEQUENCE OF BLANKS, SAMPLES, AND STANDARDS, IS GIVEN BELOW:

METHOD SURROGATE RT
S1 : 6.43 S2 : 14.54

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01	BCAL 4	BCAL4	08/25/06	0617	6.43	14.54

		QC LIMITS
S1	= TFT(Surr)	(+/- 0.07 MINUTES)
S2	= BB(Surr)	(+/- 0.07 MINUTES)

* Values outside of QC limits.

8
BETX/GAS ANALYTICAL SEQUENCE

Lab Name: ANALYTICAL RESOURCES, INC　　Client: GEOMATRIX

SDG No.: JU16,JU45　　Project: FRP

Instrument ID: PID2　　GC Detector: RTX 502-2 PID

Run Date: 08/26/06

THE ANALYTICAL SEQUENCE OF BLANKS, SAMPLES, AND STANDARDS, IS GIVEN BELOW:

METHOD SURROGATE RT
S1 : 6.43　　S2 : 14.56

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01	ZZZZZ	ZZZZZ	08/26/06	1019	6.43	14.56
02	RT0826+BCAL	RT0826+BCAL	08/26/06	1048	6.43	14.56
03	ZZZZZ	ZZZZZ	08/26/06	1117	6.44	14.56
04	LCS0826S1	LCS0826S1	08/26/06	1147	6.43	14.55
05	JLSD0826S1	LCSD0826S1	08/26/06	1216	6.44	14.56
06	MB0826S1	MB0826S1	08/26/06	1246	6.42	14.55
07	LCS0826W1	LCS0826W1	08/26/06	1420	6.46	14.57
08	LCSD0826W1	LCSD0826W1	08/26/06	1449	6.44	14.56
09	MB0826W1	MB0826W1	08/26/06	1518	6.42	14.56
10	ZZZZZ	ZZZZZ	08/26/06	1633		14.56
11	RP082406-08	JU16H	08/26/06	1702	6.42	14.56
12	ZZZZZ	ZZZZZ	08/26/06	1732	6.42	14.56
13	BCAL 2	BCAL2	08/26/06	1801	6.44	14.56
14	ZZZZZ	ZZZZZ	08/26/06	1830	6.44	14.56
15	RP082608-02	JU45B	08/26/06	1900	6.43	14.56
16	RP082608-04	JU45D	08/26/06	1929	6.43	14.55
17	RP082608-03	JU45C	08/26/06	1959	6.42	14.56
18	RP082608-01	JU45A	08/26/06	2028	6.42	14.55
19	ZZZZZ	ZZZZZ	08/26/06	2057	6.43	14.56
20	ZZZZZ	ZZZZZ	08/26/06	2127	6.42	14.56
21	ZZZZZ	ZZZZZ	08/26/06	2156	6.42	14.56
22	ZZZZZ	ZZZZZ	08/26/06	2225	6.42	14.54
23	ZZZZZ	ZZZZZ	08/26/06	2255	6.43	14.55
24	ZZZZZ	ZZZZZ	08/26/06	2324	6.43	14.55
25	BCAL 3	BCAL3	08/26/06	2354	6.43	14.55
26	ZZZZZ	ZZZZZ	08/27/06	0023	6.44	14.54
27	RP082608-01	JU45AMS	08/27/06	0053	6.44	14.55
28	RP082608-01	JU45AMSD	08/27/06	0122	6.43	14.54
29	ZZZZZ	ZZZZZ	08/27/06	0151	6.41	14.54
30	BCAL 4	BCAL4	08/27/06	0221	6.43	14.55
31	GCAL 4	GCAL4	08/27/06	0250	6.45	14.54

		QC LIMITS
S1	= TFT(Surr)	(+/- 0.07 MINUTES)
S2	= BB(Surr)	(+/- 0.07 MINUTES)

* Values outside of QC limits.

FORM VIII-2 BETX

BETX/GAS ANALYTICAL SEQUENCE

Lab Name: ANALYTICAL RESOURCES, INC Client: GEOMATRIX

SDG No.: JU16,JU19,JU45,JU46 Project: FRP

Instrument ID: PID2 GC Detector: RTX 502-2 PID

Run Date: 08/28/06

THE ANALYTICAL SEQUENCE OF BLANKS, SAMPLES, AND STANDARDS, IS GIVEN BELOW:

METHOD SURROGATE RT
S1 : 6.43 S2 : 14.56

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01	ZZZZZ	ZZZZZ	08/28/06	1103		14.56
02	RT0828+BCAL	RT0828+BCAL	08/28/06	1133	6.43	14.56
03	ZZZZZ	ZZZZZ	08/28/06	1202	6.44	14.56
04	LCS082806S1	LCS082806S1	08/28/06	1315	6.45	14.56
05	LCSD082706S1	LCSD082806S1	08/28/06	1344	6.44	14.57
06	MB082806S1	MB082806S1	08/28/06	1414	6.42	14.56
07	RP082606-09	JU46C	08/28/06	1614	6.44	14.57
08	RP082608-06	JU45F	08/28/06	1643	6.42	14.56
09	RP082406-03	JU16G	08/28/06	1713	6.44	14.56
10	RP082406-14	JU19F	08/28/06	1742	6.44	14.56
11	RP082406-11	JU19C	08/28/06	1811	6.42	14.56
12	RP082406-07	JU16C	08/28/06	1841	6.43	14.56
13	ZZZZZ	ZZZZZ	08/28/06	1910		14.55
14	BCAL 2	BCAL 2	08/28/06	1940	6.43	14.55
15	RP082406-04	JU16D	08/28/06	2009	6.43	14.56
16	RP082406-18	JU19J	08/28/06	2039	6.43	14.56
17	RP082606-08	JU46B	08/28/06	2108	6.42	14.56
18	RP082406-09	JU19A	08/28/06	2137	6.42	14.55
19	RP082406-05	JU16A	08/28/06	2207	6.42	14.56
20	RP082406-10	JU19B	08/28/06	2236	6.43	14.55
21	RP082406-12	JU19D	08/28/06	2306	6.43	14.54
22	RP082406-13	JU19E	08/28/06	2335	6.43	14.54
23	RP082406-15	JU19G	08/29/06	0005	6.44	14.55
24	ZZZZZ	ZZZZZ	08/29/06	0034		14.54
25	BCAL 3	BCAL 3	08/29/06	0104	6.43	14.54
26	RP082406-17	JU19I	08/29/06	0133	6.43	14.54
27	RP082608-05	JU45E	08/29/06	0202	6.43	14.54
28	RP082606-07	JU46A	08/29/06	0232	6.42	14.55
29	ZZZZZ	ZZZZZ	08/29/06	0301		14.53
30	ZZZZZ	ZZZZZ	08/29/06	0331	6.43	14.54
31	RT0829+BCAL	RT0829+BCAL	08/29/06	0853	6.44	14.57

		QC LIMITS
S1	= TFT(Surr)	(+/- 0.07 MINUTES)
S2	= BB(Surr)	(+/- 0.07 MINUTES)

* Values outside of QC limits.

page 1 of 1

FORM VIII-2 BETX

Memorandum

TO:	John Long	**DATE:**	November 10, 2006
FROM:	Crystal Neirby	**PROJ. NO.:**	8769
CC:	Project File	**PROJ. NAME:**	Former Rhone-Poulenc Site

SUBJECT: **October 2006 – Soil and Groundwater Sampling Data Quality Review – SDG KA96**

This memorandum presents a summary data quality review of three soil samples, one groundwater sample, and one trip blank collected on October 13, 2006. The samples were submitted to Analytical Resources, Inc. (ARI), a Washington State Department of Ecology (Ecology)-accredited laboratory, located in Tukwila, Washington. The samples were analyzed for the following organic analyses:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8021B

The analyses were performed in general accordance with methods specified in Environmental Protection Agency's (EPA) *Test Methods for Evaluating Solid Waste (SW-846), January 1995*, and associated revisions.

The samples and the analyses conducted on the samples are listed in the table below.

Sample ID	Laboratory Sample ID	Requested Analyses
GMX-15-14.0	KA96A	BTEX
GMX-15-GW	KA96D	BTEX
GMX-16-10.5	KA96B	BTEX
TB-101306	KA96E	BTEX
GMX-19-14.8	KA96C	BTEX

Upon receipt by ARI, the sample jar information was compared to the chain-of-custody. Discrepancies were noted by ARI and addressed with Geomatrix personnel prior to sample analyses. The temperature of the cooler was recorded as part of the check-in procedure. The cooler temperature was 8.5°C, outside the acceptable range of 4 +/- 2 °C. The samples were submitted to the laboratory within approximately one hour of collection; therefore, the temperature of the cooler likely reflects ambient sampling conditions. Results were not qualified based on the temperature of the cooler.

Data review is based on method performance criteria and quality control (QC) criteria as documented in the Quality Assurance Project Plan (QAPP), *Interim Measures Performance*

Monitoring Plan, September 2002. The laboratory provided a data package containing summarized sample results and associated QA/QC data. The data review conducted on this SDG included a review of summarized results and QA/QC data per the requirements set forth in Section D.1 of the QAPP. A full review was not performed on this data package, as is required in the QAPP. The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the quality control data. In cases where the laboratory did not track limits for an analyte the limits in the QAPP were used. Hold times, method blanks, surrogate recoveries, laboratory control samples (LCS), matrix spike/matrix spike duplicate (MS/MSD) results, and reporting limits were reviewed to assess compliance with applicable methods and the QAPP. If data qualification was required, data were qualified in general accordance with the definitions and use of qualifying flags outlined in the EPA documents: *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, October 1999*.

The following qualifiers may be added to the data:

- U: The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R: The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

ORGANIC ANALYSES

Samples were analyzed for BTEX by the method identified in the introduction to this report.

1. Holding Times – Acceptable
2. Continuing Calibrations – Acceptable
3. Blanks – Acceptable:

One trip blank was submitted with the samples. A method blank was prepared with each laboratory sample batch. The frequency requirements for trip, field and method blanks were met. Target compounds were not detected in the blanks, with the following exceptions.

Toluene was detected in the method blank associated with the samples analyzed on 10/21/06 at a concentration of 28 µg/L. Toluene was also detected in the trip blank at a concentration of 13 µg/L. The toluene concentrations in the associated samples were at least 10 times greater than the blank contamination; therefore, sample results are not qualified.

4. Surrogates – Acceptable

5. LCS – Acceptable

6. MS/MSD – Project samples were not used to perform MS/MSD analyses; therefore the laboratory did not include MS/MSD results. Sample results are not qualified.

7. Reporting Limits – Acceptable except as noted:
   The toluene concentrations were greater than the range of the instrument is the initial analyses of samples GMX-15-14.0 and GMX-16-10.5. The toluene results are reported from the reanalysis of both of these samples. The reporting limits for all of the samples are elevated due to high toluene concentrations.

OVERALL ASSESSMENT OF DATA

The completeness of ARI SDG KA96 is 100 percent. The data usability is based on USEPA guidance documents and the QAPP referenced in the introduction to this report. Few problems were identified and analytical performance was generally within specified limits. The data are acceptable and meet the project's data quality objectives.

Sample	Qualified Analyte	Qualified Result	Units	Qualifier Reason
GMX-15-14.0	none			
GMX-15-GW	none			
GMX-16-10.5	none			
TB-101306	none			
GMX-19-14.8	none			

Analytical Resources, Incorporated
Analytical Chemists and Consultants

GEOMATRIX
Received
OCT 25 2006
SEATTLE

24 October 2006

John Long
Geomatrix
600 University, Suite 1020
Seattle, WA 98101

RE: Project No: 8769.005, Former Rhone-Poulenc Site
ARI Job No: KA96

Dear John:

Please find enclosed the chain of custody documentation (COC) and the final results for the samples from the project referenced above. Three soil samples, one water sample and one trip blank were received intact on October 13, 2006. The samples were analyzed for BETX as requested.

A small amount of toluene was detected in the method blank associated with the 10/21/06 analyses of the soil samples. Toluene was detected in all samples associated with this blank. Since the concentrations of toluene measured in the samples were significantly greater than the amount found in the blank, no corrective actions were taken.

The remaining analyses proceeded without incident of note.

A copy of these reports and all raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
markh@arilabs.com

Enclosures

cc: file KA96

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: KA96
Turn-around Requested: 1 week
Page: 1 of 1
ARI Client Company: Geomatrix Consultants
Phone: 206.
Date: 10-13-06
Ice Present? Y
Client Contact: John Long jlong@geomatrix.com
No. of Coolers: 1
Cooler Temps: 8.8
Client Project Name: Former Rhone-Poulenc Site
Client Project #: 8769.005
Samplers: S. Mearon

Sample ID	Date	Time	Matrix	No. Containers	BTEX (8021)								Notes/Comments
GMX-15-14.0	10-13-06	1103	Soil	3	X								1x1.5oz jar 2x40mL VOAs w/methanol
GMX-15-GW	10-13-06	1130	water	3	X								3x40mL VOAs- unpreserv
GMX-16-10.5	10-13-06	1222	Soil	3	X								1x1.5oz jar 2x40mL VOAs w/methanol
TB-101306	10-13-06	—	water	2	X								2x40mL VOAs w/HCl
GMX-19-14.8	10-13-06	1557	soil	3	X								1x1.5oz jar 2x40mL VOAs w/methanol

SM 10/13/06

Comments/Special Instructions

Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature) Sarah Mearon	(Signature)	(Signature)	(Signature)
Printed Name: Sarah Mearon	Printed Name: Emily Oriacnowski	Printed Name:	Printed Name:
Company: Geomatrix	Company: ARI	Company:	Company:
Date & Time: 10-13-06 1700	Date & Time: 10/13/06 1700	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

ARI Data Reporting Qualifiers

Effective 11/22/04

Inorganic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Duplicate RPD is not within established control limits
B	Reported value is less than the CRDL but ≥ the Reporting Limit
N	Matrix Spike recovery not within established control limits
NA	Not Applicable, analyte not spiked
H	The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
L	Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Flagged value is not within established control limits
B	Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
J	Estimated concentration when the value is less than ARI's established reporting limits
D	The spiked compound was not detected due to sample extract dilution
NR	Spiked compound recovery is not reported due to chromatographic interference
E	Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
S	Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
NA	The flagged analyte was not analyzed for
NS	The flagged analyte was not spiked into the sample
M	Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
Y	The analyte reporting limit is raised due to a positive chromatographic interference. The compound is not detected above the raised limit but may be present at or below the limit
C	The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
P	The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: MB-102006
METHOD BLANK

Lab Sample ID: MB-102006
LIMS ID: 06-19378
Matrix: Soil
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: NA
Date Received: NA

Date Analyzed: 10/20/06 16:03
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 100 mg-dry-wt

CAS Number	Analyte	RL	Result
71-43-2	Benzene	25	< 25 U
108-88-3	Toluene	25	< 25 U
100-41-4	Ethylbenzene	25	< 25 U
	m,p-Xylene	50	< 50 U
95-47-6	o-Xylene	25	< 25 U

BETX Surrogate Recovery	
Trifluorotoluene	110%
Bromobenzene	109%

BETX values reported in µg/kg (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: MB-102106
METHOD BLANK

Lab Sample ID: MB-102106
LIMS ID: 06-19379
Matrix: Soil
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: NA
Date Received: NA

Date Analyzed: 10/21/06 13:33
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 100 mg-dry-wt

CAS Number	Analyte	RL	Result
71-43-2	Benzene	25	< 25 U
108-88-3	**Toluene**	**25**	**28**
100-41-4	Ethylbenzene	25	< 25 U
	m,p-Xylene	50	< 50 U
95-47-6	o-Xylene	25	< 25 U

BETX Surrogate Recovery

Trifluorotoluene	107%
Bromobenzene	112%

BETX values reported in µg/kg (ppb)

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: GMX-15-14.0
SAMPLE

Lab Sample ID: KA96A
LIMS ID: 06-19378
Matrix: Soil
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: 10/13/06
Date Received: 10/13/06

Date Analyzed: 10/20/06 22:16
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 0.38 mg-dry-wt
Percent Moisture: 17.7%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	6,600	< 6,600 U
108-88-3	Toluene	6,600	S DNR
100-41-4	Ethylbenzene	6,600	< 6,600 U
	m,p-Xylene	13,000	< 13,000 U
95-47-6	o-Xylene	6,600	< 6,600 U

BETX Surrogate Recovery

Trifluorotoluene	101%
Bromobenzene	113%

BETX values reported in μg/kg (ppb)

TG
11/10/06

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: GMX-15-14.0
REANALYSIS

Lab Sample ID: KA96A
LIMS ID: 06-19378
Matrix: Soil
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: 10/13/06
Date Received: 10/13/06

Date Analyzed: 10/21/06 14:02
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 0.0095 mg-dry-wt
Percent Moisture: 17.7%

CAS Number	**Analyte**	**RL**	**Result**
71-43-2	Benzene	260,000	< 260,000 U DNR
108-88-3	**Toluene**	**260,000**	**30,000,000**
100-41-4	Ethylbenzene	260,000	< 260,000 U DNR
	m,p-Xylene	530,000	< 530,000 U
95-47-6	o-Xylene	260,000	< 260,000 U

BETX Surrogate Recovery

Trifluorotoluene	101%
Bromobenzene	107%

BETX values reported in μg/kg (ppb)

TG
11/10/06

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: GMX-16-10.5
SAMPLE

Lab Sample ID: KA96B
LIMS ID: 06-19379
Matrix: Soil
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: 10/13/06
Date Received: 10/13/06

Date Analyzed: 10/20/06 22:45
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 0.38 mg-dry-wt
Percent Moisture: 16.0%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	6,600	< 6,600 U
108-88-3	Toluene	6,600	S DNR
100-41-4	Ethylbenzene	6,600	< 6,600 U
	m,p-Xylene	13,000	< 13,000 U
95-47-6	o-Xylene	6,600	< 6,600 U

BETX Surrogate Recovery

Trifluorotoluene	103%
Bromobenzene	113%

BETX values reported in $\mu g/kg$ (ppb)

TG
11/10/06

ANALYTICAL
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ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: GMX-16-10.5
REANALYSIS

Lab Sample ID: KA96B
LIMS ID: 06-19379
Matrix: Soil
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: 10/13/06
Date Received: 10/13/06

Date Analyzed: 10/21/06 14:30
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 0.0096 mg-dry-wt
Percent Moisture: 16.0%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	260,000	< 260,000 U DNR
108-88-3	**Toluene**	**260,000**	**8,000,000**
100-41-4	Ethylbenzene	260,000	< 260,000 U DNR
	m,p-Xylene	520,000	< 520,000 U
95-47-6	o-Xylene	260,000	< 260,000 U

BETX Surrogate Recovery	
Trifluorotoluene	102%
Bromobenzene	108%

BETX values reported in μg/kg (ppb)

FORM I

TG
11/10/06

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: GMX-19-14.8
SAMPLE

Lab Sample ID: KA96C
LIMS ID: 06-19380
Matrix: Soil
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: 10/13/06
Date Received: 10/13/06

Date Analyzed: 10/20/06 21:48
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 71 mg-dry-wt
Percent Moisture: 16.8%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	35	< 35 U
108-88-3	**Toluene**	**35**	**230**
100-41-4	Ethylbenzene	35	< 35 U
	m,p-Xylene	70	< 70 U
95-47-6	o-Xylene	35	< 35 U

BETX Surrogate Recovery	
Trifluorotoluene	110%
Bromobenzene	112%

BETX values reported in µg/kg (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-102006
LAB CONTROL SAMPLE

Lab Sample ID: LCS-102006
LIMS ID: 06-19378
Matrix: Soil
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 10/20/06 15:06
LCSD: 10/20/06 15:34
Instrument/Analyst LCS: PID1/PKC
LCSD: PID1/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 100 mg-dry-wt
LCSD: 100 mg-dry-wt

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	399	410	97.3%	400	410	97.6%	0.3%
Toluene	3460	3340	104%	3470	3340	104%	0.3%
Ethylbenzene	610	610	100%	613	610	100%	0.5%
m,p-Xylene	2450	2290	107%	2470	2290	108%	0.8%
o-Xylene	869	795	109%	880	795	111%	1.3%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	**LCSD**
Trifluorotoluene	111%	106%
Bromobenzene	119%	113%

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-102106
LAB CONTROL SAMPLE

Lab Sample ID: LCS-102106
LIMS ID: 06-19379
Matrix: Soil
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 10/21/06 12:36
LCSD: 10/21/06 13:04
Instrument/Analyst LCS: PID1/PKC
LCSD: PID1/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 100 mg-dry-wt
LCSD: 100 mg-dry-wt

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	374	410	91.2%	376	410	91.7%	0.5%
Toluene	3380	3340	101%	3250	3340	97.3%	3.9%
Ethylbenzene	564	610	92.5%	578	610	94.8%	2.5%
m,p-Xylene	2300	2290	100%	2360	2290	103%	2.6%
o-Xylene	818	795	103%	836	795	105%	2.2%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	98.1%	100%
Bromobenzene	112%	115%

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: MB-102006
METHOD BLANK

Lab Sample ID: MB-102006
LIMS ID: 06-19381
Matrix: Water
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: NA
Date Received: NA

Date Analyzed: 10/20/06 16:03
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery

Trifluorotoluene	110%
Bromobenzene	109%

BETX values reported in μg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: GMX-15-GW
SAMPLE

Lab Sample ID: KA96D
LIMS ID: 06-19381
Matrix: Water
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: 10/13/06
Date Received: 10/13/06

Date Analyzed: 10/20/06 17:00
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Dilution Factor: 2000

CAS Number	Analyte	RL	Result
71-43-2	Benzene	2,000	< 2,000 U
108-88-3	**Toluene**	**2,000**	**300,000**
100-41-4	Ethylbenzene	2,000	< 2,000 U
	m,p-Xylene	2,000	< 2,000 U
95-47-6	o-Xylene	2,000	< 2,000 U

BETX Surrogate Recovery	
Trifluorotoluene	104%
Bromobenzene	107%

BETX values reported in µg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: TB-101306
SAMPLE

Lab Sample ID: KA96E
LIMS ID: 06-19382
Matrix: Water
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: 10/13/06
Date Received: 10/13/06

Date Analyzed: 10/20/06 16:32
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	**Toluene**	**1.0**	**13**
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery

Trifluorotoluene	108%
Bromobenzene	108%

BETX values reported in μg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-102006
LAB CONTROL SAMPLE

Lab Sample ID: LCS-102006
LIMS ID: 06-19381
Matrix: Water
Data Release Authorized:
Reported: 10/23/06

QC Report No: KA96-Geomatrix
Project: Former Rhone-Poulenc Site
Event: 8769.005
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 10/20/06 15:06
LCSD: 10/20/06 15:34
Instrument/Analyst LCS: PID1/PKC
LCSD: PID1/PKC

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0 mL
LCSD: 1.0 mL

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	7.98	8.20	97.3%	8.01	8.20	97.7%	0.4%
Toluene	69.2	66.8	104%	69.4	66.8	104%	0.3%
Ethylbenzene	12.2	12.2	100%	12.3	12.2	101%	0.8%
m,p-Xylene	49.1	45.8	107%	49.5	45.8	108%	0.8%
o-Xylene	17.4	15.9	109%	17.6	15.9	111%	1.1%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	111%	106%
Bromobenzene	119%	113%

Memorandum

TO:	John Long	**DATE:**	January 2, 2007
FROM:	Zanna Satterwhite	**PROJ. NO.:**	8769
CC:	Project File	**PROJ. NAME:**	Former Rhone-Poulenc Site

SUBJECT: **December 2006 – Groundwater Sampling Data Quality Review – SDG KI81**

This memorandum presents a summary data quality review of two groundwater samples collected on December 14, 2006. The samples were submitted to Analytical Resources, Inc. (ARI), a Washington State Department of Ecology (Ecology)-accredited laboratory, located in Tukwila, Washington. The samples were analyzed as sample delivery group (SDG) KI81 for the following organic analyses:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8021B

The analyses were performed in general accordance with methods specified in Environmental Protection Agency's (EPA) *Test Methods for Evaluating Solid Waste (SW-846), January 1995*, and associated revisions.

The samples and the analyses conducted on the samples are listed in the table below.

Sample ID	Laboratory Sample ID	Requested Analyses
EPE121406-1	KI81A	BTEX
EPE121406-2	KI81B	BTEX

Upon receipt by ARI, the sample jar information was compared to the chain-of-custody. Discrepancies were noted by ARI and addressed with Geomatrix personnel prior to sample analyses. The temperature of the cooler was within the acceptable range of 4 +/- 2 °C.

Data review is based on method performance criteria and quality control (QC) criteria as documented in the Former Rhone-Poulenc Site May 2006 Soil Sampling Quality Assurance Project Plan (QAPP). The laboratory provided a data package containing summarized sample results and associated Quality Assurance (QA)/QC data. The data review conducted on this SDG included a review of summarized results and QA/QC data per the requirements set forth in Section D1 of the QAPP. The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the QC data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used.

Hold times, method blanks, surrogate recoveries, laboratory control samples (LCS), matrix spike/matrix spike duplicate (MS/MSD) results, and reporting limits were reviewed to assess compliance with applicable methods and the QAPP. If data qualification was required, data were qualified in general accordance with the definitions and use of qualifying flags outlined in the EPA document: *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, October 1999*.

The following qualifiers may be added to the data:

- U: The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R: The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

ORGANIC ANALYSES

Samples were analyzed for BTEX by the method identified in the introduction to this report.

1. Holding Times – Acceptable
2. Continuing Calibrations – Acceptable
3. Blanks – Acceptable except as noted:
   A method blank was prepared with each laboratory sample batch. Target compounds were not detected in the method blank. No trip blanks or field blanks were submitted with the samples; therefore, the frequency requirements specified in the QAPP for trip, field and method blanks were not met.
4. Surrogates – Acceptable
5. LCS – Acceptable

6. MS/MSD – Project samples were not used to perform MS/MSD analyses; therefore, the laboratory did not include MS/MSD results. Sample results are not qualified.

7. Reporting Limits – Acceptable except as noted:
The reporting limits for the samples are elevated 50X to 2000X due to high toluene concentrations.

OVERALL ASSESSMENT OF DATA

The completeness of ARI SDG KI81 is 100 percent. The data usability is based on USEPA guidance documents and the QAPP referenced in the introduction to this report. Few problems were identified and analytical performance was generally within specified limits. The data are acceptable and meet the project's data quality objectives.

Sample	**Qualified Analyte**	**Qualified Result**	**Units**	**Qualifier Reason**
EPE121406-1	none			
EPE121406-2	none			

Analytical Resources, Incorporated
Analytical Chemists and Consultants

GEOMATRIX
Received
DEC 20 2006
SEATTLE

19 December 2006

John Long
GeoMatrix Consultants
600 University, Suite 1020
Seattle, WA 98101

RE: Project: 8769, FRP
ARI Job No: KI81

Dear John:

Please find enclosed a sample custody record (COC) and a set of analytical results for the samples from the project referenced above. Analytical Resources, Inc. accepted two water samples in good condition on December 14, 2006. The samples were analyzed for BETX as requested.

Both samples were initially analyzed on 12/15/06. The percent differences were low for the CCAL that bracketed the analyses of these samples. Both samples were re-analyzed on 12/16/06. The re-analyses proceeded without incident of note. The results for the re-analyses only have been submitted.

Copies of these reports and all associated raw data will be kept on file at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
markh@arilabs.com
206/695-6210

cc: file KI81

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: KI81
Turn-around Requested: 1-day
ARI Client Company: Geomatrix
Phone: 206-342-1760
Client Contact: John Long
Client Project Name: FRP
Client Project #: 8769
Samplers: D. SMITH

Page: 1 of 1
Date: 12/14/06
Ice Present? Y
No. of Coolers: 1
Cooler Temps: 2.6°

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: BTEX (8021)								Notes/Comments
EPE121406-1	12/14/06	1041	W	4	X								
EPE121406-2	12/14/06	1208	W	4	X								

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
	(Signature) Dwight Smith	(Signature) Bob Congleton	(Signature)	(Signature)
	Printed Name: Dwight Smith	Printed Name: Bob Congleton	Printed Name:	Printed Name:
	Company: Geomatrix	Company: ARI	Company:	Company:
	Date & Time: 12/14/06 1350	Date & Time: 12/14/06 1350	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

ARI Data Reporting Qualifiers

Effective 11/22/04

Inorganic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Duplicate RPD is not within established control limits
B	Reported value is less than the CRDL but ≥ the Reporting Limit
N	Matrix Spike recovery not within established control limits
NA	Not Applicable, analyte not spiked
H	The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
L	Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Flagged value is not within established control limits
B	Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
J	Estimated concentration when the value is less than ARI's established reporting limits
D	The spiked compound was not detected due to sample extract dilution
NR	Spiked compound recovery is not reported due to chromatographic interference
E	Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
S	Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
NA	The flagged analyte was not analyzed for
NS	The flagged analyte was not spiked into the sample
M	Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
Y	The analyte reporting limit is raised due to a positive chromatographic interference. The compound is not detected above the raised limit but may be present at or below the limit
C	The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
P	The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

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ORGANICS ANALYSIS DATA SHEET
BETX by Method EPA 602M
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Sample ID: MB-121606
METHOD BLANK

Lab Sample ID: MB-121606
LIMS ID: 06-24862
Matrix: Water
Data Release Authorized:
Reported: 12/18/06

QC Report No: KI81-Geomatrix
Project: FRP
Event: 8769
Date Sampled: NA
Date Received: NA

Date Analyzed: 12/16/06 11:32
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	**Analyte**	**RL**	**Result**
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U

BETX Surrogate Recovery

Trifluorotoluene	88.6%
Bromobenzene	87.7%

BETX values reported in µg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method EPA 602M
Page 1 of 1

Sample ID: EPE121406-1
SAMPLE

Lab Sample ID: KI81A
LIMS ID: 06-24862
Matrix: Water
Data Release Authorized:
Reported: 12/18/06

QC Report No: KI81-Geomatrix
Project: FRP
Event: 8769
Date Sampled: 12/14/06
Date Received: 12/14/06

Date Analyzed: 12/16/06 17:29
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Dilution Factor: 2000

CAS Number	Analyte	RL	Result
71-43-2	Benzene	2,000	< 2,000 U
108-88-3	**Toluene**	**2,000**	**210,000**
100-41-4	Ethylbenzene	2,000	< 2,000 U
	m,p-Xylene	2,000	< 2,000 U
95-47-6	o-Xylene	2,000	< 2,000 U

BETX Surrogate Recovery	
Trifluorotoluene	87.7%
Bromobenzene	91.4%

BETX values reported in µg/L (ppb)

ANALYTICAL
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ORGANICS ANALYSIS DATA SHEET
BETX by Method EPA 602M
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Sample ID: EPE121406-2
SAMPLE

Lab Sample ID: KI81B
LIMS ID: 06-24863
Matrix: Water
Data Release Authorized:
Reported: 12/18/06

QC Report No: KI81-Geomatrix
Project: FRP
Event: 8769
Date Sampled: 12/14/06
Date Received: 12/14/06

Date Analyzed: 12/16/06 17:59
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Dilution Factor: 50.0

CAS Number	Analyte	RL	Result
71-43-2	Benzene	50	< 50 U
108-88-3	**Toluene**	**50**	**8,100**
100-41-4	Ethylbenzene	50	< 50 U
	m,p-Xylene	50	< 50 U
95-47-6	o-Xylene	50	< 50 U

BETX Surrogate Recovery	
Trifluorotoluene	85.3%
Bromobenzene	88.3%

BETX values reported in μg/L (ppb)

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method EPA 602M
Page 1 of 1

Sample ID: LCS-121606
LAB CONTROL SAMPLE

Lab Sample ID: LCS-121606
LIMS ID: 06-24862
Matrix: Water
Data Release Authorized:
Reported: 12/18/06

QC Report No: KI81-Geomatrix
Project: FRP
Event: 8769
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 12/16/06 10:33
LCSD: 12/16/06 11:03
Instrument/Analyst LCS: PID1/PKC
LCSD: PID1/PKC

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0
LCSD: 1.0

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	6.97	8.20	85.0%	6.74	8.20	82.2%	3.4%
Toluene	62.2	66.8	93.1%	60.4	66.8	90.4%	2.9%
Ethylbenzene	11.4	12.2	93.4%	11.1	12.2	91.0%	2.7%
m,p-Xylene	42.3	45.8	92.4%	41.1	45.8	89.7%	2.9%
o-Xylene	15.0	15.9	94.3%	14.5	15.9	91.2%	3.4%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	**LCSD**
Trifluorotoluene	101%	92.4%
Bromobenzene	99.7%	91.8%

Geomatrix

Memorandum

TO:	John Long	**DATE:**	May 22, 2007
FROM:	Zanna Satterwhite	**PROJ. NO.:**	8769
CC:	Project File	**PROJ. NAME:**	Former Rhone-Poulenc Site
SUBJECT:	**May 2007 – Groundwater Sampling Data Quality Review – SDG KZ04**		

This memorandum presents a summary data quality review of two groundwater samples collected on May 15, 2007. The samples were submitted to Analytical Resources, Inc. (ARI), a Washington State Department of Ecology (Ecology)-accredited laboratory, located in Tukwila, Washington. The samples were analyzed as sample delivery group (SDG) KZ04 for the following organic analyses:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8021B

The analyses were performed in general accordance with methods specified in Environmental Protection Agency's (EPA) *Test Methods for Evaluating Solid Waste (SW-846), January 1995*, and associated revisions.

The samples and the analyses conducted on the samples are listed in the table below.

Sample ID	Laboratory Sample ID	Requested Analyses
GMX-20A-051507	KZ04A	BTEX
GMX-21A-051507	KZ04B	BTEX

Upon receipt by ARI, the sample jar information was compared to the chain-of-custody. Discrepancies were noted by ARI and addressed with Geomatrix personnel prior to sample analyses. The temperature of the cooler was not measured, but according to the sampling staff, the samples were kept on ice from the time they were collected to delivery to ARI.

Data review is based on method performance criteria and quality control (QC) criteria as documented in the Former Rhone-Poulenc Site May 2006 Soil Sampling Quality Assurance Project Plan (QAPP). The laboratory provided a data package containing summarized sample results and associated Quality Assurance (QA)/QC data. The data review conducted on this SDG included a review of summarized results and QA/QC data per the requirements set forth in Section D1 of the QAPP. The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the QC data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used. Hold times, method blanks, surrogate recoveries, laboratory control samples (LCS), matrix spike/matrix spike duplicate (MS/MSD) results, and reporting limits were reviewed to assess compliance with applicable methods and the QAPP. If data qualification was required, data were qualified in general accordance with the definitions and use of qualifying flags outlined in the EPA document: *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, October 1999*.

The following qualifiers may be added to the data:

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

- J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

- UJ: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

- R: The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

ORGANIC ANALYSES

Samples were analyzed for BTEX by the method identified in the introduction to this report.

1. Holding Times – Acceptable

2. Blanks – Acceptable except as noted:
   A method blank was prepared with each laboratory sample batch. Target compounds were not detected in the method blank. A trip blank was submitted and analyzed; no target compounds were detected. No field blanks were submitted with the samples; therefore, the frequency requirements specified in the QAPP for field blanks were not met. No data were qualified due to the lack of the field blank.

3. Surrogates – Acceptable

4. LCS – Acceptable

5. MS/MSD – Project samples were not used to perform MS/MSD analyses; therefore, the laboratory did not include MS/MSD results in their report. Sample results were evaluated based on the LCS and are not qualified.

6. Reporting Limits – Acceptable except as noted:
   The reporting limits for the samples are elevated 480X to 2000X due to high toluene concentrations. The laboratory only reported results from analyses run at a dilution.

OVERALL ASSESSMENT OF DATA

The completeness of ARI SDG KZ04 is 100 percent. The data usability is based on USEPA guidance documents and the QAPP referenced in the introduction to this report. Few problems were identified and analytical performance was generally within specified limits. The data are acceptable and meet the project's data quality objectives.

Sample	Qualified Analyte	Qualified Result	Units	Qualifier Reason
GMX-20A-051507	none			
GMX-21A-051507	none			

Analytical Resources, Incorporated
Analytical Chemists and Consultants

GEOMATRIX
Received
MAY 18 2007
SEATTLE

17 May 2007

Gary Dupuy
Geomatrix
600 University, Suite 1020
Seattle, WA 98101

RE: Project No: 8769, FRP
ARI Job No: KZ04

Dear Gary:

Please find enclosed the chain of custody documentation (COC) and the final results for the samples from the project referenced above. Two water samples and one trip blank were received intact on May 15, 2007. The samples were analyzed for BETX as requested.

These analyses proceeded without incident of note.

A copy of these reports and all raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
markh@arilabs.com

Enclosures

cc: file KZ04

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number:
Turn-around Requested: 5-day
Page: 1 of 1
ARI Client Company: Geomatrix
Phone: 206 342 1760
Date: 5/15/07
Ice Present?
Client Contact: Gary Dupuy
No. of Coolers:
Cooler Temps:
Client Project Name: FRP
Client Project #: 8769
Samplers: A. BAZIN

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested								Notes/Comments
					toluene								
GMX-20A-051507	5/15/07	12:30	Water	4	\								
GMX-21A-051507	5/15/07	11:10	Water	4	\								

Comments/Special Instructions

Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)	(Signature) Ashley	(Signature)	(Signature)
Printed Name: Abigail Bazin	Printed Name: ASHLEY LAMOUNTAIN	Printed Name:	Printed Name:
Company: Geomatrix	Company: ARI	Company:	Company:
Date & Time: 17:10 5/15/07	Date & Time: 5/15/07 1710	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

ARI Data Reporting Qualifiers

Effective 11/22/04

Inorganic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Duplicate RPD is not within established control limits
B	Reported value is less than the CRDL but ≥ the Reporting Limit
N	Matrix Spike recovery not within established control limits
NA	Not Applicable, analyte not spiked
H	The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
L	Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Flagged value is not within established control limits
B	Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
J	Estimated concentration when the value is less than ARI's established reporting limits
D	The spiked compound was not detected due to sample extract dilution
NR	Spiked compound recovery is not reported due to chromatographic interference
E	Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
S	Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
NA	The flagged analyte was not analyzed for
NS	The flagged analyte was not spiked into the sample
M	Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
Y	The analyte reporting limit is raised due to a positive chromatographic interference. The compound is not detected above the raised limit but may be present at or below the limit
C	The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
P	The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: GMX-20A-051507
SAMPLE

Lab Sample ID: KZ04A
LIMS ID: 07-9141
Matrix: Water
Data Release Authorized:
Reported: 05/17/07

QC Report No: KZ04-Geomatrix, Inc.
Project: FRP
Event: 8769
Date Sampled: 05/15/07
Date Received: 05/15/07

Date Analyzed: 05/16/07 18:13
Instrument/Analyst: PID3/PKC

Purge Volume: 5.0 mL
Dilution Factor: 2000

CAS Number	Analyte	RL	Result
71-43-2	Benzene	500	< 500 U
108-88-3	**Toluene**	500	**68,000**
100-41-4	Ethylbenzene	500	< 500 U
	m,p-Xylene	1,000	< 1,000 U
95-47-6	o-Xylene	500	< 500 U

BETX Surrogate Recovery	
Trifluorotoluene	92.5%
Bromobenzene	94.1%

BETX values reported in µg/L (ppb)

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: GMX-21A-051507
SAMPLE

Lab Sample ID: KZ04B
LIMS ID: 07-9142
Matrix: Water
Data Release Authorized:
Reported: 05/17/07

QC Report No: KZ04-Geomatrix, Inc.
Project: FRP
Event: 8769
Date Sampled: 05/15/07
Date Received: 05/15/07

Date Analyzed: 05/16/07 18:37
Instrument/Analyst: PID3/PKC

Purge Volume: 5.0 mL
Dilution Factor: 500

CAS Number	Analyte	RL	Result
71-43-2	Benzene	120	< 120 U
108-88-3	**Toluene**	**120**	**14,000**
100-41-4	Ethylbenzene	120	< 120 U
	m,p-Xylene	250	< 250 U
95-47-6	o-Xylene	120	< 120 U

BETX Surrogate Recovery	
Trifluorotoluene	90.8%
Bromobenzene	89.7%

BETX values reported in µg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: TRIP BLANK
SAMPLE

Lab Sample ID: KZ04C
LIMS ID: 07-9163
Matrix: Water
Data Release Authorized:
Reported: 05/17/07

QC Report No: KZ04-Geomatrix, Inc.
Project: FRP
Event: 8769
Date Sampled: 05/07/07
Date Received: 05/15/07

Date Analyzed: 05/16/07 13:08
Instrument/Analyst: PID3/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	0.25	< 0.25 U
108-88-3	Toluene	0.25	< 0.25 U
100-41-4	Ethylbenzene	0.25	< 0.25 U
	m,p-Xylene	0.50	< 0.50 U
95-47-6	o-Xylene	0.25	< 0.25 U

BETX Surrogate Recovery

Trifluorotoluene	104%
Bromobenzene	99.3%

BETX values reported in μg/L (ppb)

ANALYTICAL
RESOURCES
INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: MB-051607
METHOD BLANK

Lab Sample ID: MB-051607
LIMS ID: 07-9141
Matrix: Water
Data Release Authorized:
Reported: 05/17/07

QC Report No: KZ04-Geomatrix, Inc.
Project: FRP
Event: 8769
Date Sampled: NA
Date Received: NA

Date Analyzed: 05/16/07 11:36
Instrument/Analyst: PID3/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	0.25	< 0.25 U
108-88-3	Toluene	0.25	< 0.25 U
100-41-4	Ethylbenzene	0.25	< 0.25 U
	m,p-Xylene	0.50	< 0.50 U
95-47-6	o-Xylene	0.25	< 0.25 U

BETX Surrogate Recovery	
Trifluorotoluene	96.1%
Bromobenzene	93.2%

BETX values reported in µg/L (ppb)

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-051607
LAB CONTROL SAMPLE

Lab Sample ID: LCS-051607
LIMS ID: 07-9141
Matrix: Water
Data Release Authorized:
Reported: 05/17/07

QC Report No: KZ04-Geomatrix, Inc.
Project: FRP
Event: 8769
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 05/16/07 12:03
LCSD: 05/16/07 11:13
Instrument/Analyst LCS: PID3/PKC
LCSD: PID3/PKC

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0
LCSD: 1.0

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	8.81	7.50	117%	8.19	7.50	109%	7.3%
Toluene	62.2	55.8	111%	59.7	55.8	107%	4.1%
Ethylbenzene	14.9	13.3	112%	14.2	13.3	107%	4.8%
m,p-Xylene	57.8	52.7	110%	55.7	52.7	106%	3.7%
o-Xylene	21.9	21.0	104%	21.1	21.0	100%	3.7%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	104%	103%
Bromobenzene	98.3%	99.3%

APPENDIX B

Short Plat Description of East Parcel

```
roject: 10265                                      Fri August 26 14:53:57 2
             Parcel Map Check

----------------------------------------------------------------------------

arcel name: LOT 1

  North: 193162.4743          East : 1637311.4710
ine  Course: S 71-49-21 W  Length: 1.77
       North: 193161.9221            East : 1637309.7894
ine  Course: S 62-42-32 W  Length: 842.28
       North: 192775.7269            East : 1636561.2649
ine  Course: N 14-00-00 W  Length: 877.15
       North: 193626.8218            East : 1636349.0631
ine  Course: S 88-51-08 E  Length: 956.07
       North: 193607.6706            East : 1637304.9413
ine  Course: S 00-50-26 E  Length: 445.25
       North: 193162.4685            East : 1637311.4731

  Perimeter: 3122.52   Area: 572,881 sq. ft. 13.152 acres

apcheck Closure - (Uses listed courses, radii, and deltas)
rror Closure: 0.0061                Course: S 19-34-09 E
 Error North: -0.00578               East : 0.00205
recision  1: 511,888.52
```

```
Project: 10265                                    Fri August 26 14:54:01
              Parcel Map Check

-------------------------------------------------------------------------

Parcel name: LOT 2

   North: 193156.0766          East : 1638149.7731
Line   Course: N 88-18-58 W  Length: 14.95
         North: 193156.5159           East : 1638134.8296
Line   Course: N 85-46-07 W  Length: 486.97
         North: 193192.4468           East : 1637649.1869
Line   Course: N 83-08-12 W  Length: 117.00
         North: 193206.4285           East : 1637533.0254
Line   Course: S 85-06-48 W  Length: 119.00
         North: 193196.2915           East : 1637414.4579
Line   Course: S 71-49-21 W  Length: 108.40
         North: 193162.4748           East : 1637311.4676
Line   Course: N 00-50-26 W  Length: 445.25
         North: 193607.6769           East : 1637304.9359
Line   Course: S 88-51-08 E  Length: 102.03
         North: 193605.6331           East : 1637406.9454
Line   Course: S 22-10-28 E  Length: 46.03
         North: 193563.0075           East : 1637424.3184
Line   Course: S 88-51-08 E  Length: 542.82
         North: 193552.1342           East : 1637967.0295
Line   Course: S 22-32-07 E  Length: 305.16
         North: 193270.2751           East : 1638083.9827
Line   Course: S 30-33-07 E  Length: 121.90
         North: 193165.2986           East : 1638145.9468
Line   Course: S 22-32-07 E  Length: 9.98
         North: 193156.0807           East : 1638149.7717

   Perimeter: 2419.48   Area: 281,732 sq. ft. 6.468 acres

Mapcheck Closure - (Uses listed courses, radii, and deltas)
Error Closure: 0.0043                Course: N 19-12-20 W
 Error North: 0.00403                 East : -0.00140
Precision  1: 562,672.09
```

City of Tukwila
Department of Community Development
6300 Southcenter Boulevard, Tukwila, WA 98188
Telephone (206) 431-3670 FAX (206) 431-3665
E-mail: tukplan@tukwila.wa.us

SHORT PLAT NO. ______________

DECLARATION

KNOW ALL MEN BY THESE PRESENT THAT WE, THE UNDERSIGNED, OWNER(S) IN FEE SIMPLE OF THE LAND HEREIN DESCRIBED DO HEREBY MAKE A SHORT SUBDIVISION THEREOF PURSUANT TO RCW 58.17.060 AND ACKNOWLEDGE THAT SAID SUBDIVISION SHALL NOT BE FURTHER DIVIDED IN ANY MANNER WITHIN A PERIOD OF FIVE YEARS, FROM THE DATE OF RECORD, WITHOUT THE FILING OF A FINAL PLAT. THE UNDERSIGNED FURTHER DECLARE THIS SHORT PLAT TO BE THE GRAPHIC REPRESENTATION OF SAID SHORT SUBDIVISION AND THE SAME IS MADE WITH THE FREE CONSENT AND IN ACCORDANCE WITH THE DESIRE OF THE OWNER(S).

IN WITNESS WHEREOF WE HAVE SET OUR HANDS AND SEALS.

BY: ______________________ ______________________
TITLE

PRINTED NAME: ______________________

ACKNOWLEDGMENT

STATE OF WASHINGTON)
COUNTY OF KING) SS.

On this day personally appeared before me ______________ to me known to be the individual who executed the foregoing. Instrument and acknowledged that he/she signed the same as his/her voluntary act act and deed for uses and purposes mentioned therein.

GIVEN UNDER MY HAND AND OFFICIAL SEAL THIS _____ DAY OF _________, 20__.

Notary Seal

____
SIGNATURE OF NOTARY PUBLIC

____
NAME OF COMMISSIONED

____
TITLE

____
MY APPOINTMENT EXPIRES

APPROVALS

TUKWILA SHORT SUBDIVISION COMMITTEE APPROVAL

Reviewed and approved by the Short Subdivision Committee and hereby certified for filing this _______ day of _____________, 200___.

____
Chairperson, Short Subdivision Committee

KING COUNTY FINANCE DIVISION

I certify that all property taxes are paid and that a deposit has been made in sufficient amount to pay the taxes for the following year; that there are no delinquent special assessments certified to this office for collection; and that all special assessments on any of the property herein dedicated as streets, alleys, or for other public use are paid in full.
This _____ day of __________, 200__.

____
Deputy King County Assessor

____
King County Assessor

KING COUNTY ASSESSOR'S APPROVAL

Examined and approved this _____ day of __________, 2000.

____
Deputy King County Assessor

____
King County Assessor

____
Tax Account Numbers

LEGAL DESCRIPTION (OLD)

THAT PORTION OF TRACTS 1 AND 2 OF THE MEADOWS, ACCORDING TO THE PARTITION MAP OF PART OF THE FRANCIS MCNATT DONATION LAND CLAIM NO. 38 FILED IN KING COUNTY SUPERIOR COURT CAUSE NUMBER 120091, AND OF THE ABANDONED BED OF THE DUWAMISH RIVER, ALL LOCATED IN SECTION 33, TOWNSHIP 24 NORTH, RANGE 4 EAST, WILLAMETTE MERIDIAN, IN KING COUNTY, WASHINGTON, AND ALL LYING WESTERLY OF THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH AND ALSO WESTERLY OF THE PARCEL OF LAND ADJOINING EAST MARGINAL WAY WHICH WAS CONVEYED TO GREAT NORTHERN RAILWAY COMPANY BY DEED RECORDED UNDER RECORDING NUMBER 4784818; LYING EASTERLY OF THE EASTERLY MARGIN OF THE RIGHT OF WAY OF COMMERCIAL WATERWAY DISTRICT NO. 1 (DUWAMISH WATERWAY); LYING SOUTHERLY OF THE HEREINAFTER DESCRIBED "LINE A"; AND LYING NORTHERLY OF THE HEREINAFTER DESCRIBED "LINE B":

LINE A:

BEGINNING ON THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH, WHICH POINT BEARS NORTH 89° 15' 54" WEST A DISTANCE OF 2470.01 FEET ALONG THE DONATION CLAIM LINE AND SOUTH 23° 40' 59" EAST A DISTANCE OF 648.77 FEET ALONG THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH FROM THE INTERSECTION OF THE LINE BETWEEN THE DONATION CLAIMS OF FRANCIS MCNATT AND HENRY VAN ASSELT WITH THE EAST LINE OF SECTION 33, TOWNSHIP 24 NORTH, RANGE 4 EAST, WILLAMETTE MERIDIAN, IN KING COUNTY, WASHINGTON; RUNNING THENCE WEST A DISTANCE OF 1574.72 FEET TO THE EAST LINE OF COMMERCIAL WATERWAY DISTRICT NO. 1;
THENCE SOUTH 15° 00' 00" EAST ALONG SAID EASTERLY LINE A DISTANCE OF 237.76 FEET TO THE TRUE POINT OF BEGINNING OF SAID "LINE A";
THENCE EAST A DISTANCE OF 1053.10 FEET;
THENCE SOUTH 23° 02' 00" EAST A DISTANCE OF 46.03 FEET;
THENCE EAST A DISTANCE OF 561.38 FEET TO THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH AND THE TERMINUS OF SAID "LINE A";

LINE B:

BEGINNING ON THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH AT A POINT WHICH BEARS NORTH 89° 15' 54" WEST A DISTANCE OF 2470.01 FEET ALONG THE DONATION CLAIM LINE AND SOUTH 23° 40' 59" EAST A DISTANCE OF 1374.17 FEET ALONG THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH FROM THE INTERSECTION OF THE LINE BETWEEN THE DONATION CLAIMS OF FRANCIS MCNATT AND HENRY VAN ASSELT WITH THE EAST LINE OF SECTION 33, TOWNSHIP 24 NORTH, RANGE 4 EAST, WILLAMETTE MERIDIAN, IN KING COUNTY, WASHINGTON, SAID POINT BEING AT THE INTERSECTION OF THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH WITH THE NORTH LINE OF VAN DE VANTER STOCK FARM TRACT AND THE TRUE POINT OF BEGINNING OF SAID "LINE B";
THENCE NORTH 89° 27' 50" WEST A DISTANCE OF 14.94 FEET;
THENCE NORTH 86° 54' 59" WEST A DISTANCE OF 486.97 FEET;
THENCE NORTH 84° 17' 04" WEST A DISTANCE OF 117.00 FEET;
THENCE SOUTH 83° 57' 56" WEST A DISTANCE OF 119.00 FEET;
THENCE SOUTH 70° 40' 29" WEST A DISTANCE OF 110.173 FEET;
THENCE SOUTH 61° 33' 40" WEST A DISTANCE OF 840.02 FEET, TO THE EASTERLY LINE OF THE RIGHT OF WAY OF COMMERCIAL WATERWAY DISTRICT NO. 1 AND THE TERMINUS OF SAID "LINE B";
TOGETHER WITH THE RIGHT TO CROSS THE PARCEL CONVEYED TO GREAT NORTHERN RAILWAY COMPANY AS RESERVED IN DEED RECORDED UNDER RECORDING NUMBER 4784818.

SITUATE IN THE CITY OF TUKWILA, COUNTY OF KING, STATE OF WASHINGTON.

LEGAL DESCRIPTION (NEW) (BEARINGS ROTATED TO CURRENT BASIS OF BEARINGS)

THAT PORTION OF TRACTS 1 AND 2 OF THE MEADOWS, ACCORDING TO THE PARTITION MAP OF PART OF THE FRANCIS MCNATT DONATION LAND CLAIM NO. 38 FILED IN KING COUNTY SUPERIOR COURT CAUSE NUMBER 120091, AND OF THE ABANDONED BED OF THE DUWAMISH RIVER, ALL LOCATED IN SECTION 33, TOWNSHIP 24 NORTH, RANGE 4 EAST, WILLAMETTE MERIDIAN, IN KING COUNTY, WASHINGTON, AND ALL LYING WESTERLY OF THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH AND ALSO WESTERLY OF THE PARCEL OF LAND ADJOINING EAST MARGINAL WAY WHICH WAS CONVEYED TO GREAT NORTHERN RAILWAY COMPANY BY DEED RECORDED UNDER RECORDING NUMBER 4784818; LYING EASTERLY OF THE EASTERLY MARGIN OF THE RIGHT OF WAY OF COMMERCIAL WATERWAY DISTRICT NO. 1 (DUWAMISH WATERWAY); LYING SOUTHERLY OF THE HEREINAFTER DESCRIBED "LINE A"; AND LYING NORTHERLY OF THE HEREINAFTER DESCRIBED "LINE B":

LINE A:

COMMENCING ON THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH, WHICH POINT BEARS NORTH 88°07'02" WEST, A DISTANCE OF 2470.01 FEET ALONG THE DONATION CLAIM LINE AND SOUTH 22°32'07" EAST, A DISTANCE OF 648.77 FEET ALONG THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH FROM THE INTERSECTION OF THE LINE BETWEEN THE DONATION CLAIMS OF FRANCIS MCNATT AND HENRY VAN ASSELT WITH THE EAST LINE OF SECTION 33, TOWNSHIP 24 NORTH, RANGE 4 EAST, WILLAMETTE MERIDIAN, IN KING COUNTY, WASHINGTON;
RUNNING THENCE SOUTH 88°51'08" WEST, A DISTANCE OF 1574.72 FEET TO THE EAST LINE OF COMMERCIAL WATERWAY DISTRICT NO. 1;
THENCE SOUTH 14°00'00" EAST, ALONG SAID EASTERLY LINE A DISTANCE OF 237.76 FEET TO THE POINT OF BEGINNING OF SAID "LINE A";
THENCE SOUTH 88°51'08" EAST, A DISTANCE OF 1058.10 FEET;
THENCE SOUTH 22°10'28" EAST, A DISTANCE OF 46.03 FEET;
THENCE SOUTH 88°51'08" EAST, A DISTANCE OF 542.82 FEET TO THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH AND THE TERMINUS OF SAID "LINE A";

LINE B:

COMMENCING ON THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH AT A POINT WHICH BEARS NORTH 88°07'02" WEST, 2470.01 FEET ALONG THE DONATION CLAIM LINE AND SOUTH 22°32'07" EAST, 1374.17 FEET ALONG THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH FROM THE INTERSECTION OF THE LINE BETWEEN THE DONATION CLAIMS OF FRANCIS MCNATT AND HENRY VAN ASSELT WITH THE EAST LINE OF SECTION 33, TOWNSHIP 24 NORTH, RANGE 4 EAST, WILLAMETTE MERIDIAN, IN KING COUNTY, WASHINGTON, SAID POINT BEING AT THE INTERSECTION OF THE WESTERLY MARGIN OF EAST MARGINAL WAY SOUTH WITH THE NORTH LINE OF VAN DE VANTER STOCK FARM TRACT AND THE POINT OF BEGINNING OF SAID "LINE B";
THENCE NORTH 88°18'58" WEST, A DISTANCE OF 14.95 FEET;
THENCE NORTH 85°46'07" WEST, A DISTANCE OF 486.97 FEET;
THENCE NORTH 83°08'12" WEST. A DISTANCE OF 117.00 FEET;
THENCE SOUTH 85°06'48" WEST. A DISTANCE OF 119.00 FEET;
THENCE SOUTH 71°49'21" WEST, A DISTANCE OF 110.17 FEET;
THENCE SOUTH 62°42'32" WEST, A DISTANCE OF 842.28 FEET, TO THE EASTERLY LINE OF THE RIGHT OF WAY OF COMMERCIAL WATERWAY DISTRICT NO. 1 AND THE TERMINUS OF SAID "LINE B";
TOGETHER WITH THE RIGHT TO CROSS THE PARCEL CONVEYED TO GREAT NORTHERN RAILWAY COMPANY AS RESERVED IN DEED RECORDED UNDER RECORDING NUMBER 4784818.

SITUATE IN THE CITY OF TUKWILA, COUNTY OF KING, STATE OF WASHINGTON.

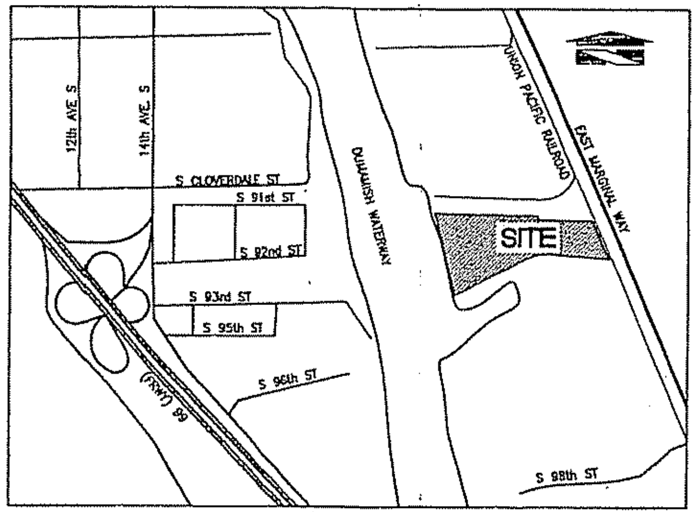
LOT 1

THAT PORTION OF THE ABOVE LYING WEST OF THE FOLLOWING "LINE C";
COMMENCING AT THE AFORESAID POINT OF BEGINNING OF SAID "LINE A";
THENCE SOUTH 88°51'08" EAST, A DISTANCE OF 772.68 FEET TO THE POINT OF BEGINNING;
THENCE SOUTH 00°50'26" EAST, 445.25 FEET TO ABOVE-MENTIONED "LINE B" AND THE POINT OF TERMINUS.

LOT 2

THAT PORTION OF THE ABOVE LYING EAST OF THE FOLLOWING "LINE C";
COMMENCING AT THE AFORESAID POINT OF BEGINNING OF SAID "LINE A";
THENCE SOUTH 88°51'08" EAST, A DISTANCE OF 772.68 FEET TO THE POINT OF BEGINNING;
THENCE SOUTH 00°50'26" EAST, 445.25 FEET TO ABOVE-MENTIONED "LINE B" AND THE POINT OF TERMINUS.

VOLUME PAGE



VICINITY MAP

URBAN SHORELINE STANDARDS*

1. BUILDING SETBACK – 50 FEET
2. OUTSIDE STORAGE SETBACK – 20 FEET
3. PARKING – BENEATH OR LANDWARD OF THE USE IT SERVES (VARIANCE REQUIRED)
4. VEGETATION BUFFER – NONE
5. LANDSCAPING SCREEN/BUFFER FOR PARKING – 5 FEET
6. MAXIMUM BUILDING HEIGHT – 35 FEET

*ALL SETBACKS TO BE MEASURED FROM THE ORDINARY HIGH WATER MARK OF THE DUWAMISH WATERWAY

SITE DATA

1. TAX PARCEL NO.: 542260-0010
2. SITE ADDRESS: 9229 EAST MARGINAL WAY
3. ZONING: MIC/H (MANUFACTURING INDUSTRIAL CENTER/HEAVY INDUSTRIAL)
4. COMPREHENSIVE PLAN: MIC/H
5. EXISTING USE: ENVIRONMENTAL REMEDIATION / UNUSED DEVELOPED SITE
6. PROPOSED USE: OUTDOOR STORAGE AND WAREHOUSE
7. BUILDING SETBACK: FRONT=20 FEET, SIDE=0 FEET, REAR=0 FEET

HORIZONTAL DATUM - BASIS OF BEARINGS

NORTH AMERICAN DATUM OF 1927 **NAD-27**
WASHINGTON STATE PLANE COORDINATE SYSTEM – NORTH ZONE
THE MONUMENTED OFFSET CENTERLINE OF EAST MARGINAL WAY TAKEN AS North 22°32'07" West. PER Book 72, of Surveys, Page 222, KING COUNTY RECORDS.

VERTICAL DATUM - BASIS OF ELEVATIONS

NATIONAL GEODETIC VERTICAL DATUM OF 1929 **NGVD-29**

ORIGINAL PROJECT BENCHMARK FROM 1988 SURVEY BY BARGHAUSEN CONSULTING ENGINEERS 2" BRASS DISK SURFACE MONUMENT ON EAST SIDE OF 102nd St. BRIDGE (DESTROYED)

SITE BENCHMARK
TOP OF MAGNAIL SET ON WEST SIDE OF EAST MARGINAL WAY
(SEE DRAWING) ELEVATION = 17.91 FEET

RECORDER'S CERTIFICATE ....

FILED FOR RECORD THIS ...... DAY OF ...., 20......
AT .... M IN BOOK .... OF ....AT PAGE.........AT
THE REQUEST OF WILLIAM R. WORKMAN

....
MANAGER SUPT. OF RECORDS

LAND SURVEYOR'S CERTIFICATE:

I, William R. Workman, registered as a land surveyor by the State of Washington, certify that this plat is based on an actual survey of the land described herein, conducted by me or under my supervision; that the distances, courses and angles are shown thereon correctly; and that the monuments other than those monuments approved for setting at a later date, have been set and lot corners staked on the ground as depicted on the plat.

______________________ Date
WILLIAM R. WORKMAN
Professional Land Surveyor
Washington Registration No. 41298

9/9/05
WILLIAM R. WORKMAN
41298
EXPIRES 08-19-2007

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

DRAWN BY: SRF
DATE: 8/26/05
SCALE: AS SHOWN
CHECKED BY: WRW
JOB NO.: 10265

RECORD OF SURVEY

PORTION of the F. McNATT Donation Land Claim No. 38,
In the South 1/2 of SECTION 33
Township 24 North, Range 4 East, Willamette Meridian
City of TUKWILA KING County State of WASHINGTON

FOR: **DAVIS PROPERTY & INVESTMENT**
P.O. Box 1043
Kent, WA 98035-1043

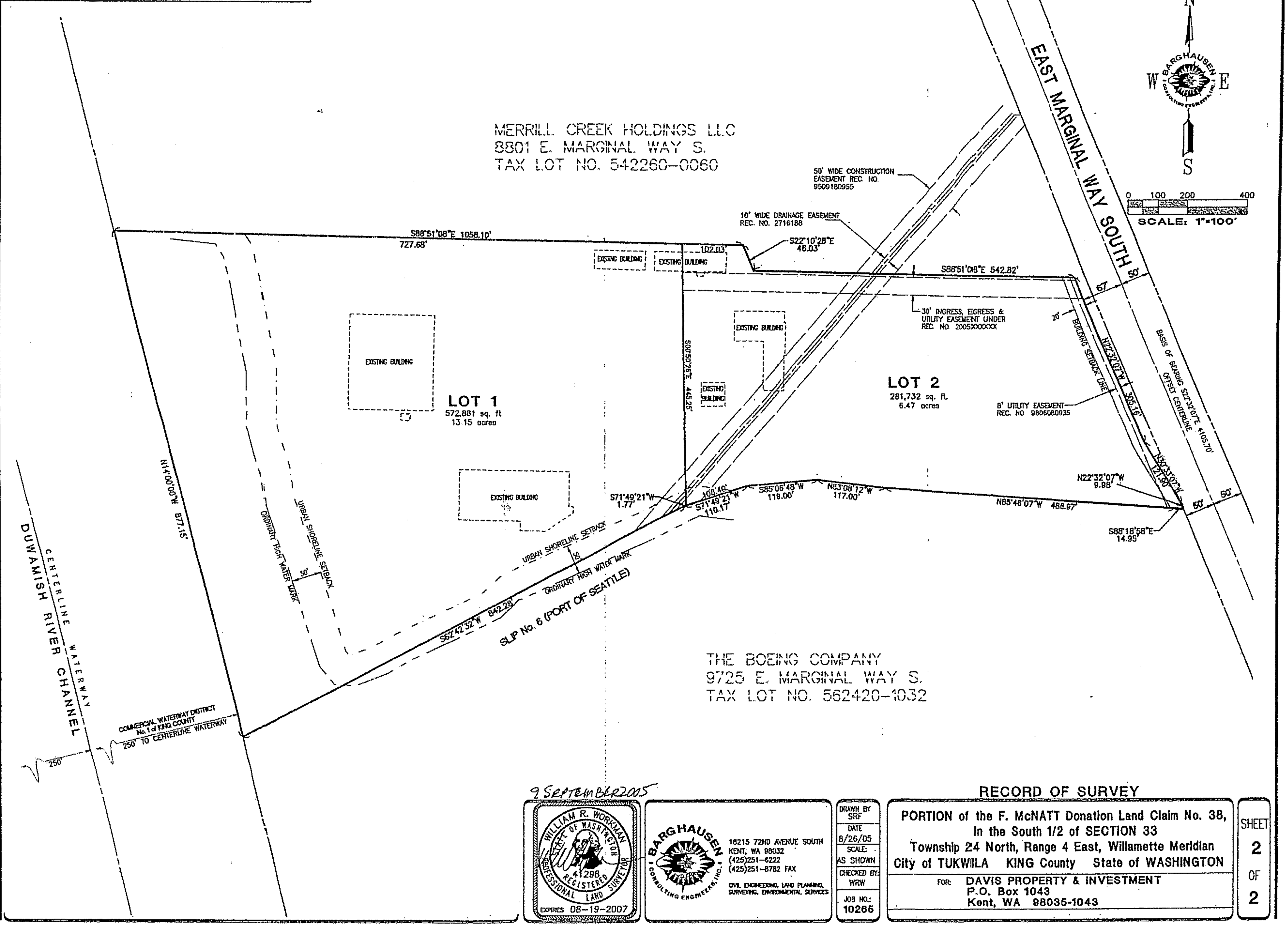
SHEET 1 OF 2

File: P:\10000s\10265\survey\plats\10265SP01.dwg Date/Time: 09/09/2005 13:34 Scale: 1=100 xflink Xrefs:

City of Tukwila
Department of Community Development
6300 Southcenter Boulevard, Tukwila, WA 98188
Telephone (206) 431-3670 FAX (206) 431-3665
E-mail: tukplan@tukwila.wa.us

SHORT PLAT NO. ____________

VOLUME PAGE



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9 SEPTEMBER 2005

WILLIAM R. WORKMAN
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Kent, WA 98035-1043

SHEET 2 OF 2

APPENDIX C

Boring Logs

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-1

BORING LOCATION: East Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: Cascade Drilling, Inc.

DATE STARTED: 8/24/06

DATE FINISHED: 8/24/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 13.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Power Probe 9630 Pro-PTO

DEPTH TO WATER (ft.) FIRST ~8.5 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]

LOGGED BY: Z. Satterwhite

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
0–1					SILTY SAND (SM): very dark gray (10YR 3/1), moist, 80% fine to medium sand, 20% low plasticity fines	
1				5.8	SILT (ML): gray (10YR 5/1), moist, 90% fines, 10% fine sand, firm, low plasticity	
2						OVM = Thermo Environmental 580B PID calibrated with 100 ppm isobutylene standard.
3				10.1		
4	GMX-1-4.0	■				
5				460	SILTY SAND (SM): brown mottled black and beige moist, 80% fine to medium sand, 20% low plasticity fines, odor	
6						
7				884	SANDY SILT (ML): pale brown and black (10YR 6/3), moist, 70% fines, 30% fine to coarse sand, firm, low plasticity, odor; silt and sand layers are intermingled and appear to be reworked native material	
8	GMX-1-8.0	■			wet, sheen	Grab groundwater sample GMX-1 collected through 3/4-inch O.D. PVC temporary well casing with 5 feet of stainless steel-wrapped well screen (0.010-inch slot size) pre-packed with 2/20 sand (screen interval 8 to 13 feet bgs).
9				>1129		
10						
11				49	POORLY GRADED SAND with SILT (SP-SM): brown to black (5Y 2.5/1), wet, 90% fine to coarse sand, 10% low plasticity fines, iron-stained, odor	
12						
13					Bottom of boring at 13.0 feet.	
14						
15						
16						
17						
18						
19						
20						
21						

OAKBOREV (REV. 3/00)

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-2

BORING LOCATION: East Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: Cascade Drilling, Inc.

DATE STARTED: 8/24/06

DATE FINISHED: 8/24/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 13.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Power Probe 9630 Pro-PTO

DEPTH TO WATER (ft.) FIRST ~9.0 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]

LOGGED BY: Z. Satterwhite

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
0–1					SILTY SAND (SM): very dark gray (10YR 3/1), moist, 80% fine to medium sand, 20% low plasticity fines	
1				339	SANDY SILT (ML): dark gray mottled pale brown (10YR 4/1), moist, 70% fines, 30% fine to coarse sand, low plasticity, firm	OVM = Thermo Environmental 580B PID calibrated with 100 ppm isobutylene standard.
3	GMX-2-2.5			436		
5					↓ black/pale brown laminations (native?); odor	
6				320		
7.5					POORLY GRADED SAND with SILT (SP-SM): black (5Y 2.5/1), moist, 90% fine to medium sand, 10% low plasticity fines, odor, sheen	Grab groundwater sample GMX-2 collected through 3/4-inch O.D. PVC temporary well casing with 5 feet of stainless steel-wrapped well screen (0.010-inch slot size) pre-packed with 2/20 sand (screen interval 8 to 13 feet bgs).
8–9	GMX-2-8.0			>1063		
9					↓ wet	
11				761		
13					Bottom of boring at 13.0 feet.	

OAKBOREV (REV. 3/00)

Geomatrix

Project No. 8769.005

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-3

BORING LOCATION: East Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: Cascade Drilling, Inc.

DATE STARTED: 8/24/06

DATE FINISHED: 8/24/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 15.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Power Probe 9630 Pro-PTO

DEPTH TO WATER (ft.) FIRST ~7.5 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]

LOGGED BY: Z. Satterwhite

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
0–1					SILTY SAND (SM): very dark gray (10YR 3/1), moist, 65% fine sand, 25% low plasticity fines, 10% fine to coarse gravel	
1–3.5	GMX-3-2.0			1.2	SILT with SAND (ML): grayish brown (10YR 5/2), moist, 85% fines, 15% fine sand, firm, low plasticity	OVM = Thermo Environmental 580B PID calibrated with 100 ppm isobutylene standard.
3.5–7.5	GMX-3-5.5			1.5 1.5	SILTY SAND (SM): grayish brown (10YR 5/2), moist, 65% fine sand, 45% low plasticity silt, laminations varving (native?) damp/slightly wet	
7.5–12				2.1 1.8	SANDY SILT (ML): pale brown (10YR 6/3), wet, 65% fines, 45% fine sand, low plasticity, firm, laminations	Grab groundwater sample GMX-3 collected through 3/4-inch O.D. PVC temporary well casing with 5 feet of stainless steel-wrapped well screen (0.010-inch slot size) pre-packed with 2/20 sand (screen interval 10 to 15 feet bgs).
12–15				1.1	POORLY GRADED SAND with SILT (SP-SM): black (5Y 2.5/1), wet, 90% fine to coarse sand, 10% low plasticity fines	
15					Bottom of boring at 15.0 feet.	

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-4

BORING LOCATION: East Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: Cascade Drilling, Inc.

DATE STARTED: 8/24/06

DATE FINISHED: 8/24/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 14.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Power Probe 9630 Pro-PTO

DEPTH TO WATER (ft.) FIRST ~7.5 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]

LOGGED BY: Z. Satterwhite

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
0–1		0.5	SILTY SAND (SM): very dark gray (10YR 3/1), moist, 65% fine sand, 25% low plasticity fines, 10% fine to coarse gravel	
1–3.5	GMX-4-2.0	0.5	SILT with SAND (ML): grayish brown (10YR 5/2), moist, 85% fines, 15% fine sand, firm, low plasticity laminations (native?)	OVM = Thermo Environmental 580B PID calibrated with 100 ppm isobutylene standard.
3.5–7.5	GMX-4-6.0	0.5 1.0	SILTY SAND (SM): grayish brown (10YR 5/2), moist, 65% fine sand, 45% low plasticity silt, laminations	
7.5–11.5		1.3 1.4	SANDY SILT (ML): pale brown (10YR 6/3), wet, 65% fines, 45% fine sand, low plasticity, firm, laminations iron oxide staining	Grab groundwater sample GMX-4 collected through 3/4-inch O.D. PVC temporary well casing with 5 feet of stainless steel-wrapped well screen (0.010-inch slot size) pre-packed with 2/20 sand (screen interval 7 to 12 feet bgs).
11.5–14		0.8	POORLY GRADED SAND with SILT (SP-SM): black (5Y 2.5/1), wet, 90% fine to coarse sand, 10% low plasticity fines	
14			Bottom of boring at 14.0 feet.	

OAKBOREV (REV. 3/00)

Geomatrix

Project No. 8769.005

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-5

BORING LOCATION: West Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: Cascade Drilling, Inc.

DATE STARTED: 8/24/06

DATE FINISHED: 8/24/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 20.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Power Probe 9630 Pro-PTO

DEPTH TO WATER (ft.) FIRST ~13.5 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]

LOGGED BY: Z. Satterwhite

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
1					SILTY SAND with GRAVEL (SM): dark grayish brown mottled dark orange (10YR 4/2), moist, 65% fine to medium sand, 20% low plasticity fines, 15% fine to coarse subangular to angular gravel, trace black coal	
2				2.0		OVM = Thermo Environmental 580B PID calibrated with 100 ppm isobutylene standard.
3				1.0		
4		☒			SILTY SAND (SM): very dark greenish gray (10Y 3/1), moist, 65% fine to coarse sand, 30% low plasticity fines, 5% fine to coarse gravel	
5				1.0		
6						
7				1.0	reddish horizon	
8		☒				
9	GMX-5-8.0	■		2.0		
10				1.0		
11					SILT (ML): pale brown mottled dark gray (10YR 6/3), wet, 90% fines, 10% fine sand, low plasticity, firm	
12		☒			SANDY SILT (ML): pale brown mottled dark gray (10YR 6/3), wet, 70% fines, 30% fine to coarse sand, low plasticity, firm, odor	
13	GMX-5-12.0	■		>1099		
14				52	saturated	Grab groundwater samples GMX-5 and GMX-5A (field duplicate) collected through 1-inch O.D. PVC temporary well casing with 5 feet of screen (0.010-inch slot size) not pre-packed (screen interval 13 to 18 feet bgs).
15					wood POORLY GRADED SAND with SILT (SP-SM): black (5Y 2.5/1), wet, 90% fine to coarse sand, 10% low plasticity fines	
16		☒				
17				70		
18						
19						
20				13		
21					Bottom of boring at 20.0 feet.	

OAKBOREV (REV. 3/00)

PROJECT: Former Rhone-Poulenc Site Tukwila, Washington	**Boring No. GMX-6**
BORING LOCATION: East Parcel	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 8/26/06 — DATE FINISHED: 8/26/06
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 16.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: AMS 9630 PTO Probe	DEPTH TO WATER (ft.) FIRST ~13.0 — COMPL. NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]	LOGGED BY: J. Long
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long — REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
					SILT with SAND (ML): very dark gray (2.5Y 3/1), moist, 90% fines, 10% fine sand, low plasticity, firm	
1						
2				0		OVM = Thermo Environmental 580B PID calibrated with 100 ppm isobutylene standard.
3						
4				0		
5					▽ very dark grayish brown (2.5Y 3/2); 20% fine sand	
6						
7						
8				0		
9					SILTY SAND (SM): dark olive brown (2.5Y 3/3), moist, 75% fine to medium sand, 15% medium plasticity silt, 10% fine to coarse subrounded gravel	
10						
11						Grab groundwater sample GMX-6 collected through 1-inch O.D. PVC temporary well casing with 5 feet of screen (0.010-inch slot size) not pre-packed (screen interval 11 to 16 feet bgs).
12				0		
13	GMX-6-13.0	■			POORLY GRADED SAND (SP): black (5Y 2.5/1), wet, 95% fine to medium sand, 5% fines	
14				0		
15						
16					Bottom of boring at 16.0 feet.	
17						
18						
19						
20						
21						

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-7

BORING LOCATION: East Parcel	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 8/26/06 — DATE FINISHED: 8/26/06
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 16.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: AMS 9630 PTO Probe	DEPTH TO WATER (ft.) FIRST ~10.0 — COMPL. NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]	LOGGED BY: J. Long
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long — REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES			OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
	Sample No.	Sample	Blows/ Foot			
					SILT (ML): dark gray (5Y 4/1), dry, 95% fines, 5% fine sand, medium plasticity, firm	
1						
2					SILT with SAND (ML): dark grayish brown (2.5Y 4/2), moist, 85% fines, 15% fine sand, medium plasticity, firm	OVM = Thermo Environmental 580B PID calibrated with 100 ppm isobutylene standard.
3						
4				0	SILTY SAND (SM): dark gray (2.5Y 4/1), moist, 70% fine sand, 30% medium plasticity fines	
5						
6						
7					SILT with SAND (ML): dark grayish brown (2.5Y 4/2), moist, 85% fines, 15% fine sand, low plasticity, firm	
8				0		
9					SILTY SAND (SM): dark gray (2.5Y 4/1), wet, 70% fine sand, 30% medium plasticity fines	
10						
11						Grab groundwater sample GMX-7 collected through 1-inch O.D. PVC temporary well casing with 5 feet of screen (0.010-inch slot size) not pre-packed (screen interval 11 to 16 feet bgs).
12		☒		0	POORLY GRADED SAND (SP): dark gray (2.5Y 4/1), wet, 95% fine to medium sand, 5% fines	
13						
14						
15						
16					Bottom of boring at 16.0 feet.	
17						
18						
19						
20						
21						

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-8

BORING LOCATION: East Parcel	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 8/26/06 — DATE FINISHED: 8/26/06
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 12.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: AMS 9630 PTO Probe	DEPTH TO WATER (ft.) FIRST ~10.0 — COMPL. NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]	LOGGED BY: J. Long
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long — REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
					SILT (ML): very dark grayish brown (2.5Y 3/2), dry, 95% fines, 5% fine sand, low plasticity, firm	
1						
2						OVM = Thermo Environmental 580B PID calibrated with 100 ppm isobutylene standard.
3					POORLY GRADED SAND with SILT (SP-SM): dark grayish brown (2.5Y 4/2), moist, 90% fine sand, 10% low plasticity fines	
4				16		
5						
6						
7						
8				>3000	▽ strong toluene odor; silt content increasing	
9				120		
10					SILT with SAND (ML): very dark gray (2.5Y 3/1), wet, 75% fines, 25% fine sand, low plasticity, firm, less odor	
11					POORLY GRADED SAND (SP): very dark gray (2.5Y 3/1), wet, 95% fine to medium sand, 5% fines Bottom of boring at 12.0 feet.	
12				0.0		
13						
14						
15						
16						
17						
18						
19						
20						
21						

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-9

BORING LOCATION: East Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: Cascade Drilling, Inc.

DATE STARTED: 8/26/06

DATE FINISHED: 8/26/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 12.2

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: AMS 9630 PTO Probe

DEPTH TO WATER (ft.) FIRST ~10.0 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4’ x 1.5"]

LOGGED BY: J. Long

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
					SILT (ML): dark grayish brown (2.5Y 4/2), moist, 95% fines, 5% fine sand, medium plasticity, firm	
1				<1.0		
2						OVM = VX-500 Industrial Scientific PID calibrated with 100 ppm isobutylene standard.
3						
4					SILTY SAND (SM): dark gray (2.5Y 4/1), moist, 60% fine to medium sand, 40% non-plastic fines, light 1-3mm bedding	
5				0.5		
6						
7						
					SANDY SILT (ML): dark gray (2.5Y 4/1), moist, 75% fines, 25% fine sand, medium plasticity, firm	
8						
9					SILTY SAND (SM): dark gray (2.5Y 4/1), moist, 80% fine sand, 20% low plasticity fines	
10				10	▽ wet	
11						
12					POORLY GRADED SAND (SP): very dark gray (2.5Y 3/1), wet, 95% fine to medium sand, 5% fines	
13					Bottom of boring at 12.2 feet.	
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OAKBOREV (REV. 3/00)

Geomatrix

Project No. 8769.005

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-10

BORING LOCATION: East Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: Cascade Drilling, Inc.

DATE STARTED: 8/26/06

DATE FINISHED: 8/26/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 16.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: AMS 9630 PTO Probe

DEPTH TO WATER (ft.) FIRST ~10.0 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]

LOGGED BY: J. Long

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
1				<1.0	SILT (ML): dark grayish brown (2.5Y 4/2), moist, 95% fines, 5% fine sand, low plasticity, firm	
2					CLAYEY SILT (ML): dark grayish brown (2.5Y 4/2), moist, 95% fines, 5% fines sand, medium plasticity, firm	OVM = VX-500 Industrial Scientific PID calibrated with 100 ppm isobutylene standard.
4		☒		0.0	SILT with SAND (ML): dark grayish brown (2.5Y 4/2), moist, 85% fines, 15% fine sand, medium plasticity, firm	
7					some sand to sandy silt	
9	GMX-10-9.0	■			SILTY SAND (SM): very dark grayish brown (2.5Y 4/2), moist, 60% fine to medium sand, 40% low plasticity fines ▼ wet	
11				0.0		Grab groundwater sample GMX-7 collected through 1-inch O.D. PVC temporary well casing with 5 feet of screen (0.010-inch slot size) not pre-packed (screen interval 11 to 16 feet bgs).
16					Bottom of boring at 16.0 feet.	

PROJECT: Former Rhone-Poulenc Site Tukwila, Washington	**Boring No. GMX-11**
BORING LOCATION: West Parcel	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 8/26/06 DATE FINISHED: 8/26/06
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 16.0 MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Diedrich D-25	DEPTH TO WATER (ft.) FIRST ~11.0 COMPL. NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]	LOGGED BY: J. Long
HAMMER WEIGHT: NA DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
0					POORLY GRADED SAND (SP): brown (7.5YR 4/3), moist, 95% fine to medium sand, 5% fines	
2						OVM = VX-500 Industrial Scientific PID calibrated with 100 ppm isobutylene standard.
3					very dark gray (2.5Y 3/1)	
4				0.0		
6					sand with irregular 1-2" gravel (fill); some silt	
7.5					SILTY SAND (SM)	
8				0.0	SILT (ML): light olive brown (2.5Y 5/3), moist, 95% fines, 5% fine sand, medium plasticity, firm	
9				>4000	SILTY SAND (SM): very dark gray (2.5Y 3/1), moist, 70% fine sand, 30% low plasticity fines	
12.5					POORLY GRADED SAND (SP): very dark gray (2.5Y 3/1), wet, 95% fine to medium sand, 5% fines, very strong odor	
15				1500		
16					Bottom of boring at 16.0 feet.	

OAKBOREV (REV. 3/00)

PROJECT: Former Rhone-Poulenc Site Tukwila, Washington	**Boring No. GMX-12**
BORING LOCATION: West Parcel	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 8/26/06 · DATE FINISHED: 8/26/06
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 12.2 · MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Diedrich D-25	DEPTH TO WATER (ft.) FIRST NA · COMPL. NA
SAMPLING METHOD: Geoprobe macro-core sampler [4’ x 1.5"]	LOGGED BY: J. Long
HAMMER WEIGHT: NA · DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long · REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
0–8					No log from 0 to 8 feet bgs, due to liner shortage.	OVM = VX-500 Industrial Scientific PID calibrated with 100 ppm isobutylene standard.
8		☒			SILT (ML): grayish brown (2.5Y 5/2), wet, 95% fines, 5% fine sand, medium plasticity, firm, fine layering, mottled	
12				<1.0 >4000	POORLY GRADED SAND (SP): very dark gray (2.5Y 3/1), moist, 95% fine to medium sand, 5% fines, dark rounded grains, very strong toluene odor	No PID response at 1 inch above contact.
12.2					Bottom of boring at 12.2 feet.	

OAKBOREV (REV. 3/00)

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-13

BORING LOCATION: West Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: ESN Northwest, Inc.

DATE STARTED: 10/13/06

DATE FINISHED: 10/13/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 12.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Strataprobe

DEPTH TO WATER (ft.) FIRST 9.8 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]

LOGGED BY: S. Mearon

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
					ASPHALTIC CONCRETE (3 inches)	
1					AGGREGATE BASE (6 inches)	
2				0 HS	POORLY GRADED SAND (SP): dark grayish brown (2.5Y 4/2), moist, 95% fine to medium sand, 5% nonplastic fines	OVM = ThermoEnvironmental Instruments 580B PID calibrated with 100 ppm isobutylene standard.
3				1 HS	POORLY GRADED SAND with SILT (SP-SM): olive brown (2.5Y 4/3), moist, 90% fine to medium sand, 10% nonplastic fines coaly fragments	
4					SILTY SAND (SM): dark gray (2.5Y 4/1), moist, 75% fine to medium sand, 25% nonplastic fines	
5				0 HS	SILT (ML): dark gray (5Y 4/1), moist, 90% fines, 10% fine sand, nonplastic, firm	
6				0 HS	SILTY SAND (SM): dark gray (5Y 4/1), moist, 80% fine sand, 20% nonplastic fines, carbonaceous laminations	
7						
8						
9				0 HS	olive brown (2.5Y 4/3), 85% fine to medium sand, 15% nonplastic fines	Driller comment: water at 11 feet bgs in boring.
10				0 HS	dark gray (5Y 4/1), sand fraction fine	
11				0 HS	POORLY GRADED SAND (SP): very dark gray (2.5Y 3/1), wet, 95% fine to medium sand, 5% fines, trace coarse sand	
12					SILT (ML): dark gray (5Y 4/1), moist, 95% fines, 5% fine sand, nonplastic, firm, carbonaceous laminations	Borehole destroyed using bentonite chips placed from total depth to ground surface.
					Bottom of boring at 12.0 feet.	
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OAKBOREV (REV. 3/00)

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-14

BORING LOCATION: West Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: ESN Northwest, Inc.

DATE STARTED: 10/13/06

DATE FINISHED: 10/13/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 14.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Strataprobe

DEPTH TO WATER (ft.) FIRST 12.8 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4’ x 1.5"]

LOGGED BY: S. Mearon

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
					ASPHALTIC CONCRETE (3 inches)	
1					AGGREGATE BASE (5 inches)	
2				0 HS	POORLY GRADED SAND (SP): dark grayish brown (2.5Y 4/2), moist, 95% fine to medium sand, 5% nonplastic fines	OVM = ThermoEnvironmental Instruments 580B PID calibrated with 100 ppm isobutylene standard.
3				0 HS	SILTY SAND with GRAVEL (SM): olive gray (5Y 4/2), moist, 65% fine to medium sand, 20% fine gravel, 15% nonplastic fines	
4					POORLY GRADED SAND with SILT (SP-SM): olive brown (2.5Y 4/3), moist, 90% fine to medium sand, 10% non-plastic fines, trace fine gravel	
5				0 HS	SILTY SAND (SM): black (2.5Y 2.5/1)	
6					SILT (ML): dark gray (5Y 4/1), moist, 90% fines, 10% fine sand, nonplastic, firm	
7				0 HS		
8		☒				
9				0 HS	POORLY GRADED SAND with SILT and GRAVEL (SP-SM): very dark grayish brown (2.5Y 3/2), moist, 70% fine to medium sand, 20% fine gravel, 10% nonplastic fines	Driller comment: water at 12.5 feet bgs in boring.
10					SILT (ML): dark gray (5Y 4/1), moist, 95% fines, 5% fine sand, nonplastic, firm	
11				0 HS	organic material "nodules"	
					carbonaceous laminations	
12					POORLY GRADED SAND (SP): very dark gray (2.5Y 3/1)	Borehole destroyed using bentonite chips placed from total depth to ground surface.
13				0 HS	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): dark grayish brown (2.5Y 4/2)	
					SILTY SAND (SM): bluish black (5PB 2.5/1), wet	
14				0 HS	POORLY GRADED SAND (SP): very dark gray (2.5Y 3/1)	
					Bottom of boring at 14.0 feet.	
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PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-15

BORING LOCATION: West Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: ESN Northwest, Inc.

DATE STARTED: 10/13/06

DATE FINISHED: 10/13/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 15.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Strataprobe

DEPTH TO WATER (ft.) FIRST 12.3 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]

LOGGED BY: S. Mearon

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
1				0	ASPHALTIC CONCRETE (2 inches) AGGREGATE BASE (5 inches)	
2				0	POORLY GRADED SAND (SP): dark grayish brown (2.5Y 4/2), moist, 95% fine to medium sand, 5% fines	OVM = ThermoEnvironmental Instruments 580B PID calibrated with 100 ppm isobutylene standard.
3				0	SILTY SAND with GRAVEL (SM): olive gray (5Y 4/2), moist, 55% fine to coarse sand, 30% fine to coarse gravel, 15% nonplastic fines black (5Y 2.5/1)	
4				0	SILT (ML): dark gray (2.5Y 4/1), moist, 90% fines, 10% fine sand, nonplastic, firm	
5				0	POORLY GRADED SAND (SP): black (5Y 2.5/1), moist, 95% fine to medium sand, 5% fines	
6				0	SANDY SILT (ML): black (5Y 2.5/1), moist, 70% fines, 30% fine sand, nonplastic, firm	Pushed 3-foot interval 8 to 11 feet bgs.
7				0	SILT (ML): dark gray (2.5Y 4/1), moist, 95% fines, 5% fine sand, nonplastic, firm	Grab groundwater sample GMX-15-GW collected through 3 feet of stainless steel screen placed in borehole from 15.2 to 17 feet bgs.
8				1.3	SP carbonaceous laminations	
9				59.6		
10				70.4	laminations increase in abundance	
11				185	POORLY GRADED SAND (SP): black (5Y 2.5/1), moist, 95% fine sand, 5% fines, trace medium sand, odor	
12				49.9 82.6	SILT (ML): dark gray (2.5Y 4/1), mottled with black (5Y 2.5/1), moist, 95% fines, 5% fine sand, nonplastic, firm SILTY SAND WITH GRAVEL (SM)	Borehole destroyed using bentonite chips placed from total depth to ground surface.
13					POORLY GRADED SAND with SILT (SP-SM): black (5Y 2.5/1), wet, 90% fine to medium sand, 10% nonplastic fines, odor	
14	GMX-15-14.0			158		
15					Bottom of boring at 15.0 feet.	
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OAKBOREV (REV. 3/00)

PROJECT: Former Rhone-Poulenc Site Tukwila, Washington	**Boring No. GMX-16**
BORING LOCATION: West Parcel	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 10/13/06 — DATE FINISHED: 10/13/06
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 16.0 — MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Strataprobe	DEPTH TO WATER (ft.) FIRST 15.4 — COMPL. NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]	LOGGED BY: S. Mearon
HAMMER WEIGHT: NA — DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long — REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
			ASPHALTIC CONCRETE (3 inches)	
1			AGGREGATE BASE (12 inches)	
			POORLY GRADED SAND (SP): dark grayish brown (2.5Y 4/2),	
2		0	SILTY SAND with GRAVEL (SM): very dark grayish brown (2.5Y 3/2), moist, 50% fine to coarse sand, 35% fine to coarse gravel, 15% nonplastic fines	OVM = ThermoEnvironmental Instruments 580B PID calibrated with 100 ppm isobutylene standard.
3		0	POORLY GRADED SAND (SP): very dark gray (2.5Y 3/1), moist, 95% fine to medium sand, 5% fines, trace brick fragments SILT (ML)	
5		0		
6			SILTY SAND (SM)	
			PLYWOOD	
7		0	SILT (ML): dark gray (5Y 4/1), moist, 95% fines, 5% fine sand, nonplastic, firm	
8		0 0 HS	carbonaceous laminations, mottled with brown (7.5YR 5/3)	
9			SILT with SAND (ML): black (5Y 2.5/1), moist, 85% fines, 15% fine sand, nonplastic, firm	
10	GMX-16-10.5	202 HS	POORLY GRADED SAND with SILT (SP-SM): black (5Y 2.5/1), moist, 90% fine to medium sand, 10% nonplastic fines, odor (faint)	
12		28.9 HS	SILT (ML): dark gray (2.5Y 4/1), mottled with brown (7.5YR 5/3), moist, 95% fines, 5% fine sand, nonplastic, firm, stringers of POORLY GRADED SAND WITH SILT (SP-SM)	Borehole destroyed using bentonite chips placed from total depth to ground surface.
14		107	odor	
15		23.1	SILTY SAND WITH GRAVEL (SM): dark grayish brown (2.5Y 4/2)	
16			POORLY GRADED SAND with SILT (SP-SM): black (5Y 2.5/1), wet, 90% fine to medium sand, 10% nonplastic fines, odor (faint)	
17			Bottom of boring at 16.0 feet.	

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-17

BORING LOCATION: West Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: ESN Northwest, Inc.

DATE STARTED: 10/13/06

DATE FINISHED: 10/13/06

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 16.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Strataprobe

DEPTH TO WATER (ft.) FIRST 15.0 COMPL. NA

SAMPLING METHOD: Geoprobe macro-core sampler [4’ x 1.5"]

LOGGED BY: S. Mearon

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
					ASPHALTIC CONCRETE (3 inches)	
1				0	AGGREGATE BASE (8 inches)	
2					POORLY GRADED SAND (SP): dark grayish brown (2.5Y 4/2), moist, 95% fine to medium sand, 5% fines	OVM = ThermoEnvironmental Instruments 580B PID calibrated with 100 ppm isobutylene standard.
3				0	SILTY SAND with GRAVEL (SM): dark grayish brown (2.5Y 4/2), moist, 55% fine to coarse sand, 30% fine gravel, 15% nonplastic fines	
4				0	very dark gray (2.5Y 3/1) trace brick fragments gravel fraction fine to coarse	
5				0	POORLY GRADED SAND (SP): very dark gray (5Y 3/1), moist, 95% fine to medium sand, 5% fines	
6						
7				0 0	SILTY SAND (SM): very dark gray (5Y 3/1), moist, 80% fine sand, 20% nonplastic fines	
8					SILT (ML): very dark gray (5Y 3/1), moist, 90% fines, 10% fine sand, nonplastic, firm brown (7.5YR 5/3) mottled with dark gray (2.5Y 4/1), soft, carbonaceous material	
9				0 HS		Rock in shoe causes poor recovery 12 to 14 feet bgs.
10				0 HS	rootlets	
11					black (5Y 2.5/1)	
12				0	SILTY SAND (SM): very dark grayish brown (2.5Y 3/2), moist, 75% fine to coarse sand, 20% nonplastic fines, 5% fine gravel	Borehole destroyed using bentonite chips placed from total depth to ground surface.
13						
14				0 HS	80% fine to coarse sand, 20% nonplastic fines, trace fine gravel	
15				0 HS	POORLY GRADED SAND (SP): black (5Y 2.5/1), wet, 95% fine to medium sand, 5% fines	
16					Bottom of boring at 16.0 feet.	
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OAKBOREV (REV. 3/00)

PROJECT: Former Rhone-Poulenc Site Tukwila, Washington	**Boring No. GMX-18**
BORING LOCATION: West Parcel	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 10/13/06 · DATE FINISHED: 10/13/06
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 16.0 · MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Strataprobe	DEPTH TO WATER (ft.) FIRST 12.0 · COMPL. NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]	LOGGED BY: S. Mearon
HAMMER WEIGHT: NA · DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long · REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
					ASPHALTIC CONCRETE (3 inches)	
1				0	AGGREGATE BASE (6 inches)	
2				0	POORLY GRADED SAND with SILT and GRAVEL (SP-SM): grayish brown (2.5Y 5/2), moist, 45% fine to coarse sand, 45% fine to coarse gravel, 10% nonplastic fines dark grayish brown (2.5Y 4/2)	OVM = ThermoEnvironmental Instruments 580B PID calibrated with 100 ppm isobutylene standard.
4				0	grayish brown (2.5Y 5/2), 75% fine to coarse sand, 15% fine gravel, 10% nonplastic fines	
5				0	POORLY GRADED SAND (SP): olive brown (2.5Y 3/2), moist, 95% fine to medium sand, 5% fines, trace coarse sand and fine gravel	
7				0	POORLY GRADED SAND with SILT and GRAVEL (SP-SM): light olive brown (2.5Y 5/3), dry, 70% fine to coarse sand, 20% fine to coarse gravel, 10% nonplastic fines, concrete debris	Concrete debris in shoe causes poor recovery 8 to 12 feet bgs.
12				6.2	POORLY GRADED SAND (SP): wet	Borehole destroyed using bentonite chips placed from total depth to ground surface.
13				1.2	SILT with SAND (ML): very dark gray (2.5Y 3/1), moist, 80% fines, 20% fine sand, nonplastic, firm	
					SANDY SILT (ML): very dark gray (2.5Y 3/1), moist, 70% fines, 30% fine sand, nonplastic, firm, rootlets	
15				0	POORLY GRADED SAND with SILT (SP-SM)	
16					Bottom of boring at 16.0 feet.	

OAKBOREV (REV. 3/00)

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-19

BORING LOCATION: West Parcel	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: ESN Northwest, Inc.	DATE STARTED: 10/13/06 DATE FINISHED: 10/13/06
DRILLING METHOD: Direct push	TOTAL DEPTH (ft.): 17.0 MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Strataprobe	DEPTH TO WATER (ft.) FIRST: 14.6 COMPL.: NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 1.5"]	LOGGED BY: S. Mearon
HAMMER WEIGHT: NA DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long REG. NO.: L.Hg. 1354

DEPTH (feet)	Sample No.	Sample	Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
0					ASPHALTIC CONCRETE (3 inches)	
					AGGREGATE BASE (6 inches)	
1				0	POORLY GRADED SAND (SP): dark grayish brown (2.5Y 4/2), moist, 95% fine to medium sand, 5% fines, trace coarse sand	OVM = ThermoEnvironmental Instruments 580B PID calibrated with 100 ppm isobutylene standard.
2				0	POORLY GRADED SAND with SILT and GRAVEL (SP-SM): very dark grayish brown (2.5Y 3/2), moist, 70% fine to coarse sand, 20% fine gravel, 10% nonplastic fines, brick fragments, concrete debris gravel fraction fine to coarse	
3				0		
5				0 HS	POORLY GRADED GRAVEL (GP): very dark gray (5Y 3/1), moist, 90% fine gravel, 5% fine to medium sand, 5% fines [PEA GRAVEL]	
6				0 HS	POORLY GRADED SAND with SILT (SP-SM): black (2.5Y 2.5/1), moist, 90% fine to medium sand, 10% nonplastic fines	
8					SILT (ML): brown (7.5YR 5/3), mottled with dark gray (2.5Y 4/1), moist, 95% fines, 5% fine sand, nonplastic, firm, carbonaceous laminations	
9				0 HS		
10				0 HS		
12						Borehole destroyed using bentonite chips placed from total depth to ground surface.
13				0	SANDY SILT (ML): black (2.5Y 2.5/1), moist, 70% fines, 30% fine sand, nonplastic, firm	
14	GMX-19-14.8			0		
15				0	POORLY GRADED SAND with SILT (SP-SM): black (2.5Y 2.5/1), wet	Used piston sampler to sample 14 to 17 feet bgs interval.
17					Bottom of boring at 17.0 feet.	

OAKBOREV (REV. 3/00)

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PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-20A

BORING LOCATION: East Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: Holt (Boart Longyear)

DATE STARTED: 5/15/07

DATE FINISHED: 5/15/07

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 20.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Geoprobe 6600HD

DEPTH TO WATER (ft.) FIRST 3.0 COMPL. 11.25

SAMPLING METHOD: Geoprobe macro-core sampler [5' x 2"]

LOGGED BY: A. Bazin

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
1				0	SILTY SAND (SM): grayish brown (10YR 5/2), moist, 55% fine to medium sand, 45% low plasticity fines [FILL]	
2				0		OVM = ThermoEnvironmental Instruments 580B PID calibrated with 100 ppm isobutylene standard.
3					wet	
4						
5						
6				0		
7				0		
8						
9				0	SILTY SAND (SM): very dark grayish brown (10YR 3/2), wet, 50% fine to medium sand, 40% low plasticity fines, 10% fine gravel (subrounded, up to 1/3")	
10						Grab groundwater sample GMX-20A-051507 collected through 5 feet of 1.5" diameter prepacked PVC screen (0.010" slot and 100 mesh silica sand) placed in borehole from 15 to 20 feet bgs.
11				32		
12					GP-GM: poorly-graded gravel with silt and sand	
13				132		
14						
15				0	POORLY GRADED GRAVEL with SILT and SAND (GP-GM): black (N 2.5/), wet, 65% fine gravel (subangular, up to 1/2"), 25% medium to coarse sand, 10% nonplastic fines with small piece of green glass	
16						
17						
18						
19						Borehole destroyed using bentonite chips placed from total depth to ground surface.
20					Bottom of boring at 20.0 feet.	
21						

OAKBOREV (REV. 3/00)

Geomatrix

Project No. 8769.005

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring No. GMX-21A

BORING LOCATION: East Parcel

ELEVATION AND DATUM: Not surveyed; datum is ground surface

DRILLING CONTRACTOR: Holt (Boart Longyear)

DATE STARTED: 5/15/07

DATE FINISHED: 5/15/07

DRILLING METHOD: Direct push

TOTAL DEPTH (ft.): 20.0

MEASURING POINT: Ground surface

DRILLING EQUIPMENT: Geoprobe 6600HD

DEPTH TO WATER (ft.) FIRST 5.0 COMPL. 12.85

SAMPLING METHOD: Geoprobe macro-core sampler [5' x 2"]

LOGGED BY: A. Bazin

HAMMER WEIGHT: NA

DROP: NA

RESPONSIBLE PROFESSIONAL: J. Long

REG. NO. L.Hg. 1354

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Not surveyed	REMARKS
1				1	SILTY SAND (SM): gray (10YR 5/1), moist, 65% fine to medium sand, 35% nonplastic fines [FILL]	
2				4		OVM = ThermoEnvironmental Instruments 580B PID calibrated with 100 ppm isobutylene standard.
3				3		
4						
5					SILTY SAND (SM): very dark gray (10YR 3/1), wet, 55% fine to medium sand, 35% low plasticity fines, 10% fine gravel (rounded up to 1/4")	
6				0		
7				0		
8						
9				0	SM: Silty sand with gravel	
10						Grab groundwater sample GMX-21A-051507 collected through 5 feet of 1.5" diameter prepacked PVC screen (0.010" slot and 100 mesh silica sand) placed in borehole from 14 to 19 feet bgs.
11				1	SILTY SAND with GRAVEL (SM): dark grayish brown (10YR 4/2), wet, 50% medium to coarse sand, 30% low plasticity fines, 20% fine gravel (up to 1", rounded)	
12				1		
13					SILTY SAND (SM): dark gray (10YR 4/1), wet, 55% fine sand, 45% nonplastic fines, odor	
14				2		
15				12	POORLY GRADED SAND (SP): black (N 2.5/), wet, 95% fine to coarse sand, 5% fines	
16				2		
17						
18				21		
19				12		Borehole destroyed using bentonite chips placed from total depth to ground surface.
20					Bottom of boring at 20.0 feet.	
21						

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Boring Log Explanation

BORING LOCATION:

ELEVATION AND DATUM:

DRILLING CONTRACTOR:

DATE STARTED:

DATE FINISHED:

DRILLING METHOD:

TOTAL DEPTH (ft.):

MEASURING POINT:

DRILLING EQUIPMENT:

DEPTH TO WATER | FIRST | COMPL. | 24 HRS.

SAMPLING METHOD:

LOGGED BY:

HAMMER WEIGHT:

DROP:

RESPONSIBLE PROFESSIONAL:

REG. NO.

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	REMARKS
					Notes	
1					1. Soil descriptions are in accordance with the USCS as set forth by ASTM D2488-90 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."	
2					2. Soil color described according to Munsell Color Chart.	
3					3. Dashed lines separating soil strata represent inferred boundaries between sampled intervals that may be abrupt or gradual transitions.	
4						
5					4. Solid lines represent approximate boundaries observed within sample intervals. 5. OVM = organic vapor meter, reading in volumetric parts per million. HS = head space measurement.	
6					6. Odor, if noted is subjective and not necessarily indicative of specific compounds or concentrations.	
7					7. NA = Not applicable.	
8					8. ND = No data.	
9						
10		▯			Interval of recovered soil collected with Geoprobe sampler.	
11						
12		☒			Interval of no recovery.	
13	GMX-15-13.0	■			Sample collected for chemical analysis and sample identification.	
14						
15						

KEYFORM (REV. 7/99)

APPENDIX D

Cost Estimate

TABLE D-1

CORRECTIVE MEASURES IMPLEMENTATION COST ESTIMATE[1]

Former Rhone-Poulenc East Marginal Way Facility
Tukwila, Washington

Description	Rate	Units	CMI Fieldwork and Reporting	
			Quantity	Cost
Labor - O&M				
Senior Professional	$170	hour	12	$2,040
Professional	$102	hour	124	$12,648
Drafting/Graphics	$85	hour	0	$0
Administrative	$75	hour	0	$0
Labor Total			**136**	**$14,700**
Labor - Report				
Senior Professional	$170	hour	18	$3,060
Professional	$102	hour	100	$10,200
Drafting/Graphics	$85	hour	32	$2,720
Administrative	$75	hour	40	$3,000
Labor Total			**190**	**$19,000**
Other Direct Costs				
Permitting	$6,000	lump	1	$6,000
Water level indicator	$22	day	8	$176
Horiba U-22 Rental	$121	day	8	$968
PID	$110	day	12	$1,320
Miscellaneous sampling equipment	$83	lump	12	$996
Shipping of instruments	$28	lump	5	$140
Drum	$66	lump	9	$594
8 Foot tall Perimeter fence (2 year rental)	$8	LF[2]	150	$1,200
4 foot temporary fence (2 year rental)	$6	LF	220	$1,320
Compressor/vacuum pump enclosure	$275	lump	2	$550
Compressor/vacuum pump	$715	each	3	$2,145
Granular Activated Carbon units and carbon	$9,900	lump	1	$9,900
Sparging pipes, valves, gauges, pipe rack	$6,600	lump	1	$6,600
Electrical	$6,600	lump	1	$6,600
Dismantle system	$3,100	lump	1	$3,100
Subtotal				**$41,600**
Contingency	5%			$2,100
Total, Other Direct Costs				**$43,700**

TABLE D-1

CORRECTIVE MEASURES IMPLEMENTATION COST ESTIMATE[1]

Former Rhone-Poulenc East Marginal Way Facility
Tukwila, Washington

Description	Rate	Units	CMI Fieldwork and Reporting	
			Quantity	Cost
Subcontractors				
Driller				
Mobilization/demobilization	$605	lump	1	$605
Monitoring well installation				
2" monitoring wells (PVC) to 20 ft	$2,530	each	3	$7,590
Biosparge well installation				
2" sparge wells (PVC) to 25 ft	$2,750	each	7	$19,250
Vent Well Installation				
2" vent wells (PVC) to 20 ft	$2,530	each	7	$17,710
Well Development (biosparge and monitoring wells only)				
Travel	$358	day	3	$1,074
Development	$330	hour	20	$6,600
Contractor, Biosparge System Installation	$66	hour	40	$2,640
Microbial/nutrient assessment	$660	lump	1	$660
Laboratory testing				
BTEX[3] (EPA Method 8021B, water)	$69	each	24	$1,656
BTEX[3] (Microseeps Method AM4.02, air)	$100	each	28	$2,800
Waste disposal				
Disposal of cuttings (incl tax)	$154	drum	9	$1,386
Total, Subcontractors				**$62,000**
TOTAL				**$139,400**

Notes:

1. Assumptions:
   - Lab costs assume normal 2-week (10 business days) turnaround time.
   - One field duplicate sample, one field blank sample, and one trip blank will be collected per event.
   - Scope of work assumes Level D personal protective equipment.
   - Waste disposal costs assume waste is nonhazardous. Hazardous waste handling and disposal will not be required.
   - Costs are in 2007 dollars.
2. LF = linear feet.
3. BTEX = benzene, toluene, ethylbenzene, and xylenes.

APPENDIX E

Health and Safety Plan

Environmental Site Health & Safety Plan

Former Rhone-Poulenc East Marginal Way Facility
Tukwila, Washington

Prepared by:

Geomatrix Consultants, Inc.
600 University Street, Suite 1020
Seattle, Washington 98101

Project No. 8769

SITE HEALTH AND SAFETY PLAN

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SITE HEALTH AND SAFETY PLAN

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SITE HEALTH AND SAFETY PLAN

1.0 PURPOSE

This site Health and Safety Plan HASP outlines the health and safety procedures that shall be followed during field work conducted at the site. The observance and practice of the procedures in this plan are mandatory for all employees of Geomatrix Consultants, Inc. (Geomatrix), at the site. All subcontractors shall be made aware of the requirements of this plan; however, subcontractors are responsible for the health and safety of their own employees and for following all applicable federal, state, and local regulations.

This plan has been reviewed by the Project Manager and Project Health and Safety Officer. Prior to entering the site, Geomatrix personnel shall read this plan and be familiar with health and safety procedures required when working on site. A copy of the plan shall be available on site for inspection and review.

SITE HEALTH AND SAFETY PLAN

2.0 ADMINISTRATIVE INFORMATION

Project Name: Former Rhone-Poulenc East Marginal Way Facility

Project Start Date: November 2005 Project Number: 8769

Project Address: 9229 East Marginal Way South, Tukwila, Washington

Client: Container Properties, L.L.C.

Client Contact: Gary Dupuy

Telephone No.: 206-342-1760 (Work) 206-849-9185 (Cell)

Project Manager: Larry McGaughey

Telephone No.: 206-342-1760 (Work) 206-755-1525 (Cell)

Project Health & Safety Officer: Tim Reinhardt

Telephone No.: 206-342-1760 (Work) 425-241-5816 (Cell)

Site Safety Officer: Zanna Satterwhite

Telephone No.: 206-342-1760 (Work) 206-499-7588 (Cell)

SITE HEALTH AND SAFETY PLAN

3.0 PROJECT DESCRIPTION

This HASP addresses redevelopment activities at the site, including biosparge system installation, well installation/abandonment, structure demolition, groundwater treatment operations and maintenance, direct-push borings, groundwater sampling, grading and paving, and site maintenance.

3.1 SITE HISTORY

The site occupies approximately 21 acres within the City of Tukwila in an area known as Seattle's South End Industrial District. Industrial use of the site began in the 1930s when I.F. Laucks built a pilot plant to formulate glue for use in plywood manufacturing. In 1946, Monsanto Chemical Company (Monsanto) purchased the site and continued the manufacture of glue, as well as paints, resins, and handling of wood preservatives. Monsanto began vanillin production in 1952, which continued through sale of the property to Rhone-Poulenc in 1986 until Rhone-Poulenc ceased manufacturing at the site in 1991. Rhone-Poulenc transferred title of the site to Rhodia in January 1998. Rhodia sold the property in November 1998 to Container Properties LLC, the current owner of the western half of the site (West Parcel). In late 2006, the eastern half of the site (East Parcel) was purchased by the Museum of Flight.

The majority of the buildings and equipment of the site were demolished by mid-1992. Some of the former structures at the site had subgrade basements and other subsurface features, such as sumps. After demolition of the above-grade structures, these subgrade structures were filled with sand or other similar material and covered with asphalt pavement. A subsurface barrier wall was installed in 2003 around the western portion of the site where the majority of the pollutants are present, and a groundwater treatment system was installed to provide hydraulic control inside the barrier wall.

The groundwater treatment system was moved to a new building in January 2006. The remaining above- and below-ground structures were cleaned out and demolished in spring 2006. The West Parcel has since been repaved for use as a wrecked car storage lot on a 15 year lease with Insurance Auto Auctions International (IAAI). The East Parcel is currently vacant.

3.2 SITE PHYSICAL DESCRIPTION

The site (which includes East and West Parcels) is bounded by private properties to the north and south, by East Marginal Way on the east, and by the Duwamish River on the west. The West

Parcel is relatively flat and mostly paved with asphalt; there is a small buffer of 10-15 feet of vegetation along the southern and western edges of the West Parcel. The East Parcel is two-thirds gravel and one-third poorly vegetated fill. The eastern half of the site is currently vacant and mostly unpaved. Both parcels are secured with chain link fencing. The West Parcel is also surrounded by an electric fence.

3.3 TYPE OF FIELD WORK

The primary concern at the site is the potential for unknown hazardous materials to be present within the subsurface at concentrations, toxicity, and volume to present a future risk to the environment. Small quantities of material or materials with lower toxicity/mobility or at low concentrations would likely not pose a risk to the Hydraulic Control Interim Measure (HCIM) operation or final site cleanup. As a result, the objectives of the planned redevelopment and remediation are to:

- Continue groundwater monitoring and treatment to be protective of the adjacent waterways;
- Identify and remove/stabilize site contaminants of concern; and
- Prepare the site for future development and use that will be protective of the environment and personnel on site.

3.4 SCOPE OF FIELD ACTIVITIES

Field tasks for redevelopment activities are listed below.

1. West Parcel groundwater monitoring: sampling and analysis, water level readings.
2. East Parcel groundwater monitoring: sampling and analysis, water level readings.
3. West Parcel groundwater treatment: operation and maintenance of on-site treatment system.
4. East Parcel groundwater treatment: installation, operation, and maintenance of on-site biosparge/vent well treatment system.
5. Excavation: investigation of suspected contaminated areas.
6. Sampling and analysis: soil and groundwater.

SITE HEALTH AND SAFETY PLAN

7. Stormwater management: Both Parcels are currently under a Construction Stormwater Permit held by Container Properties and require monitoring and stabilization of affected soils under the permit.

8. Well installation/abandonment.

SITE HEALTH AND SAFETY PLAN

4.0 PRIMARY RESPONSIBILITIES

The following text identifies the individuals responsible for the implementation of this plan and describes the primary duties assigned to each position.

4.1 PROJECT MANAGER

The Project Manager (PM) will have overall responsibility for the success of the project, including the successful implementation of this HASP. The PM will review health and safety issues as needed and as consulted and will have the authority to reallocate resources and personnel to safely accomplish the field work.

In addition the PM shall:

1. Direct all Geomatrix personnel involved in investigative, monitoring, and remedial activities at the site and vicinity;
2. Make the Project Health and Safety Officer aware of all pertinent project developments and plans;
3. Make available the resources that are necessary for a safe working environment;
4. Maintain communications with the client, as necessary; and
5. Verify that all Geomatrix project personnel have received required training, are aware of the potential hazards associated with site operations, have been instructed in the work practices necessary for personal health and safety, and are familiar with the site HASP's procedures for all scheduled activities and for dealing with emergencies.

4.2 PROJECT HEALTH AND SAFETY OFFICER

The Project Health and Safety Officer (PHSO) shall:

1. Advise project manager and project personnel on all health and safety aspects of investigative, monitoring, and remedial activities conducted by Geomatrix personnel at the site and vicinity;
2. Specify required exposure monitoring to assess site health and safety conditions;
3. Review any accident/incident reports and make corrective action recommendations;
4. Modify the site HASP as required based on accidents/incidents and findings regarding site hazards and work practices;

5. Report all accidents/incidents and findings regarding personnel exposure, site hazards, and work practices to the PM; and

6. Suspend the hazardous site work if the PHSO believes that Geomatrix or a contractor's personnel are or may be exposed to an immediate health hazard.

4.3 SITE SAFETY OFFICER

The Site Safety Officer (SSO) may be a person dedicated to this task, or the SSO functions may be a collateral duty of the Site Supervisor. The SSO shall fulfill the following functions.

1. Verify that appropriate personal protective equipment (PPE) is available for Geomatrix site personnel and enforce proper utilization of personal protective equipment by all on-site Geomatrix personnel.

2. Verify that all Geomatrix personnel have received required training, are aware of the potential hazards associated with site operations, have been instructed in the work practices necessary for personal health and safety, and are familiar with the site HASP's procedures for all scheduled activities and for dealing with emergencies.

3. Observe Geomatrix's and contractor's procedures with respect to health and safety. If the SSO believes that Geomatrix or a contractor's personnel are or may be exposed to an imminent health hazard, the SSO shall suspend the hazardous site work. If site personnel do not have required protective equipment, the SSO shall consult with the PHSO before proceeding with the work.

4. Implement the site HASP and report to the project manager any observed significant differences in site conditions from those anticipated in the plan.

5. Conduct daily site safety briefings and additional briefings as needed.

6. Calibrate monitoring equipment daily and properly record and file calibration and monitoring results.

7. Under direction of the PHSO perform required exposure monitoring.

8. Maintain monitoring equipment or arrange maintenance as necessary.

9. Assume other duties as directed by the PHSO.

10. Prepare reports of any observed accidents/incidents or inadequate work practices and communicate them to the PM and PHSO.

SITE HEALTH AND SAFETY PLAN

4.4 SITE SUPERVISOR

The Site Supervisor (SS) shall perform the following functions.

1. Maintain control of the site and direct daily site operations to be consistent with applicable environmental and health and safety regulations, site work plans, and this project HASP, and enforce safe work practices and proper utilization of personal protective equipment by all on-site Geomatrix and contractor personnel.
2. With guidance from the PHSO, observe Geomatrix and contractor's procedures with respect to health and safety. If the SS believes that Geomatrix or a contractor's personnel are or may be exposed to an imminent health hazard, the SS shall suspend the hazardous site work coordinating that suspension through the subcontractor's site supervisor. If site personnel do not have required protective equipment, the SS shall consult with the PHSO before proceeding with the work.
3. Implement the site HASP and report to the project manager any observed significant differences in site conditions from those anticipated in the plan.
4. Conduct site safety briefings as needed.
5. Verify that required personal protective, monitoring, and emergency equipment is provided and maintained in effective working condition at all times when work occurs on site.
6. Report observed accidents/incidents or inadequate work practices to the project manager and the PHSO.

4.5 PROJECT PERSONNEL

Project personnel involved in on-site investigations and operations shall be responsible for the following.

1. Take reasonable precautions to prevent injury to themselves and to their fellow employees.
2. Perform only those tasks that they can do safely and immediately report accidents and/or unsafe conditions to the SSO or PHSO.
3. Follow the procedures set forth in the site HASP and report to the SSO, SS, or PHSO any observed deviations by Geomatrix or contractor personnel from the procedures described in the plan.
4. Inform the SSO and PHSO of any physical conditions that might affect their ability to perform the planned field tasks.

4.6 TRAINING REQUIREMENTS

All project personnel must comply with applicable regulations specified in Title 29, U.S. Code of Federal Regulations (29 CFR) Part 1910.120 and the Washington Administrative Code (WAC) Chapter 296-843, hazardous waste operations and emergency response (HAZWOPER), administered by the Washington State Department of Labor and Industries (L&I). These include completion of a 40-hour health and safety training course for HAZWOPER, an annual 8-hour refresher training, and participation in Geomatrix's medical surveillance program and respiratory protection program. In addition to the 40-hour course and 8-hour refreshers, the SS (and SSO, if performing the duties of the SS) will have completed an 8-hour course for hazardous waste site supervisors as required by WAC 296-843-20015. Each site worker will also have a minimum of 3 days of supervised field experience at hazardous waste sites before being allowed to work on site without close direct supervision. At least one person on site will be current in CPR/First Aid. Documentation of all required training will be maintained on site by the SS.

Additional site-specific training that covers on-site hazards, PPE requirements, use and limitations, decontamination procedures, and emergency response information as outlined in this site HASP will be given by the PHSO or SSO before beginning on-site work. Site-specific training briefings should be documented on the "Project Health and Safety Field Meeting Form" provided at the end of this plan.

4.7 MEDICAL SURVEILLANCE

All Geomatrix project site personnel shall participate in the Geomatrix medical surveillance program, which includes annual audiometric and physical examinations for employees involved in hazardous waste or materials projects. It requires that all such personnel have medical clearance before being issued a respirator and participating in field activities. To comply with 29 CFR § 1910.120(f3), medical examinations occur:

1. prior to performing field work;
2. at least once every 12 months;
3. at termination of employment;
4. upon occurrence of possible overexposure; and/or
5. more frequently if deemed necessary by a physician.

SITE HEALTH AND SAFETY PLAN

5.0 HAZARD ASSESSMENT

An assessment of the potential hazards that may be encountered during field activities at the site are designated by field task in Table 1 and are discussed below. Job Safety Analysis (JSA) sheets are included as Appendix A.

5.1 POTENTIAL CHEMICAL HAZARDS AT SITE

Previous investigations of a section of the facility have identified the presence of toluene, food-grade mineral oil, dissolved copper, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), high pH, and other contaminants in soils and groundwater. Listed below are hazardous substances that have been found or are suspected to be present at the site.

<u>Hazardous Substances Known or Suspect at Site</u>:

CHEMICAL	MEDIA	MAXIMUM CONCENTRATION[1]	ROUTES OF EXPOSURE
Copper	Soil & groundwater	2,750 mg/kg; 940 µg/L	Ingestion, inhalation
Arsenic	Soil & groundwater	61.4 mg/kg; 210 µg/L	Ingestion, inhalation
Mercury	Soil & groundwater	368 mg/kg; 1.7 µg/L	Ingestion, inhalation
Toluene	Soil & groundwater	28,000 mg/kg; 400,000 µg/L	Dermal, ingestion, inhalation
Ethylbenzene	Soil	770 mg/kg	Dermal, ingestion, inhalation
Methylene chloride	Soil & groundwater	330 mg/kg; 1,600 µg/L	Dermal, ingestion, inhalation
Total petroleum hydrocarbons (TPH)	Soil	8,200 mg/kg	Dermal, ingestion, inhalation
PAHs	Soil & groundwater	0.8 mg/kg; 0.2 µg/L	Dermal, ingestion, inhalation
PCBs	Soil, process sumps, and process equipment	20,000 µg/kg	Dermal, ingestion, inhalation
Corrosives	Soil & groundwater	pH 12	Dermal, ingestion, inhalation

Material safety data sheets (MSDs) for copper and toluene are included as Appendix B.

---

[1] mg/kg = milligrams per kilogram; µg/L = micrograms per liter.

Air monitoring requirements and action levels related to potential chemical hazards at the site are discussed in Section 6.0.

SITE HEALTH AND SAFETY PLAN

TABLE 1

ANTICIPATED HAZARDS

TASK	HAZARDS																
		PHYSICAL															
	Chemical	Trip/Fall	Heavy Equipment	Underground Utilities	Overhead Power Lines	Noise	Heat Stress	Cold Stress	Sunburn	Drilling	Trench/Excavation	Confined Space	Traffic	Biological	Explosive	General Safety	Electrical/Pressure
Groundwater monitoring	X	X	X	X		X	X	X	X	X				X		X	
Groundwater treatment system operations	X	X	X			X	X							X		X	X
Excavation	X	X	X	X		X	X	X	X		X	X	X	X		X	
Sampling	X	X	X			X	X	X	X		X		X	X		X	
Stormwater management	X	X	X			X	X	X	X					X		X	
Well installation/abandonment	X	X	X	X		X	X	X	X	X			X	X		X	

SITE HEALTH AND SAFETY PLAN

5.2 POTENTIAL PHYSICAL HAZARDS AT SITE

Potential physical hazards are discussed below.

5.2.1 Underground Utility Hazards

An underground utility check shall be performed prior to initiating any subsurface investigation or work. The check will include:

X Call Before You Dig — Note: Call Before You Dig must be notified at least 2 working days before any subsurface work begins. The ticket confirmation number shall be recorded in project field notes.
X Private Locator: Applied Professional Services (APS) (425) 888-2590
X Plans Check. Facility Contact: ______
______ Geophysical Survey

Underground utilities have been previously located and abandoned during construction of the underground barrier wall at the site. Utilities will be located by a private locator if any activities are conducted in areas where utilities were not previously located.

5.2.2 Electrical Hazards

Whenever possible, site personnel will avoid working under overhead high voltage lines. The SS is responsible for documenting a determination of the voltage and minimum approach distance to any potentially energized electrical distribution line. Lines will be confirmed to be deenergized when minimum approach distances cannot be met. The following are minimum clearances for overhead high voltage lines.

Normal Voltage (phase to phase)			Minimum Required Clearance (feet)
750	-	50,000	10
50,000	-	75,000	11
75,000	-	125,000	13
125,000	-	175,000	15
250,000	-	379,000	21
370,000	-	550,000	27
550,000	-	1,000,000	42

(Reference: WAC 296-24-960)

To prevent electrocution hazards from equipment, all electrical extension cords will be rated for the combined amperage of the equipment they power, and must be factory listed as rated SJOW or STOW (an "-A" extension is acceptable for either) and inspected prior to use for defects in the cord and plugs. Any reduction in the original jacket, gap between the strain relief, or any evidence of overheating (cord discoloration or melting) will result in the immediate destruction of the cord and replacement as necessary. The following safe work practices will also be enforced.

- No exposed energized conductors operating above 50 volts to ground will be allowed on site unless properly guarded from contact by unqualified persons.
- Electrical distribution systems and repairs to utilization equipment operating above 50 volts to ground will be performed only by a qualified licensed electrician.
- All portable power tools will be inspected for defects before use and will be of a double-insulated design.
- Any generator brought on site will be grounded to a suitable earth and will be equipped with overcurrent protection;
- All extension cords running outside will be protected by a ground-fault circuit interrupter, which will be tested daily.
- No extension cords will be routed through walls, ceilings, doors, or windows.

5.2.3 Noise Hazards

All on-site personnel shall wear hearing protection when working near large heavy equipment, such as drill rigs or earth movers, generators, compressors, or in other noisy conditions. As a general rule, hearing protection should be worn when two people standing within 3 feet of each other cannot communicate at normal conversational voice levels.

5.2.4 Heat Stress Hazards

Heat stress is not expected on this project; however, the following description is included in the event of unusually warm weather. Heat stress is a potential hazard in the summer months, especially for workers wearing protective clothing. To avoid heat stress, personnel should drink plenty of fluids and take periodic work breaks.

The signs, symptoms, and treatment of heat stress include the following.

- Heat rash may result from exposure to heat or humid air.

- Heat cramps caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include muscle spasms and pain in the hands, feet, and abdomen. Persons experiencing these symptoms should rest in a cooler area, drink cool (not cold) liquids, and gently massage cramped muscles.

- Heat exhaustion occurs from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; and fainting. Persons experiencing these symptoms should lie down in a cooler area, drink cool liquids with electrolytes (Gatorade, etc.), remove any protective clothing, and cool body with wet compresses at forehead, back and neck, and/or armpits.

- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; and coma.

5.2.5 Cold Stress Hazards

Exposure to cold can cause the body's internal temperature to drop to a dangerously low level. This is called hypothermia. Cold stress is a hazard during most months, especially during wet conditions. Exposure to temperatures below freezing can cause frostbite of hands, feet, and face.

Symptoms of hypothermia include:

- vague, slow, slurred speech;
- forgetfulness, memory lapses;
- inability to use hands;
- frequent stumbling;
- drowsiness.

To prevent hypothermia, personnel should stay dry and avoid exposure; wear sufficient clothing in layers such that outer clothing is wind- and waterproof and inner layers retain warmth (wool or polypropylene); and keep hands and feet well protected at all times.

5.2.6 Sunburn Hazards

Skin exposure to ultraviolet radiation can result in sunburn. Personnel should wear long-sleeved shirts, hats, and sunscreen to protect against sunburn.

5.2.7 Drilling Hazards

Drilling hazards include noise, heavy equipment operation, rotating/moving parts, pressurized hydraulic lines, and trip/fall hazards. Nondrilling personnel should stay away from the area around the borehole during drilling. Hard hats and safety glasses shall be worn by all personnel within 30 feet of the raised mast of an operating drill rig. All personnel will be instructed as to the location of the "kill switch" on the drill rig.

5.2.8 Trench/Excavation Hazards

Excavations are one of the tasks planned for this site. Utilities in and near the excavation areas will be positively located prior to excavation, as described in Section 5.2.1. The exact location of the utilities will be determined by hand excavation when nearing the utility depth if the utility line cannot be proven to be both deenergized and locked out (for electrical utilities) or locked out, double-blanked, and bled (for lines or vessels containing hazardous liquids or gases).

Both the U.S. Occupational Safety and Health Administration (OSHA) and L&I require that in all excavations greater than 4 feet in depth, workers exposed to potential cave-ins must be protected by shoring, sloping, or benching the sides of the excavation, or placing a shield between the side of the excavation and the work area. Any excavation 4 feet deep or deeper must have adequate means of access/egress and must be tested by a competent person for oxygen deficiency or hazardous atmosphere before anyone enters. Entry into excavations/trenches 4 feet deep or deeper requires compliance with L&I regulations for trenching and excavation contained in WAC 296-155-650 through -657. However, for this project, no entries are anticipated for excavations deeper than 4 feet. Confirmation sampling will be conducted from the excavator bucket.

Adjacent structures and encumbrances will be assessed for structural hazards that might occur prior to any excavation, and if any exist (or entries occur in excavations ≥ 4 feet deep), a competent person will document their daily inspections of the excavation and adjacent facilities for hazards. Appropriate physical barricades will be placed around exposed vertical faces of excavations ≥ 4 feet to the lower level where a worker may walk. No excavation ≥ 10 feet deep is planned; if deeper excavation is necessary, a fall protection work plan will be developed if persons not directly involved with the excavation will be exposed to a fall hazard ≥ 10 feet to the lower level. The following persons are those to be considered directly involved in the excavation process:

- Foreman of the crew,
- Signal person,
- Employee hooking on pipe or other materials,
- Grade person,
- Inspectors assessing the excavation or trench.

Care will be taken when approaching the edge of any excavation (e.g., when sampling the excavation area from above) to be sure the ground is stable and not undercut.

If entry into trenches/excavations greater than 4 feet deep is determined to be required, the PHSO will be contacted prior to entry.

5.2.9 Confined Space

Although confined space entry is not expected, the following information is included in the event it becomes necessary. A confined space is any space a person can bodily enter that has limited egress and is not designed for continuous human occupancy. Confined spaces can pose many potential hazards, including hazardous atmosphere, poor natural ventilation, engulfment, entrapment, and restricted entry for rescue purposes. All confined spaces must be considered immediately dangerous to life or health unless proven otherwise.

If entry into a confined space is required, the PHSO must be consulted and a confined space entry plan prepared and followed prior to anyone entering the space.

5.2.10 Heavy Equipment

Personnel working on site in the vicinity of operating equipment will maintain safe distances from the equipment to avoid contact with moving equipment parts, such as backhoe/excavator arms and buckets (be aware of swing radius), tires, tracks, etc. Personnel should be mindful that heavy equipment operators can see them or know they are present and should get acknowledgement from the equipment operator before approaching equipment.

5.2.11 Traffic Hazards

Personnel working on site should be aware of equipment and vehicle traffic related to the construction activities at the site. A high visibility outer garment (safety vest) will be worn any time heavy equipment or trucks are operating on site.

5.2.12 Biohazards

The site has been inactive for several years and, therefore, there is a potential for presence of bees, rodents, and other critters. Personnel shall be aware of this possibility and stay away during demolition and other disturbances that may startle critters. Persons with bee allergies will make the SS and SSO aware of their allergies and have a bee sting kit available if bees are present.

5.2.13 Other Hazards

The fence to the north side of the property (on the adjacent property) is electrified. Care shall be exercised to avoid contact with or wetting the fence. There is a potential for vandals entering the site; the gate shall remain closed at all times, when unattended.

5.3 GENERAL SAFE WORK PROCEDURES

In working with or around any hazardous or potentially hazardous substances or situations, site personnel should plan all activities before starting any task. Site personnel shall identify health and safety hazards involved with the work planned and consult with the PHSO or SSO as to how the task can be performed in the safest manner, if he/she has any uncertainties.

Common safety hazards include trip/fall hazards and those associated with working around heavy equipment. All field personnel will adhere to the following general safety rules.

1. Wear protective equipment and clothing provided, when required.
2. Wear a hard hat and safety glasses in all construction areas and during drilling activities.
3. Wear sturdy work boots or shoes at the site. Steel-toed boots are required during drilling and construction activities.
4. Do not eat, drink, or use tobacco in restricted work areas.
5. Prevent splashing of materials containing chemicals.

SITE HEALTH AND SAFETY PLAN

6. Prevent back injury by never lifting or carrying a load that is heavier than you can comfortably handle. When lifting heavy objects, bend the knees and use the leg muscles.

7. Keep all heat sources away from combustible liquids, gases, or any flammable materials. When working in areas where combustible gases are present, use only intrinsically safe (nonsparking) equipment.

8. Familiarize yourself with the physical characteristics of investigations, including:

    - wind direction in relation to restricted work areas;
    - accessibility of other personnel, equipment, and vehicles;
    - areas of known or suspected chemicals in soil and groundwater;
    - site access;
    - nearest water sources;
    - location of communication devices.

9. Limit personnel and equipment in restricted work areas to the number necessary to perform the task at hand.

10. Dispose of all wastes generated during investigative activities at the site as directed by the PM.

11. Inspect power cords for damage such as cuts and frays. Suspend cords only with nylon rope or plastic ties.

12. When in doubt of your safety, it is better to overprotect.

13. Practice defensive driving.

14. If site activities include the use of a drill rig, all on-site personnel should know the location of the "kill switch."

15. Verify that a first-aid kit, eye wash, and a type ABC fire extinguisher are available at the site and/or in a field vehicle when performing field work.

SITE HEALTH AND SAFETY PLAN

6.0 AIR MONITORING

The use of monitoring equipment is not anticipated due to the semivolatile nature of chemicals present at the site. If site conditions change or odors are noted that cause concern, a photoionization detector may be used to determine airborne concentrations of total hydrocarbons.

The monitoring equipment must be calibrated in accordance with the manufacturer's instructions. In addition, the results of daily instrument calibrations shall be logged in the field logbook, or on a Daily Instrument Calibration Check Sheet.

The following air monitoring equipment may be used.

_X_ Photoionization Detector (PID)
_X_ Flame Ionization Detector (FID); PID only if weather permitting
____ Draeger Pump and Tubes (specify tubes)
____ Combustible Gas Meter (CGM)
____ Oxygen Meter (O2)
____ Dust (Particle) Meter
____ Other (specify)

The type and frequency of air monitoring for each work task is specified below. Air monitoring instruments will be calibrated and maintained according to manufacturer’s specifications. Calibration information and air monitoring results will be recorded in project field notes.

TASK	INSTRUMENT	FREQUENCY
1. Excavation and sampling	FID (PID if weather permitting)	Initially when exposing significant volumes of newly-excavated soils and as required based on site conditions and odors.
2. All other tasks	FID (PID if weather permitting)	As required based on site conditions and odors.

6.1 ACTION LEVELS

Listed below are Washington Industrial Safety and Health Act (WISHA) permissible exposure limits (PELs), short term exposure limits (STELs) and American Conference of Government Industrial Hygienists (ACGIH) recommended threshold limit values (TLVs) for the chemicals of potential concern at the site most likely to pose an inhalation hazard.

SITE HEALTH AND SAFETY PLAN

Applicable Inhalation Exposure Limits:

CHEMICAL	WISHA PEL/STEL[1]	ACGIH TLV
Toluene	100/150 ppm	50 ppm
Ethylbenzene	100/125 ppm	100 ppm
Methylene chloride	25/125 ppm	50 ppm
Oil Mist (mineral)	5/10 mg/m^3	5/10 mg/m^3

1. ppm = parts per million; mg/m^3 = milligrams per cubic meter.

To prevent overexposure to site contaminants, the following actions will be taken in response to elevated FID or PID readings:

AIR MONITORING ACTION LEVELS

PID Monitor Reading (ppm) sustained more than 5 minutes in breathing zone	Action
≤ 10	Continue periodic monitoring
> 10	Stop work and consult PHSO to develop additional controls and/or a respiratory protection addendum to the plan

If workers suspect significant chemical exposures (e.g., detect unusual odors, develop symptoms of occupational exposure to the site contaminants) or have other unexplained adverse health effects (e.g., dizziness, nausea), workers will be encouraged to stop work and notify the PHSO.

7.0 PERSONAL PROTECTIVE EQUIPMENT

The following personal PPE will be used as specified below.

PPE Required	**Task 1**	**Task 2**	**Task 3**	**Task 4**	**Task 5**
	Groundwater Monitoring	Excavation	Sampling	Stormwater Management	Treatment System Operations
Steel-Toed Boots (Rubber)				X	
Steel-Toed Boots (Leather)	Av	X	X		Av
Hard Hat	Av	X	X	Av	
Safety Glasses/Goggles	X	X	X	X	X
Safety Shield/Face Mask	Av		Av		
Ear Plugs	Av	X	X	Av	Av
Gloves (specify type): Nitrile	X	X	X	X	X
Tyvek Coverall		Av		Av	
Saranex Coverall					
Half-Face Respirator					
Full-Face Respirator					
Respirator Cartridge (specify type):					
Orange Vests	Av	X	X	Av	Av
Rain/Cold Appropriate Clothing	Av	Av	Av	Av	Av

Key:

X = PPE Required

Av = Have available at work site

SITE HEALTH AND SAFETY PLAN

8.0 SITE CONTROL

The purpose of site control is to minimize the potential exposure to site hazards, to prevent vandalism at the site, and to provide adequate facilities for workers. Work area controls and decontamination areas will be provided to limit the potential for chemical exposure associated with site activities.

8.1 WORK AREA

An exclusion zone (EZ) will be set up immediately surrounding the site work areas. Only authorized personnel shall be permitted access to the exclusion zone. If practical, the exclusion zone will be cordoned with barriers, cones, or fencing to limit unauthorized access. No eating, drinking, or smoking are allowed in the exclusion zone.

8.2 DECONTAMINATION AREAS

Equipment and personnel decontamination areas (contaminent reduction zone) will be set up adjacent to the work exclusion zones and will be the only entrance from the surrounding support zone, which will be maintained free of contaminants. All equipment and tools used during work activities shall be decontaminated in the designated decontamination area. Decontamination procedures are described in Section 9.0 of this plan.

8.3 COMMUNICATIONS

A field representative should contact the project manager or office at least once a day while in the field. The closest telephone is located: on-site cell phone.

SITE HEALTH AND SAFETY PLAN

9.0 DECONTAMINATION

This section describes procedures for decontamination of personnel and equipment, and for handling investigation-derived waste.

9.1 PERSONNEL DECONTAMINATION PROCEDURES

Personnel shall perform the following steps for decontamination.

- Remove disposable gloves and clothing and place in plastic bags.
- Wash hands and face before eating, drinking, or smoking and at the end of the work day.

9.2 DECONTAMINATION PROCEDURES FOR EQUIPMENT/SAMPLING GEAR

If outer PPE or equipment has been soiled with contaminated soil or groundwater, the following steps will be followed whenever personnel leave the EZ or work area:

1. Remove all equipment, sample containers, and notes from EZ and place in the contaminent reduction zone (CRZ).
2. Scrub boots with a stiff-bristled brush, wash with a decontamination solution, and then rinse with water. Washtubs and chairs will be provided.
3. Remove outer gloves (and boot covers, if used).
4. Remove Tyvek® coverall; discard in provided container.
5. Remove hard hat, wash outer layer, and rinse.
6. Remove eye protection.
7. Remove hearing protection.
8. Remove inner gloves.
9. Thoroughly wash hands, neck, and face if required.
10. Proceed to support zone (SZ).
11. Redress in street clothes and exit.

The decontamination area may be covered with plastic sheeting, depending on the task, which will be replaced when torn or heavily soiled, and at the end of each shift.

If used on this project, each worker will be responsible for cleaning, sanitizing, and storing their own respirator in accordance with manufacturer's guidance (i.e., washing in warm water and detergent or sanitizing solution, air drying, and storing in a plastic storage bag). Cartridges will be changed in accordance with a respiratory protection program to be developed by separate addendum to this plan, should the need arise for respirators.

When all work activities have been completed, contaminated tools will be either appropriately decontaminated or properly disposed of as hazardous waste. Tools that can be decontaminated are constructed of nonporous, nonabsorbent materials. Tools (shovels, auger flights, etc.) should be decontaminated by brushing them with a decontamination solution (e.g., Alconox and water) and rinsing with water, if they come into contact with contaminants. A high-pressure steam cleaner may also be used for decontamination. All visible particles are to be removed before the tool is considered clean. All waste and spent decontamination solutions will be properly contained. Any tool, or part of a tool, that is made of a porous/absorbent material will be discarded and disposed of as a hazardous waste if it cannot be properly decontaminated.

9.3 STORAGE OF INVESTIGATION-DERIVED MATERIALS

Investigation-derived materials (PPE/expendables, decon waste, soil cuttings, purged groundwater, etc.) will be handled and stored as follows.

All investigation-derived wastes (IDW) will be segregated into one of three categories:

- Wastewater (includes well purge water and decontamination water);
- Soil (includes drill cuttings and sediment from decontamination containers);
- Solids (includes disposable PPE and sampling equipment);

Each waste type will be placed in an appropriate container, such as a 55-gallon drum. Labels identifying the contents and the date will be placed on each container. Waste containers will be stored on site pending laboratory analysis. Ultimate disposal will be coordinated with the PM and in accordance with relevant regulations.

SITE HEALTH AND SAFETY PLAN

10.0 EMERGENCY RESPONSE

This section defines the emergency action plan for the site. It will be rehearsed with all site personnel and reviewed with visitors upon their initial site visit, and whenever the plan is modified or the SS or SSO believe that site personnel are unclear about the appropriate emergency actions.

A muster point of refuge will be identified by the SS and communicated to the field team each day. This point will be clear of adjacent hazards and preferably up- or cross-wind for the entire day. In an emergency, all site personnel and visitors will evacuate to the muster point for roll call versus the daily site log. It is important that each person on site understand their role in an emergency, and that they remain calm and act efficiently to ensure everyone’s safety.

After every emergency is resolved, the entire project team will meet and debrief on the incident—the purpose is not to fix blame, but to improve the planning and response to future emergencies. The debriefing will review the sequence of events, what was done well, and what can be improved. The debriefing will be documented in a written format and communicated to the PHSO. Modifications to the emergency plan will be approved by the PHSO.

Reasonably foreseeable emergency situations include: Medical emergencies, accidental release of hazardous materials (such as gasoline or diesel) or hazardous waste, and general emergencies such as fire, thunderstorm, flooding, and earthquake. Expected actions for each potential incident are outlined below.

10.1 MEDICAL EMERGENCIES

In the event of a medical emergency, the following procedures should be used.

1. Stop any imminent hazard if you can safely do it.
2. Remove ill, injured, or exposed person(s) from immediate danger if moving them will clearly not cause them harm, and no hazards exist to the rescuers.
3. Evacuate other on-site personnel to a safe place in an upwind or cross-wind direction until it is safe for work to resume.
4. If serious injury or life-threatening condition exists, call:

   911 – for paramedics, fire department, police.

Clearly describe the location, injury and conditions to the dispatcher. Designate a person to go to the site entrance and direct emergency equipment to the injured person(s). Provide the responders with a copy of this health and safety plan, to alert them to chemicals of potential concern.

5. Trained personnel may provide first aid/cardiopulmonary resuscitation if it is necessary and safe to do so. Remove contaminated clothing and PPE only if this can be done without endangering the injured person.
6. Call the PHSO or PM.
7. Immediately implement steps to prevent recurrence of the accident.

A map showing the nearest hospital location is included as Appendix C.

Hospital Harborview
Address 325 9th Avenue, Seattle, WA 98101

Telephone 206-731-3000

Telephone number of nearest Poison Control Center: (800) 222-1222

Other emergency notifications and phone numbers: If serious injury or life-threatening condition exists, call 911. Clearly describe location, injury and conditions to dispatcher/hospital. Designate a person to direct emergency equipment to the injured person(s).

10.2 ACCIDENTAL RELEASE OF HAZARDOUS MATERIALS OR WASTES

The following steps shall be taken in the event of release of hazardous substances.

1. Evacuate all on-site personnel to a safe place in an upwind direction until the PHSO determines that it is safe for work to resume.
2. Instruct a designated person to contact the PHSO and confirm a response.
3. Contain spill, if it is possible and it can be done safely.
4. Initiate cleanup.

SITE HEALTH AND SAFETY PLAN

10.3 GENERAL EMERGENCIES

In the case of fire, rapid flooding, explosion, earthquake, or other imminent hazard, work shall be halted and the local police/ fire department shall be notified by calling 911. All on-site personnel will be immediately evacuated to a safe place.

- In the event of a thunderstorm, outdoor work will be discontinued until the threat of lightning has abated.
- During the incipient phase of a fire, the available fire extinguisher(s) may be used by persons trained in putting out fires, if it is safe for them to do so.

10.4 EMERGENCY COMMUNICATIONS

In the case of an emergency, the air horn or car horn will be used as needed to signal the emergency. One long (5-second) blast will be given as the emergency/stop work signal. If the air horn is not working, a vehicle horn and/or overhead waving of arms will be used to signal the emergency. In any emergency, all personnel will evacuate to the designated muster point and await further instruction.

10.5 EMERGENCY EQUIPMENT

The following minimum emergency equipment will be readily available on site and functional at all times:

- First Aid Kit—Contents approved by the PHSO, including two bloodborne pathogen barriers;
- Sorbent material sufficient to contain the volume of the largest single container of hazardous materials (e.g., gas and diesel) brought on site;
- Portable fire extinguisher (maximum rating of 6-B/C) in truck or drill rig cab;
- Two spare sets of PPE suitable for entering the EZ; and
- A copy of the current site-specific health and safety plan.

SITE HEALTH AND SAFETY PLAN

11.0 APPROVALS

Project Manager	Date
Project Health & Safety Officer	Date
Site Safety Officer	Date

Geomatrix

PROJECT HEALTH AND SAFETY FIELD MEETING FORM

Date: ______________________________ Time: ___________________ Project No.: _________________

Project Name: ____

Location: ____

Meeting Conducted by: ____

Topics Discussed:
Physical Hazards: ____

Chemical Hazards: ____

Personal Protection: ____

Decontamination: ____

Special Site Considerations: ____

____

____

Emergency Information: ____

Hospital Location: ____

Attendees

Name/Company (printed)	Signature

Meeting Conducted by:________________________________

Signature

APPENDIX A

Job Safety Analysis Sheets

Geomatrix

JOB SAFETY ANALYSIS

JSA #

Project Name:	Former Rhone-Poulenc Site	Project No:	8769.005	Date:	5/23/07
Task:	Direct push and HSA Drilling, Installation of wells, grab gw sampling	Task Location:	East Parcel CMI		

For this Project and Task, this document is a Certification of Hazard Assessment

Completed by:	Zanna Satterwhite	Reviewed by:	Tim Reinhardt
Notes:			

Task	Hazard	Risk Control Method
Mobilization To Site	Driving accidents	Vehicle to be fit for purpose and well maintained.
		Loads to be secure and not to exceed vehicle specifications or legal limits.
		Driver to be licensed, trained and medically fit
		Driver to be rested and alert
		Minimize cell phone use
		PLAN YOUR ROUTE AHEAD OF TIME
		Driver must not be under the influence of alcohol, drugs or medication that impairs ability to drive vehicle.
Set Up Work Site	Auto / public traffic	Notify attendant or site manager / owner of work activities and location.
		Work location to be barricaded off
		High visible clothing to be worn at all times while in operational areas
	Uneven or unstable ground	Visually examine site prior to entry.
Soil Boring / Drilling		Set-up adequate exclusion zone – only trained, inducted and authorized personnel within this area
	Struck by, caught by	Stay clear of rotating auger / equipment – no hands, feet, loose clothes, or any body part to be near rotating equipment. Rotation to stop for sampling etc. Avoid exposure to burst hazard from pressurized hydraulic lines
	Impact by suspended loads	Do not walk under suspended loads
	Hearing damage from high noise levels	USE HEARING PROTECTION (EAR MUFFS OR EAR PLUGS) IF normal conversation difficult to hear at 3 feet
	Vapors and airborne particulates	MONITOR AIR CONCENTRATIONS per air monitoring plan
		Stop work if hazardous conditions identified – reassess and take the necessary precautions.
		Wear appropriate PPE including face shield / safety glasses, dust masks or respirators, long sleeve shirts and pants.
	Slip, trip & fall	Keep work area tidy and clean – including the removal of excess cuttings.
		Keep work surfaces dry where possible
		Wear appropriate PPE including non-slip soles or rubber boots if working on wet or slick surfaces
	Slip, trip & fall	Stay aware of footing and do not run
	Heat / cold stress	Take regular breaks on hot days or if feeling faint or overexerted
		Consume adequate food / beverages (water / sports drink)
		If possible, adjust work schedule to avoid temperature extremes
	Biological hazards: insects, vegetation	Open enclosures slowly, do not put hands inside enclosures where view is obstructed
		Survey site for presence of biological hazards and maintain safe distance

	Hazard from Striking Underground Services	Call local 1-call utility locator at least 2 days in advance of field work.
		Augment 1-call with professional cable locator to locate and identify all services in potential drilling area.
		Develop and review checklist of all potential utilities serving site and structures, and positively locate them.
		Due diligence review of active and historic utility lines and subsurface structures with site representatives.
		For any unlocated utilities, hand excavate or air knife to potential depth in suspected utility areas.
		Hand excavate or air knife to potential depth when within 3 feet of know utility lines.
		Observe initial 4 feet of drilling cuttings for utility bedding material .
	UV exposure	Wear correct PPE (neck to toe clothing & sun block, as needed)
	Lifting heavy equipment	Do not lift or move heavy equipment without assistance
		Use proper bending / lifting techniques by lifting with arms and legs and not with back. Keep back straight while lifting
		Take breaks if feeling faint or over exerted
	Muscle strain injury	Use correct manual lifting methods.
		Driller to manage soil sampling.
Soil Sampling	Handling contaminated materials / soils / groundwater	Wear appropriate PPE including nitrile gloves, safety glasses and neck to toe clothing.
	Sharp sampling tools	Use correct tools for opening split spoon sampler / push tubes, don’t use excessive force and keep body parts clear of tool path if it slips.
	Vapors	Monitor per air monitoring plan
	Vapors	Work upwind of sampling area if possible
Biosparge and monitoring well installation	Pinch points	Watch for pinch points when assembling and installing well pieces
	Slip, trip & fall	Keep work area tidy and clean – including the removal of excess cuttings.
		Keep work surfaces dry where possible
		Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces
Purging/sampling (pumping)	Back injuries	Bend with knees
		Lift objects properly (bending knees)
		Two people lift heavy objects
	Burns	Allow generator to cool before moving
	Splash hazards	Lower tubing slowly down well
		Secure discharge hose to wastewater receptacle prior to starting pump.
		Wear appropriate PPE -- Safety glasses/Splash goggles, etc.
	Slip, Trip, and Falls	Clean up spill immediately
		Practice good housekeeping
		Properly coil hoses, cords, ext
		Make sure work area is solid and free of obstructions

APPENDIX B

MSDs – Copper and Toluene

CDC Home | CDC Search | CDC Health Topics A-Z

National Institute for Occupational Safety and Health

Search NIOSH | NIOSH Home | NIOSH Topics | Site Index | Databases and Information Resources | NIOSH Products |

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

NPG Home | Introduction | Synonyms & Trade Names | Chemical Names | CAS Numbers | RTECS Numbers | Appendices | Se

Copper (dusts and mists, as Cu)

CAS 7440-50-8

Cu

RTECS GL532

Synonyms & Trade Names
Copper metal dusts, Copper metal fumes

DOT ID & Gu

Exposure Limits

NIOSH REL*: TWA 1 mg/m^3 [*Note: The REL also applies to other copper compounds Copper fume.]

OSHA PEL*: TWA 1 mg/m^3 [*Note: The PEL also applies to other copper compounds copper fume.]

IDLH 100 mg/m^3 (as Cu) See: 7440508

Conversion

Physical Description
Reddish, lustrous, malleable, odorless solid.

MW: 63.5	BP: 4703°F	MLT: 1981°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.94
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but powdered form may ignite.

Incompatibilities & Reactivities
Oxidizers, alkalis, sodium azide, acetylene

Measurement Methods
NIOSH 7029, 7300, 7301, 7303, 9102; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3:
(APF = 5) Any quarter-mask respirator. Click here for information on selection of N, R, or P filters.*

Up to 10 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inforr selection of N, R, or P filters.*
(APF = 10) Any supplied-air respirator*

Up to 25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.*

Up to 50 mg/m^3:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters.
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Up to 100 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o
pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi
mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing; [potential occupational

Target Organs Eyes, skin, respiratory system, liver, kidneys (increase(d) risk with Wilson's disease)

See also: INTRODUCTION See ICSC CARD: 0240 See MEDICAL TESTS: 0057

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NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

NPG Home | Introduction | Synonyms & Trade Names | Chemical Names | CAS Numbers | RTECS Numbers | Appendices | Se

Toluene

CAS 108-88-3

$C_6H_5CH_3$

RTECS XS525

Synonyms & Trade Names
Methyl benzene, Methyl benzol, Phenyl methane, Toluol

DOT ID & Gu
1294 130

Exposure Limits

NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)

OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)

IDLH 500 ppm See: 108883

Conversion 1 ppm = 3.77 mg/m^3

Physical Description
Colorless liquid with a sweet, pungent, benzene-like odor.

MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%
VP: 21 mmHg	IP: 8.82 eV		Sp.Gr: 0.87
Fl.P: 40°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500, 1501, 3800, 4000; OSHA 111
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor

appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated
lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0078 See MEDICAL TESTS: 0232

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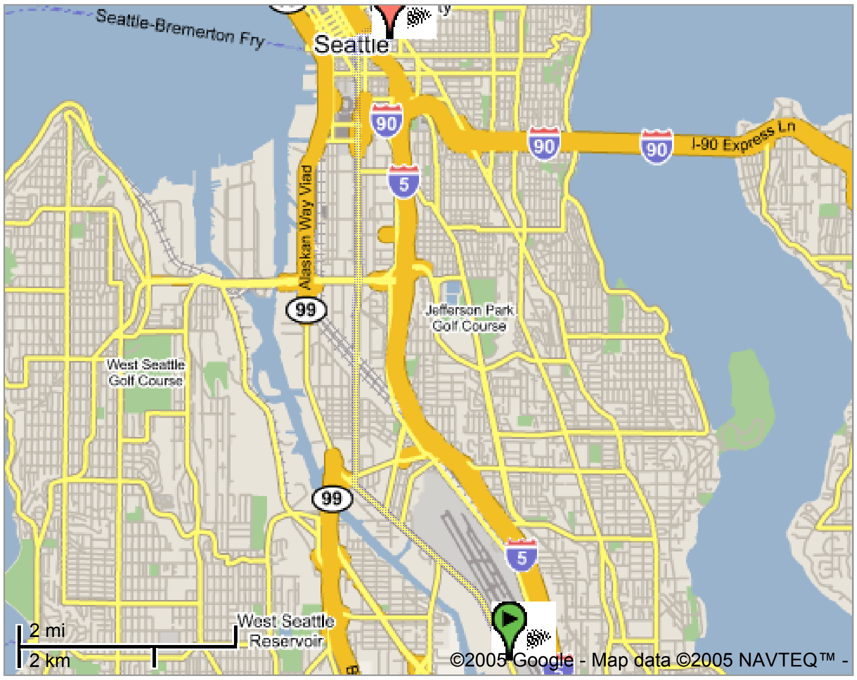
APPENDIX C

Directions to Hospital

Directions

Start address: **9229 E Marginal Way S, Seattle, WA 98108**
End address:
Harborview Medical Ctr



Start address: 9229 E Marginal Way S
Seattle, WA 98108
End address: **Harborview Medical Ctr**
325 9th Ave
Seattle, WA 98104
Distance: 6.8 mi (about 14 mins)

1. Head **northwest** from **E Marginal Way S** - go **2.2 mi**
2. Turn **right** at **4th Ave S** - go **4.0 mi**
3. Bear **left** at **4th Ave** - go **0.1 mi**
4. Turn **right** at **James St** - go **0.3 mi**
5. Turn **right** at **9th Ave** - go **0.2 mi**

APPENDIX F

Operation and Maintenance Information

OPERATION PROCEDURES:
FORMER RHONE POULENC BIOSPARGE AND VENT SYSTEM

Former Rhone Poulenc Site
Tukwila, Washington

OPERATION PROCEDURES, GENERAL OVERVIEW

Introduction

This document outlines start-up, shutdown, and maintenance procedures for routine biosparge system operation. An equipment list is attached as Table F-1.

Prerequisites to Do These Procedures

To do this procedure you must:

- Be fully trained for treatment system operations or be trained with someone who has been fully trained.
- Be fully trained for handling and management of dangerous wastes.
- Be familiar with all aspects of this operating procedure and the Health and Safety Plan (HASP).
- Be trained in Hazardous Waste Operations and Emergency Response (HAZWOPER), and current with annual training updates.

In These Procedures

Following is a list of topics in these procedures:

1.0 SAFETY CONSIDERATIONS

Health and Safety Plan (HASP)	The HASP provides plans and requirements to protect the health and safety of workers involved in the operation and maintenance of the biosparge and vent system. All workers must be familiar with and sign the HASP. Specific requirements for Personal Protective Equipment (PPE) are included in the HASP. If there are any discrepancies between PPE requirements included in these procedures and PPE requirements specified in the HASP, the requirements specified in the HASP shall be followed.
Level of Hazard	**Low to Moderate** The biosparge and vent system injects air into toluene-contaminated groundwater then collects air that may contain significant levels of toluene. Both the recovered air and the groundwater have potential hazards related to contact, inhalation, and/or ingestion. All personnel working on the biosparge and vent system must be fully trained in accordance with 29 CFR 1910 and WISHA (Washington Industrial Safety and Health Act) regulations. Forty- hour Hazardous Waste Operations and Emergency Response (HAZWOPER) Training with annual 8-hour refresher training is required for anyone performing work at the former Rhone-Poulenc biosparge and vent system.

2.0 ACCESS TO THE BIOSPARGE AND VENT SYSTEM

Site Access and Security	The biosparge and vent system will be constructed on both the East and West Parcels and will extend across the parcel boundary. As such, access to both the East Parcel (owned by Museum of Flight [MOF]) and the West Parcel (operated by Insurance Auto Auctions, Inc. [IAAI]) will be necessary for system operation. West Parcel access can be attained by entering through IAAI's entrance just North of the site and checking in at the IAAI main office. East Parcel access can be attained by entrance at the site gate on East Marginal Way or by opening the gate in the East/West Parcel divide fencing. The gate in the East/West Parcel divide fencing is electrified outside normal business hours (8:00 AM to 5:00 PM), but when not electrified is secured by a combination padlock set by IAAI.
System Access	The treatment system manifold and controls will be situated on the West Parcel, inside an area surrounded by temporary fence. Biosparge wells and vent wells will be located on both parcels. Since the West Parcel is under lease to IAAI, the vent and biosparge lines will be protected from traffic with temporary fencing. Openings will be left in the fencing for access; because site access is protected from the public, no locking gates will be necessary. The vent and biosparge wells on the East Parcel will be inside a fenced off area and accessed by opening a padlocked man gate.

3.0 ROUTINE START-UP/SHUTDOWN

Start-up Information

When starting up the system, pay close attention to the operating conditions to ensure all components are operating properly. See Figures 11 (Biosparge System Piping and Instrument diagram) and 12 (Soil Vapor Collection System Piping and Instrument diagram) from the Work Plan.

Procedure

Step	System Start-Up and Shutdown
1	Both the biosparge system and the vent well system have minimal controls. Normal operations require flow to each biosparge well and flow from each vent well. Make sure the appropriate valves are open and closed based upon the Piping and Instrumentation Diagrams (Figures 11 and 12 from the Work Plan).
2	Both the biosparge compressor and the vent well vacuum pump will be operated by a Hand/Off/Auto (HOA) switch. Normal operations will include 24-hour, 7-day-per-week operation of the compressor and the vacuum pump. To start the biosparge compressor or the vent vacuum pump, simply turn the HOA switch for the compressor and/or the vacuum pump to “AUTO.” Record time of startup and relevant observations in the field inspection log per the maintenance section in the Work Plan.
3	Both the biosparge compressor and vent well vacuum pump will shut down in the event of a thermal or electric overload. Shutdown of either the compressor or the vacuum pump will trigger an alarm to be sent via the autodialer. A pressure-relief valve is included in the biosparge piping to prevent overpressurization of the system. Similarly, a vacuum-relief valve has been included in the vent well system to prevent the system from reaching too high of a vacuum.
4	Upon startup of the compressor an hour meter will begin recording hours of operation. A similar hour meter will record vacuum pump operation time.
5	Both the compressor and the vacuum pump will run continuously under normal operations. However, shutdown will be necessary for sampling and maintenance of the system.
6	To shut down the system, simply turn the HOA switch for both the compressor and vacuum pump to “Off.” Verify that the pressure readings decrease to 0.0 psi. Record time of shutdown and relevant observations in the field inspection log.

Upon Completion

Follow good housekeeping practices.

Replace any tools or equipment used during this procedure. Remove any trash, etc. from the treatment facility area and place in proper receptacles for disposal.

4.0 ROUTINE INSPECTIONS

Shutdown Information

Routine inspections will be necessary in order to keep the system operating continuously and effectively.

Procedure

Step	Inspecting the Biosparge System
1	Upon arriving on site for routine inspections an initial system check will be performed before any changes are made to system operations.
2	The first step will be a physical check of system components, per the Biosparge and Vent Well System Inspection Log (attached).
3	The next step in the initial system check will include recording operating hours of the compressor and the vacuum pump, as well as system pressure, flow, and temperature readings, per the Biosparge and Vent Well Manifold Inspection Log (attached).
4	As appropriate based on the compressor and vacuum pump operation status, verify that operating pressures throughout the system are appropriate. High differential pressures (>5 psi) across any one piece of equipment (granular activated carbon [GAC] units) should be investigated immediately as this condition indicates clogging.
5	After initial readings and inspection, the biosparge compressor and vent well vacuum pump should be shut down for monthly inspections,. Implement appropriate maintenance for any leaks discovered, check compressor/vacuum pump filters, and empty water knockout pot, if necessary. Fill out the Maintenance Issues and Alarm Resolution Form (attached).
6	After pressure differences in the systems have decreased, water levels should be taken at each biosparge well and dissolved oxygen (DO) readings should be taken at each vent well and the three monitoring wells. (Monthly inspections only.)
7	Biosparge pressure readings should be compared to water level readings for each biosparge well. Water column height for each biosparge well should be compared to pressures for each biosparge line. To ensure flow to each well, biosparge air line pressure should be greater than the measured water column head.
8	DO readings should be greater than 1.0 mg/L at each vent well and monitoring well location to ensure sufficient oxygen is available for biodegradation.
9	The system should be restarted and adjustments to biosparge line valve position should be made to increase DO in low DO areas.
10	Vent well line valve positions should be adjusted based on initial pressure readings and to promote flow to areas with a low measured DO. Record final positions on the Biosparge and Vent Well Manifold Inspection Log.

Upon Completion

Follow good housekeeping practices.

Replace all tools and equipment used during this procedure. Remove any trash, etc. from the treatment facility area and place in proper receptacles for disposal.

5.0 ROUTINE AIR SAMPLING

Critical Information

Air sampling must be performed for compliance with Puget Sound Clean Air Agency (PSCAA) standards and to prevent cross-media contamination. Based on previous experience with PSCAA standards, these procedures should be effective for monitoring carbon bed performance and air emissions as well as monitoring emissions post PSCAA sampling requirements.

Tools/Supplies

Screwdrivers Flexible connector tubing Plastic resealable baggies Toluene calibration gas	Wrenches Portable air compressor Photoionization detector (PID) 10.0 eV or greater Microseeps sample vials, syringes, stopcocks, and sampling port.

Personal Protective Equipment

Safety glasses	Nitrile gloves

Procedure

Step	Microseeps Air Sampling (for PSCAA)
1	Air sampling will be performed before, in-between, and after the carbon units.
2	For a representative sample of emissions, sampling should be performed after the compressor and vacuum pump have been running continuously for at least 24 hours.
3	The same procedure should be followed at all three sampling locations.
4	Connect sample tap to Microseeps sampling port.
5	Insert syringe into Microseeps sampling port; follow Microseeps instructions for proper flushing and collecting correct sample amount.
6	After filling syringe and closing the stopcock, remove the syringe.
7	Insert the syringe into a Microseeps sample vial, open the stopcock, and inject the full amount into the vial per Microseeps instructions.
8	Remove the syringe from the vial, send vial to Microseeps for analysis for carbon dioxide and oxygen by Method AM20GAX; and for benzene, toluene, ethylbenzene, and xylenes (BTEX) by Method AM4.02.

Procedure

Step	PID Air Sampling
1	Air sampling will be performed before, in-between, and after the carbon units.

2	For a representative sample of emissions, sampling should be performed after the compressor and vacuum pump have been running continuously for at least 24 hours.
3	The same procedure should be followed at all three sampling locations. Calibrate the PID on an appropriate toluene calibration standard (100 ppm toluene calibration gas is standard).
4	Connect tubing from sample tap to inlet of portable air sampling compressor.
5	Connect a second line of tubing to outlet of portable air compressor, and turn on the portable air compressor. Open the sample tap valve. Vent sampled air to atmosphere for a few seconds to purge the tubing.
6	After venting the tubing, fill a resealable bag. Seal the bag and repeat. Close the sample tap valve. Turn off the portable air compressor.
7	Measure concentration in each bag with the PID by cracking open the bag seal and inserting the tip of the PID. Record readings on the inspection log. Move to the next sample port and repeat the procedure until all the sampling points have been sampled.

Upon Completion Follow good housekeeping practices.

Replace any tools or equipment used during this procedure. Remove any trash, etc. from the treatment facility area and place in proper receptacles for disposal.

6.0 CARBON ADSORBER MAINTENANCE

Critical Information

Carbon must be changed after sampling results indicate that the first stage or “lead” GAC unit has been depleted. The second stage or “lag” unit is then placed in the lead position and a replacement unit is put into service as the lag unit. This procedure should be implemented after it has been determined that the lead GAC unit has been depleted. The lead GAC unit will be determined to be depleted per PSCAA permit guidelines.

Tools/Supplies

Screwdrivers	Wrenches

Personal Protective Equipment

Safety Glasses	Nitrile Gloves

Procedure

Step	Changing Carbon
1	Make arrangements with Siemens to replace the spent carbon.
2	Shut down the biosparge compressor and the vent vacuum pump.
3	After donning the appropriate PPE, close the inlet and outlet valves on the carbon bed that is not being replaced. Open the ball valve vent on the top of the carbon bed to be replaced and then use a large wrench to open the man door on top of that unit.
4	Siemens will replace the depleted carbon with fresh carbon and check distribution piping for cracks/damage.
5	Open inlet and outlet valves for both carbon beds.
6	Restart the system and check for proper operation. Follow routine startup procedures (Section 3.0).

Upon Completion

Follow good housekeeping practices.

Replace any tools or equipment used during this procedure. Remove any trash, etc. from the treatment facility area and place in proper receptacles for disposal.

7.0 AUTODIALER SHORTCUTS AND REMOTE STATUS CHECK

Critical Information	The Verbatim Autodialer can be programmed on site or over the phone. This section details the most common features necessary to set up the system, respond to an alarm call, and to check system status remotely. The Autodialer is connected to **206-763-1461**. For more detailed commands and operations, see the Verbatim Manual.

Procedure

Step	Autodialer Programming on Site
1	The autodialer is located inside the programmable logic controller (PLC) case on the West Parcel inside the groundwater treatment building.
2	**To acknowledge an alarm call:** press the arm/disarm button.
3	**To enter the program mode:** press the program button.
4	**To remove dial out phone numbers:** 7 AA POINT ENTER Where AA is the two-digit order number, i.e. 01 would be the first number called.
5	**To program dial out phone numbers**: 7 AA 206 342 1760 ENTER (local numbers, add a 1 for long distance) Where AA is the two-digit order number, i.e. 01 would be the first number called.
6	**To Record Alarm Messages**: 1 ZZ ENTER **To Record Normal System Messages:** 2 ZZ ENTER **To Review existing Alarm/ Sys Normal messages:** 3 ZZ ENTER Where ZZ is the channel you want to program, i.e. 01 would be for channel 1.
7	**Alarm Reset Time:** After the alarm call is acknowledged, the time before the channel will be ready to call out again. 904 V ENTER (where V is a number between .1 and 99.9 hrs)
8	**Disabling Channels:** If you would like to disable an alarm rather than acknowledge it. 5 ZZ 0 ENTER (where ZZ is the channel you would like to disable).
9	**Re-enabling Channels:** Once the alarm has been answered and is off, you can put all channels back to normal operation by pressing 5 0 0 ENTER

Procedure

Step	Autodialer Programming over the Phone and Remote Status Check
1	**To acknowledge alarm calls**: Either dial 9 (wait for alarm acknowledged reply) or call back to automatically acknowledge the alarm call.
2	**To check alarm status remotely:** call the autodialer and do not press any buttons, after the warble tone the status of each input will be described. Hang up to exit or see the below options.
3	**To enter the program mod**e**:** press 1 at the warble tone.
4	**To check the dial-out phone numbers and other non-default values:** press 4 at the warble tone.

5	**To program over the phone, use the above on-site commands with the following changes:** Cancel = ** Point = * Minus = # Enter = ##
6	**To end the phone call after programming:** press an additional ##.

Autodialer Alarm Codes

Input	Alarm Condition
Internal-00	System Power Fail
01	Containment area is flooded
02	Biosparge compressor/vacuum pump failure
03	High pressure on filters
04	Differential pressure on C-1 vessel is high
05	Differential pressure on C-2 vessel is high
06	Differential water level in control wells is less than 1.2 feet
07	Well pump failed
08	High discharge flow

TABLE F-1

MAJOR BIOSPARGE AND VENT SYSTEM EQUIPMENT[1]

Former Rhone-Poulenc Site
Tukwila, Washington

Equipment	Description	Manufacturer/Supplier	Telephone
Monitoring Well Sampling Pumps	Low Flow Bladder Pump	QED PO Box 3726 Ann Arbor, Michigan 48106	800-624-2026
Adsorber Vessles (C-1 and C-2)	Granular Activated Carbon PV1000 Max Pressure 75 psi	Siemens 15403 NE Caples Rd. Brush Prairie, WA 98606	360-699-7392
Biosparge Compressor	GAST Oilless Rotary Vane Compressor 10 CFM, 10 psi	AOP Technologies Inc. 301 30th St. NE, Suite 112 Auburn, WA 98002	800-282-2672
Vent Well Vacuum Pump	GAST Oilless Rotary Vane Compressor 10 CFM @ 3" Hg 26"Hg Max vacuum	AOP Technologies Inc. 301 30th St. NE, Suite 112 Auburn, WA 98002	800-282-2672
Pressure Relief Valve	0-20 psi adjustable brass pressure relief valve 48935K45	McMaster Carr 6100 Fulton Industrial Blvd. Atlanta, GA 30336-2852	609-223-4200
Vacuum Relief Valve	0-27"Hg adjustable brass vacuum relief valve 48935K45	McMaster Carr 6100 Fulton Industrial Blvd. Atlanta, GA 30336-2852	609-223-4200
Biosparge Line Pressure Gauges	0-15 psi, 150 deg F	McMaster Carr 6100 Fulton Industrial Blvd. Atlanta, GA 30336-2852	609-223-4200
Vent Well Line Pressure Gauges	20-0" Hg, 150 deg F	McMaster Carr 6100 Fulton Industrial Blvd. Atlanta, GA 30336-2852	609-223-4200
Temperature Gauges	Bimetal Stem Thermometer- 0-200 deg F	McMaster Carr 6100 Fulton Industrial Blvd. Atlanta, GA 30336-2852	609-223-4200
Flow Elements	Pitot Tube: 167-6-CF	Dwyer Instruments, Inc. 102 Indiana Hwy. 212 Michigan City, IN 46361 USA	219-879-8000
Autodialer	Verbatim VSS-8C, SN: V1711	RACO Mfg. and Eng. Co. 1400 62nd St. Emeryville, CA 94608	800-449-4539

Note:

1. Equivalent equipment may be substituted with approval of system engineer.
   Gauge range may be changed for greater accuracy once conditions have been determined in the field.

Biosparge and Vent Well Manifold Inspection Log

Former Rhone-Poulenc Site
Tukwila, Washington

Biosparge System							
Name	Date/Time	Biosparge System Status (On/Off)	Hours of Operation (hours)	System Pressure (psi)	T1 Temperature (° F)	FI-1 System Flow (psi)	Notes

AS-1		AS-2		AS-3		AS-4		AS-5		AS-6		AS-7	
Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion

Vent Well System									
Name	Date/Time	Soil Vent System Status (On/Off)	Hours of Operation (hours)	Lead GAC Influent Pressure (PI-2) (psi)	Lead GAC Effluent Pressure (PI-1) (psi)	Lag GAC Effluent Pressure (PI-3) (psi)	T1 Temperature (° F)	FI-1 System Flow (psi)	Notes

SV-1		SV-2		SV-3		SV-4		SV-5		SV-6		SV-7	
Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion	Pressure (psi)	Valve Postion

DRAFT Biosparge and Vent Well System Inspection Log

Former Rhone-Poulenc Site
Tukwila, Washington

Remote System Checks (Perform Weekly)

	Date/Time	Biosparge compressor	Soil Vent Vacuum Pump	Notes
Week 1				
Week 2				
Week 3				
Week 4				

Visual Inspection (Perform Monthly)

Item	**Inspected (Y/N)**	**Condition (Cracks, leaks, vibration, filters dirty, etc.)**
Biosparge Compressor/Housing		
Vent Vacuum Pump/Housing		
Water Knockout		
Pressure Gauges/Relief valves		
GAC Units		
Flow Elements		
Aboveground Piping		
Fencing/Security Signs		

If problems noted, complete and attach a maintenance resolution form.

Soil Vapor Measurements (Perform Monthly)

Well ID	SV-1	SV-2	SV-3	SV-4	SV-5	SV-6	SV-7
Time							
PID Reading							

Dissolved Oxygen Measurements (Perform Monthly)

Well ID	SV-1	SV-2	SV-3	SV-4	SV-5	SV-6	SV-7	MW-64	MW-65	MW-66
Time										
DO Reading										
Water Level										

Air Emission Sample Collection (Perform Monthly)

Samples Collected (Y/N):________

Location	**PID Readings (ppm)**		**Analyses (Circle)**	**Sample Name and Time**
Lead GAC Inlet			BTEX	
Lead GAC Discharge			BTEX	
Lag GAC Discharge			BTEX	

Date of Visit:___________________
Field Representative (Print and Sign):____

Maintenance Issues and Alarm Resolution Form

Former Rhone-Poulenc Site
Tukwila, Washington

Maintenance Issue/Alarm (Attach Supporting Information as Needed)
Resolution (Attach Supporting Information as Needed)

Responsible Party (Print and Sign):____

Date:______________