DATA SUMMARY REPORT

WEST OF 4TH GROUNDWATER INVESTIGATION AREA
SEATTLE, WASHINGTON

Submitted by:

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Prepared For:

Capital Industries
Art Brass Plating
Blaser Die Casting
Philip Services Corporation

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ACRONYMS AND ABBREVIATIONS

ABP	Art Brass Plating
ARAR	applicable or relevant and appropriate requirement
Arrow	Arrow Environmental, L.L.C.
Aspect	Aspect Consulting, L.L.C.
bgs	below ground surface
BDC	Blaser Die Casting
BEI	Burlington Environmental Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Chempro	Chemical Processors, Inc.
CI	Capital Industries
c-1,2-DCE	cis-1,2-dichloroethene
COPCs	chemicals of potential concern
CRA	Conestoga-Rovers & Associates
CSM	Conceptual Site Model
DQM	Data Quality Manager
DQO	data quality objectives
DPGD	decision performance goal diagram
Ecology	Washington State Department of Ecology
ECS	Environmental Consulting Services, Inc.
EPA	U.S. Environmental Protection Agency
Farallon	Farallon Consulting, L.L.C.
FSP	Field Sampling Plan
Geomatrix	Geomatrix Consultants, Inc.
GIS	geographic information system
GPR	ground-penetrating radar
HASP	Health and Safety Plan
HCIM	Hydraulic Control Interim Measure
HVOCs	halogenated volatile organic compounds
LDW	Lower Duwamish Waterway

LNAPL	light nonaqueous-phase liquids
MCL	maximum contaminant level
MDL	method detection limits
µg/kg	micrograms per kilogram
µg/l	micrograms per liter
mg/kg	milligrams per kilogram
MTCA	Washington State Model Toxics Control Act Cleanup Regulation
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
PGG	Pacific Groundwater Group
PSC	Philip Services Corporation
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	remedial investigation
Source Areas	Properties owned and/or occupied by Art Brass Plating, Blaser Die Casting, or Capital Industries from which hazardous substances have been released or threatened to be released within the West of 4th Groundwater Investigation Area
SVOCs	semivolatile organic compounds
TCE	trichloroethene (trichloroethylene)
VC	vinyl chloride
VOCs	volatile organic compounds
West of 4th Groundwater	Investigation Area the area west of 4th Avenue South in Seattle, Washington
West of 4th Group	Capital Industries, Art Brass Plating, Blaser Die Casting, and Philip Services Corporation
1,1-DCE	1,1-dichloroethene

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon), Aspect Consulting, L.L.C. (Aspect), Pacific Groundwater Group (PGG), and Arrow Environmental, L.L.C. (Arrow) have prepared this Data Summary Report on behalf of Capital Industries (CI), Art Brass Plating (ABP), Blaser Die Casting (BDC), and Philip Services Corporation (PSC) (collectively referred to as the West of 4th Group) to provide a summary of the existing data for the area west of 4th Avenue South in Seattle, Washington (herein referred to as the West of 4th Groundwater Investigation Area) (Figures 1.1 and 1.2). In accordance with discussions with the Washington State Department of Ecology (Ecology), CI, ABP, and BDC will complete individual remedial investigations (RIs) to investigate the chemicals of potential concern (COPCs) defined in Table 1 that may have been released at each of the individual facilities.

The West of 4th Groundwater Investigation Area is defined as the geographic area west of 4th Avenue in Seattle, Washington where data have been collected on soil and groundwater quality (Figure 1.2). The geographic boundaries for the West of 4th Groundwater Investigation Area are defined as follows:

- North Boundary—South Lucile Street;
- East Boundary—6th Avenue South;
- West Boundary— Lower Duwamish Waterway (LDW); and
- South Boundary—Diagonal extending from Slip 2 to approximately the intersection of 6th Avenue South and South Mead Street

The West of 4th Groundwater Investigation Area includes three known facilities that may have released one or more COPCs to soil and/or groundwater from current or former operations. The facilities include:

- The CI facility located at 5801 3rd Avenue South (CI Facility);
- ABP facility located at 5516 3rd Avenue South (ABP Facility); and
- The BDC facility located at 5700 3rd Avenue South (BDC Facility).

Releases of one or more COPCs from former operations at a fourth facility (the PSC facility located at 734 South Lucile Street [PSC Facility[1]]) located east of the West of 4th Groundwater Investigation Area may have migrated in groundwater to within portions of the West of 4th Groundwater Investigation Area.

[1] The term "PSC facility" is used to refer to the former RCRA dangerous waste operations located at Parcel Number 1722800206 and 5084400124 at 734 South Lucile Street in Seattle, Washington, that is owned and was operated by PSC. The term may also include certain properties adjacent to the former dangerous waste facility property that were acquired by PSC following closure of the dangerous waste operations in August 2003 (e.g., adjacent property to the northwest formerly owned by The Amalgamated Sugar Company [TASCO]) that was impacted by historical releases from the PSC facility). The facility RCRA Part B permit (Permit) requires PSC to perform corrective action beyond the boundaries of the permitted facility to address such releases. The Washington Model Toxics Control Act (MTCA) regulations (Chapter 173-340 WAC) also require PSC to perform cleanup actions to address releases from the facility at "any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located." *See* WAC 173-340-200.

The geographic boundaries of the West of 4th Groundwater Investigation Area and the location of each facility are depicted on Figure 1.2.

1.1 PURPOSE AND OBJECTIVE

The purpose and objective of the Data Summary Report is to consolidate and present a summary of the data collected by the West of 4th Group members and others that are relevant to the remedial investigation and characterization of concentrations of COPCs detected in soil and groundwater located within West of 4th Groundwater Investigation Area .

1.2 ORGANIZATION OF DATA SUMMARY REPORT

Section 2 describes the physical environmental setting for the West of 4th Groundwater Investigation Area. Section 3 summarizes previous investigations and interim actions completed by the West of 4th Group members that are relevant to the West of 4th Groundwater Investigation Area. Section 4 summarizes the results of previous investigations and interim actions. The references cited and other documents relevant to the Data Summary Report are listed in Section 5, Bibliography.

1.3 STUDY BOUNDARIES

The boundaries of the Data Summary Report were defined using the following criteria:

- Geographic areas; and
- Temporal boundaries.

These components are discussed below.

1.3.1 Geographic Areas

The geographic boundaries of the Data Summary Report extend vertically from the surface to the deepest depth in borings completed within the West of 4th Groundwater Investigation Area, and laterally for the area depicted on Figure 1.2. The media of interest for the Data Summary Report include soil from the surface to the top of first-encountered groundwater and groundwater.

1.3.2 Temporal Boundaries

Data included in the Data Summary Report include all data collected by West of 4th Group members and others that are relevant to the West of 4th Groundwater Investigation Area. Figure 1.3 is an exploration location plan for the collective work completed in the study area. A subset of data collected by PSC has been “retired” in accordance with the letter from Ecology (2007) dated February 14, 2007 and is not included in the Data Summary Report. The criteria for inclusion in the “retired” PSC data set include:

- Water Table Zone:
  - The sample was collected from a water table zone direct push (DP) location that is located within a 75-foot radius of a water table zone monitoring well (MW) and

the screen intervals for the samples collected from the DP well and the MW well are similar.

- The sample was collected from a water table DP well that was sampled before 2002 and is located within a 75-foot radius of a "newer" water table DP well and the screen intervals for the samples collected from the DP wells are similar.

- Shallow Zone:
  - The sample was collected from a shallow DP well that is located within a 75-foot radius of a shallow MW and the screen intervals for the samples collected from the DP well and the MW well are similar.
  - The sample was collected from a shallow DP well that was sampled before 2002 and is located within a 75-foot radius of a "newer" shallow DP well and the screen intervals for the samples collected from the DP wells are similar.

- Intermediate Zone:
  - The sample was collected from an intermediate DP well that is located within a 75-foot radius of an intermediate monitoring well (MW) and the screen intervals for the samples collected from the DP well and the MW well are similar.
  - The sample was collected from an intermediate DP well that was sampled before 2002 and is located within a 75-foot radius of a "newer" intermediate DP well and the screen intervals for the samples collected from the DP wells are similar.

2.0 ENVIRONMENTAL SETTING

This section describes the physical environmental setting for the West of 4th Groundwater Investigation Area. The description consists of topography, surface water features, land use, vegetation, climate, and hydrogeologic conditions.

2.1 TOPOGRAPHY AND SURFACE WATER FEATURES

The West of 4th Groundwater Investigation Area is located within the floor of the north-south-trending Duwamish valley, where the land surface is relatively level, with ground surface elevations ranging from approximately 15 to 25 feet mean sea level. The valley floor is approximately 6,000 feet wide in this area, and bounded to the east and west by steeply sloped uplands that rise to elevations of 300 to 500 feet above mean sea level. The West of 4th Groundwater Investigation Area is located adjacent to and to the east of the Lower Duwamish Waterway (LDW), approximately 2 miles upstream from the point of discharge to the marine waters of Elliott Bay. No other surface water bodies are known to be present in the West of 4th Groundwater Investigation Area.

The LDW was dredged and straightened in the early 1900s. Prior to that time, the Green-Duwamish River meandered as it flowed north through the Duwamish Valley toward Elliott Bay. Slip No. 2, located southwest of the West of 4th Groundwater Investigation Area (Figure 1.2), likely is an artifact of the original river course. The former river meander curved from the east, crossing the Duwamish Valley floor in the area south of the West of 4th Groundwater Investigation Area (Booth and Herman 1998). The abandoned meanders reportedly were filled with dredged material during the waterway straightening project.

The LDW is tidally influenced and has variable salinity concentrations adjacent to the West of 4th Groundwater Investigation Area. PSC (2003d) compiled data showing that tidal fluctuations from -4.6 to +14.8 feet Mean Lower Low Water occur in the LDW, and that tide-induced flow reversals have been observed as far upstream as 13 miles. PSC (2003d) also compiled depth-specific salinity data for sampling stations located at the Spokane Street and 16th Avenue South bridges. The time-weighted average salinity at depth was 30.64 parts per thousand near Spokane Street, and 27.58 parts per thousand near 16th Avenue South.

2.2 LAND USE

The West of 4th Groundwater Investigation Area is located within the Georgetown neighborhood that has a long history of mixed industrial, commercial, and residential land use. While industrial is the predominant land use in the West of 4th Groundwater Investigation Area, commercial and residential uses are present, and the mixed-use pattern is anticipated to remain in the long-term.

2.3 VEGETATION

Vegetation in the West of 4th Groundwater Investigation Area generally is sparse, and consistent with the predominantly industrial setting. The area is typical of urban, developed land, with vegetation limited to landscaped planting areas, street-side trees, and plantings on the dispersed residential properties.

2.4 CLIMATE

The climate is characterized by mild temperatures and a rainy season, with considerable cloudiness during the winter months. Average winter daytime temperatures are in the 40s (degrees Fahrenheit) and nighttime readings in the 30s. During the summer, daytime temperatures are usually in the 70s, with nighttime lows in the 50s (PSC 2003d).

The middle of the dry season occurs in July or early August, with July being the driest month of the year. The rainy season extends from October to March, with December normally the wettest month. However, precipitation is rather evenly distributed throughout the winter and early spring months. More than 75 percent of the yearly precipitation falls during the rainy season. At the King County Airport (located approximately 2 miles south), an average annual precipitation of 36.55 inches is reported (PSC 2003d).

2.5 HYDROGEOLOGIC CONDITIONS

2.5.1 Geology

A detailed description of the regional and local geology for the West of 4th Groundwater Investigation Area was provided in the PSC Remedial Investigation Report (2003d). Additional geologic information obtained from more recent investigations performed at various facilities in the West of 4th Groundwater Investigation Area has been used to augment the geologic information presented by PSC (2003d) and is discussed below. PSC (2003d) identified the following five geologic units relevant to the local hydrogeology:

- Shallow Sand Unit (including fill);
- Intermediate Sand and Silt Unit;
- Silt Unit;
- Deep Sand and Silt Unit; and
- Bedrock.

The Shallow Sand Unit and the Intermediate Sand and Silt Unit were encountered in borings advanced within the West of 4th Groundwater Investigation Area. The Shallow Sand Unit and Intermediate Sand and Silt Unit are referred to as the Younger Alluvium (Qyal) and Older Alluvium (Qoal) (Booth and Herman 1998), respectively. The Younger Alluvium is described as moderately sorted deposits of silt, sand, and sandy silt; and containing abundant wood and organics. This unit is typically found within a few feet above or below the current sea level and represents channel and overflank (floodplain sediments) deposited by the Duwamish River in an estuarine and deltaic environment. The Older Alluvium is comprised of sands and silts with discontinuous gravel lenses and locally abundant shells and some wood. The unit is moderately dense to dense. The Silt Unit was encountered in borings advanced east of the West of 4th Groundwater Investigation Area. The Silt Unit consists of silt with up to 5 percent clay, and, at some locations up to 60 percent fine sand. The results of investigation activities conducted east of the West of 4th Investigation Area indicate that the upper surface of the Silt Unit dips to the west-southwest. Cross-sections A-A' and B-B' (Figures 2.2 and 2.3, respectively) depict the stratigraphy of the shallow soil in the West of 4th Groundwater Investigation Area. Cross section locations are shown on Figure 2.1.

Although encountered at the PSC Facility, the Silt Unit, Deep Sand and Silt Unit, and bedrock were not encountered to the total depth drilled in the borings located in the West of 4th Groundwater Investigation Area. These units were inferred to dip towards the west-southwest at the PSC Facility (PSC 2003d). It is expected that the Silt Unit, Deep Sand and Silt Unit and bedrock are present at a depth greater than 150 feet bgs within the West of 4th Groundwater Investigation Area.

The geologic descriptions of soil samples collected at borings in the West of 4th Groundwater Investigation Area during recent investigations at the Art Brass, Blaser, and Capital Industries Facilities, and adjacent to East Marginal Way near the Saint-Gobain Glass facility have been consistent with the descriptions of the Shallow Sand Unit and Intermediate Sand and Silt Unit provided in the PSC report (2003d).

2.5.2 Hydrology

2.5.2.1 Groundwater

A detailed description of the local hydrogeologic units in the West of 4th Groundwater Investigation Area was provided by PSC (2003d). Additional geologic information obtained from more recent investigations performed at various facilities in the West of 4th Groundwater Investigation Area has been used to augment the geologic information presented by PSC (2003d) and is discussed below. PSC (2003d) identified the following five hydrogeologic units, in order of increasing depth, that were identified in the area surrounding the PSC facility:

- Shallow Aquifer;
- Intermediate Aquifer;
- Silt Aquitard;
- Deep Aquifer; and
- Basement Confining Unit.

These units were correlated with the local geologic units described above. Subsurface explorations in the West of 4th Groundwater Investigation Area have primarily targeted the Shallow Aquifer and the upper portion of the Intermediate Aquifer. A limited number of borings have extended to the Silt Aquitard in the eastern portion of the West of

4th Groundwater Investigation Area (e.g. borings PSC-K10 and PSC-F16, Figure 1.3, Figure 2.2).

The Shallow Aquifer corresponds to the Shallow Sand Unit and is continuous across the West of 4th Groundwater Investigation Area. The Shallow Aquifer thickness is variable and extends to depths of up to 50 feet bgs within the West of 4th Groundwater Investigation Area. Groundwater in the Shallow Aquifer is unconfined and appears to be hydraulically connected to the underlying Intermediate Aquifer. In the vicinity of the LDW, groundwater levels in the Shallow Aquifer are tidally influenced.

The Intermediate Aquifer corresponds to the Intermediate Sand and Silt Unit and is continuous across the West of 4th Groundwater Investigation Area. In the eastern portion of the West of 4th Groundwater Investigation Area, the Intermediate Aquifer is interpreted to be more than 100 feet thick. Borings in the western portion of the West of 4th Groundwater Investigation Area do not fully penetrate the Intermediate Aquifer. The top of the Silt Aquitard forms the base of the Intermediate Aquifer. The Intermediate Aquifer was inferred by PSC (2003d) to discharge to the LDW. The degree of tidal influence for the Intermediate Aquifer, if any, has not been established within the West of 4th Groundwater Investigation Area.

A limited number of borings located east of the West of 4th Groundwater Investigation Area were of sufficient depth to encounter the Silt Aquitard and none of these borings fully penetrated this unit. At boring PSC-K10 (Figure 2.3), the Silt Aquitard was over 25 feet thick.

The hydraulic properties of the Shallow and Intermediate Aquifers are presented in detail in the PSC report (2003d) and are not reiterated herein. Aquifer slug tests were conducted by Conestoga-Rovers & Associates (2006) for Saint-Gobain Containers at temporary wells screened across 4-feet of soil at several depths in the Shallow Zone and Intermediate Zone. Conestoga-Rovers & Associates (2006) reported that results of the 15 slug tests indicated "hydraulic conductivity values ranged from approximately $4.9e^{-4}$ centimeters per second to $8.4e^{-3}$ centimeters per second with a geometric mean of $3.5e^{-3}$ which is consistent with the local aquifer sediment type (sand and silty sand)." No additional aquifer testing has been performed within the West of 4th Groundwater Investigation Area for facility-specific investigations to augment the data compiled by PSC (2003d).

PSC (2003d) adopted a standardized nomenclature for groundwater monitoring and sampling intervals. Groundwater data were divided into four depth intervals by PSC, which generally correspond to the upper and lower portions of the Shallow Aquifer, the Intermediate Aquifer, and the Deep Aquifer. These depth intervals are described below. The assessment of groundwater conditions within the West of 4th Groundwater Investigation Area continues to use the nomenclature developed by PSC (2003d) for the groundwater monitoring and sampling intervals at the facility-specific subsurface investigations.

- Water Table Zone – This zone includes monitoring wells screened above 20 feet bgs and reconnaissance groundwater samples collected above 20 feet bgs. This zone corresponds approximately to the upper 10 feet of the Shallow Aquifer;
- Shallow Zone – This zone includes monitoring wells screened below 20 feet and above 40 feet bgs, and reconnaissance groundwater samples collected between 21 feet and 40 feet bgs. This zone is generally within the Shallow Aquifer, but may include the upper portion of the Intermediate Aquifer at some locations;
- Intermediate Zone – This zone includes monitoring wells and reconnaissance groundwater samples screened below 40 feet bgs and above the Silt Aquitard. As the depth of the interface between the Shallow Aquifer and Intermediate Aquifer varies across the West of 4th Groundwater Investigation Area, the Intermediate Zone may include the lower portion of the Shallow Aquifer and/or the Intermediate Aquifer in some areas; and
- Deep Aquifer – This sampling interval includes monitoring wells in the vicinity of the PSC Facility that are screened in the Deep Aquifer. No data have been collected within the West of 4th Groundwater Investigation Area from the Deep Aquifer.

Recent groundwater monitoring and sampling in May 2007 from monitoring wells screened in the Water Table Zone, Shallow Zone, and Intermediate Zone were included in this monitoring and sampling event. The purpose of the monitoring and sampling event was conducted to collect a consistent set of groundwater monitoring data from groundwater monitoring wells located in West of 4th Groundwater Investigation Area. Monitoring and sampling were conducted in accordance with PSC sampling protocols. Findings from the monitoring and sampling event indicated the following:

- The depth to groundwater ranged from approximately 6 to 10 feet below the top of the monitoring well casings (typically near the ground surface);
- The approximate direction of groundwater flow in the Water Table Zone was west-southwest for the area between 5th and 1st Avenue South, turning more southerly in the vicinity of wells located west of 1st Avenue South. Figure 2.4 depicts the groundwater level contours and estimated direction of groundwater flow;
- A potentially anomalous groundwater level was measured at monitoring well CG-142-WT (Figure 2.4) and was higher than would be expected based on the regional gradient. The cause of this was not determined, but may be related to recharge from an unidentified leaking utility that is causing mounding of the water table in the vicinity of this monitoring well;
- The gradient for the Water Table Zone ranges from 0.002 feet per foot in the eastern and southern portions of the West of 4th Groundwater Investigation Area to 0.0003 feet per foot in the north-central portion of the West of 4th Groundwater

Investigation Area, excluding the vicinity of monitoring well CG-142-WT (Figure 2.4).

- The potentiometric head between nested monitoring wells screened in the Water Table Zone and the Shallow Zone ranged from -0.01 foot at monitoring wells CG-134-WT and CG-134-40 in the eastern portion of the West of 4th Groundwater Investigation Area to 1.53 feet at monitoring wells CG-142-WT and CG-142-40. Excluding monitoring wells CG-142-WT and CG-142-40 due to the inferred groundwater table mounding at this location, the maximum potentiometric head difference of 0.66 at monitoring wells CG-140-WT and CG-140-40 represents a vertically downward gradient of 0.21 feet per foot.
- The approximate direction of groundwater flow in the Shallow Zone was west-southwest for the area north of South Fildalgo Street and southwest in the area south of South Fildalgo Street. Figure 2.5 depicts the groundwater level contours and estimated direction of groundwater flow;
- The gradient for the Shallow Zone ranges from 0.001 feet per foot in the eastern portion of the West of 4th Groundwater Investigation Area to 0.005 foot per foot west of East Marginal Way;
- An insufficient number of monitoring wells were included in the monitoring and sampling event to develop a groundwater level contour map or to estimate the gradient for the Intermediate Zone. PSC (2003d) indicates that the groundwater flow in the Intermediate Zone across the West of 4th Groundwater Investigation Area was towards the southwest at a gradient of 0.001 feet per foot.
- The potentiometric head between nested monitoring wells CG-138-WT and CG-138-70 screened in the Water Table Zone and the Intermediate Zone, respectivley, was 0.09 feet/foot. This is a potentiometric head difference 0.01 feet/foot represents a vertically downward gradient of 0.01 feet per foot.

PSC (2003d) performed extensive research into the potential that buried utilities could provide preferential pathways for groundwater flow in the [Study Area]. Most utilities were buried at depths above the water table or used native soil as backfill. Based on their research, PSC (2003d) concluded “there is no evidence that utility corridors are providing a preferential pathway for groundwater flow.”

3.0 PREVIOUS INVESTIGATIONS AND INTERIM REMEDIAL ACTIONS

This section summarizes the previous investigations and interim remedial actions conducted in the West of 4th Groundwater Investigation Area from which the data used in preparing this Data Summary Report were drawn. The investigations and remedial actions include work conducted by each of the companies comprising the West of 4th Group, and by other property owners within the West of 4th Groundwater Investigation Area with publicly available file information. Reports providing a more thorough description of investigation activities and chemical analyses are cited in text. The results of these investigations, including geologic, hydrogeologic, and chemical characterization, are consolidated in Section 4, Source Area Summary.

3.1 PHILIP SERVICES CORPORATION

The PSC Facility is a Resource Conservation and Recovery Act-permitted (RCRA Permit) former dangerous waste treatment, storage, and disposal facility located east of the West of 4th Groundwater Investigation Area, at 734 South Lucile Street in Seattle, Washington. The ownership and operational history of the PSC Facility are summarized below:

- Prior to 1915, the PSC Facility was vacant and undeveloped, or residential;
- From circa 1915 to the late 1930s, the Oregon-Washington Railway and Navigation Company (OWR&N Co.), predecessor to the Union Pacific Railroad (UPRR), owned the property that the PSC Facility is located on, and rented portions of the property to lumber companies and residents;
- In the late 1930s, the OWR&N Co. sold the southern parcel of the property (Parcel #1722800206) to the family of Mr. Ron West, then owners of the Preservative Paint Company (Preservative Paint). OWR&N Co retained ownership of the northern parcel of what became the PSC Facility (Parcel #5084400124) until 1988. OWR&N Co. was succeeded by UPRR circa 1950;
- From the mid-1940s to 1970, Preservative Paint operated on the southern parcel (Parcel #1722800206) of the PSC Facility property under the name Wood Beautifiers, Inc. According to historical sources, Wood Beautifiers was a shingle-staining “division” of Preservative Paint. A solvent distillation unit for solvent recovery operations was constructed on the property circa 1959;
- In 1970, Chemical Processors, Inc. (Chempro) was formed as a separate company to operate certain solvent recovery operations for the family of Mr. Ron West, then owners of Preservative Paint and Parcel #1722800206 of the PSC Facility property. Chempro conducted hazardous waste treatment and solvent recovery operations on Parcel #1722800206 for Preservative Paint and other generators of hazardous waste (e.g., The Boeing Company, PACCAR, Inc.) from circa 1970 to December 1986;
- In December 1986, Mr. David Sabey (through a Sabey corporate entity) purchased all of the stock of Chempro, and concurrently purchased Parcel #1722800206, which became an asset of Chempro at that time;

- In March 1988, Glacier Park Company (a subsidiary of Burlington Northern Inc.) acquired a majority interest in Chempro;
- In October 1988, Chempro acquired the northern field parcel (Parcel #5084400124) that previously had been leased to Chempro by UPRR;
- In December 1988, Burlington Northern Inc. divested Glacier Park Company and Chempro into a newly established publicly traded company, Burlington Resources Inc. As a majority-owned subsidiary of Burlington Resources Inc., Chempro changed its corporate name to Burlington Environmental Inc. (BEI) at that time;
- In 1993, Philip Environmental Inc. purchased BEI, which remained a separate subsidiary. In 1997, Philip Environmental merged with two other publicly traded companies to form Philip Services Corporation (PSC);
- In 1999, PSC filed for bankruptcy under Chapter 11. PSC reorganized under Chapter 11, and emerged from financial restructuring in 2000;
- In August 2003, PSC completed surface closure at the PSC Facility;
- In 2003, PSC filed for bankruptcy a second time under Chapter 11. PSC again reorganized, and emerged from financial restructuring in 2004; and
- BEI remains a separate subsidiary and the legal owner of the PSC Facility. BEI currently is a wholly owned subsidiary of PSC Industrial Services Inc., a division of the reorganized Philip Services Corporation.

3.1.1 Subsurface Investigations

Releases of chemicals associated with operations of Preservative Paint, Wood Beautifiers, Chempro, and BEI occurred at the PSC Facility, resulting in elevated concentrations of COPCs in soil and groundwater. PSC currently is in the process of conducting corrective action activities at the PSC Facility to obtain site closure from Ecology. Corrective actions conducted by PSC to date include:

- Surface closure of solid waste management areas;
- A subsurface investigation at the PSC Facility and beyond the PSC Facility boundaries;
- Interim actions;
- Routine groundwater monitoring activities; and
- Remedial design/feasibility study activities.

The COPCs associated with releases at the PSC Facility include petroleum hydrocarbons, chlorinated solvent-related volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, and polychlorinated biphenyls (PCBs). The available results of historical investigation activities were summarized in the Final Comprehensive Remedial Investigation (RI) Report (PSC 2003d). Several addenda were submitted to address Ecology's comments on the Final Comprehensive RI Report (PSC 2004a, 2004b, 2004c, 2004d).

PSC conducted investigation activities to assess the nature and extent of COPCs in soil and groundwater over a geographic area extending from east of the PSC Facility to the LDW. Characterization data collected during the investigation activities conducted by PSC in locations both east and west of 4th Avenue South are applicable to COPCs attributed to releases at the PSC Facility that have come to be located in the West of 4th Groundwater Investigation Area. The purpose and scope of each investigation are summarized below.

3.1.1.1 Evaluation of Groundwater (Harper Owes and Hart Crowser 1983)

Harper-Owes and Hart-Crowser conducted subsurface investigation activities in 1982 and 1983 at the PSC Facility, prior to the RCRA Permit-required corrective action. Work included the following:

- Installation of 9 monitoring wells in locations on or adjacent to the PSC Facility (Haper Owes Wells G-1 through G-9);
- Installation of 10 groundwater monitoring wells on or adjacent to the PSC Facility (Hart Crowser Wells HC-1 through HC-10);
- Collection of soil and groundwater samples from select borings and monitoring wells for laboratory analysis; and
- Measurment of water levels in the monitoring wells to assess groundwater flow direction.

3.1.1.2 Solid Waste Management Unit Report (Chempro 1988)

PSC prepared a Solid Waste Management Unit Report in response to a request for information from the U.S. Environmental Protection Agency (EPA) regarding potential releases of hazardous waste from closed Solid Waste Management Units (Chempro 1988). The report includes: a detailed history of operations at PSC between 1958 and 1988; lists a summary of known and suspected releases that occurred; and describes the chemicals stored at the PSC Facility.

3.1.1.3 Phase I Hydrogeologic Investigation (Sweet Edwards/EMCON 1988)

Sweet Edwards/ EMCON conducted further subsurface investigation activities in 1987 to evaluate hydrogeologic conditions at the PSC Facility as part of the property transfer to BEI. Work included the following:

- Installation of monitoring wells CG-1 through CG-3 on or adjacent to the PSC Facility. PSC renamed monitoring wells CG-1 and CG-2 “CG-1-D” and “CG-2-D,” respectively, to identify the monitoring well screen with the applicable aquifer zone[2];

[2] The identification system used by PSC to name monitoring wells consists of the abbreviation “CG” (for Chempro Georgetown, the former PSC facility name) followed by a single- or double-digit numeral (either 1,2, or 4 through 12) if the well was located at the PSC Facility, or a number greater than 100 if the well was located beyond the PSC Facility boundaries that was assigned on the basis of the general chronology of the well installation, followed by the abbreviation “WT,” “S1,” “S2,” “I,” or “D”) designating the aquifer zone of the respective well screen. During the RFI activities, the monitoring well-naming convention was changed to include the depth below ground surface of the bottom of the well screen to identify the aquifer zone.

- Collection of reconnaissance groundwater samples at 10- and 20-foot bgs intervals, respectively, while advancing borings for monitoring wells CG-1-D and CG-2-D;
- Conducting of rising head slug tests in monitoring wells CG-1-D, CG-2-D, G-1, G-4 and HC-10; and,
- Collection of soil and groundwater samples from select borings and monitoring wells for laboratory analysis.

3.1.1.4 Underground Storage Tank Removal (PSC 2003d)

BEI excavated and removed underground storage tanks that had been installed by Preservative Paint and used for storage of recycled solvents and hazardous materials. BEI removed 24 underground storage tank systems that previously contained recycled solvents and cyanide waste, and collected soil and groundwater samples for laboratory analysis.

3.1.1.5 Phase II Hydrogeologic Investigation (Sweet Edwards/EMCON 1989b)

Sweet Edwards/EMCON conducted subsurface investigation activities in 1987 as part of the RCRA Facility Investigation (RFI) to satisfy the EPA Consent Order issued under Section 3008(h) of RCRA. The goal of the investigation was to characterize the nature and extent of affected soil and groundwater at the PSC Facility. Work included the following:

- Installation of 24 monitoring wells in locations on or adjacent to the PSC Facility (monitoring wells CG-1-S1, CG-1-S2, CG-1-I, CG-2-S1, CG-2-S2, CG-2-I, CG 4-D, CG-5-S1, CG-5-S2, CG-5-I, CG-5-D, CG-6-S1, CG-6-S2, CG-7-S1, CG-7-S2, CG-8-S1, CG-8-S2, CG-9-S1, CG-9-S2, CG-9-I, CG-10-S1, CG-10-S2, CG-11-S1, and CG-11-S2);
- Advancement of reconnaissance borings TB-1 through TB-14 between June 1989 and August 1989;
- Decommissioning of monitoring wells G-1 through G-4, G-7 through G-9, HC-4 through HC-6, and HC-8);
- Conducting rising head slug tests in monitoring wells CG-4-D, CG-5-D, CG-1-I, CG-2-I, CG-5-I, and CG-9-I;
- Collection of soil and groundwater samples from select reconnaissance borings and wells for laboratory analysis; and,
- Collection of soil gas samples from soil gas monitoring points for analysis.

3.1.1.6 Phase III (Off-Site) Investigation—February and August 1992 (BEI 1992a and 1992b)

BEI conducted subsurface investigation activities in 1992 to characterize the nature and extent of affected soil and groundwater at the PSC Facility in accordance with the corrective action requirement of the RCRA Permit. Work included the following:

- Advancement of 35 soil borings using a hand-auger, and collection of 26 composite soil samples;
- Collection of soil gas samples from 21 probe locations as part of a soil gas survey; and,
- Conducting of a 72-hour pumping test of the shallow aquifer using wells installed for a soil vapor extraction (SVE) pilot test.

3.1.1.7 Phase III (Off-Site) Investigation—February and August 1993 (BEI 1993a and 1993b)

BEI conducted subsurface investigation activities in 1993 to characterize the nature and extent of affected soil and groundwater at the PSC Facility in accordance with the corrective action requirement of the RCRA Permit. Work included the following:

- Installation of 17 monitoring wells in locations adjacent to the PSC Facility (monitoring wells CG-101-S1, CG-101-S2, CG-102-S1, CG-102-S2, CG-102-I, CG-102-D, CG-103-S1, CG-103-S2, CG-103-I, CG-104-S1, CG-104-S2, CG-104-I, CG-104-D, CG-105-S1, CG-105-S2, CG-105-I and CG-111-I);
- Advancement of reconnaissance borings GW-01 through GW-17 and collection of groundwater samples for laboratory analysis; and,
- Conducting slug tests in all newly installed wells.

3.1.1.8 Phase III (Off-Site) Investigation—Georgetown Sewer Investigation Summary and Discussion of Potential Sources of Contamination at CG-102 Off-Site Well (BEI 1993c)

BEI conducted investigation activities in 1993 to assess potential contaminant source areas for groundwater impact at monitoring well CG-102 in accordance with the corrective action requirement of the RCRA Permit. Work included surveying sewer lines in the vicinity of Well CG-102, and assessing historical land use in the area.

3.1.1.9 Phase III (Off-Site) Investigation—February 1994 (BEI 1994a)

BEI conducted subsurface investigation activities to characterize the nature and extent of affected soil and groundwater at the PSC Facility in accordance with the corrective action requirement of the RCRA Permit. Work included the advancement of reconnaissance borings RW-1 through RW-20, and collection of groundwater samples for laboratory analysis.

3.1.1.10 Phase III (Off-Site) Investigation—August 1996 (PSC 1996)

PSC conducted investigation activities in 1996 to assess the potential for dilution of groundwater due to stormwater infiltration. Work included measuring stormwater flow during dry, moderate rain, and heavy rain conditions to assess the potential for leakage from the sewer system.

3.1.1.11 Phase III (Off-Site) Investigation—LNAPL Investigation (PSC 1997a and 1997b)

PSC conducted investigation activities in 1996 to assess the presence of light nonaqueous-phase liquids (LNAPL) at the PSC Facility in accordance with the corrective action requirement of the RCRA Permit Work included measuring LNAPL thickness in monitoring wells to assess the presence of mobile LNAPL.

3.1.1.12 Post-Phase III (Off-Site) Investigation—Hydropunch Investigation (PSC 1998b)

PSC conducted subsurface investigation activities in 1998 to characterize the nature and extent of affected soil and groundwater up-gradient and down-gradient of the PSC Facility in accordance with the corrective action requirement of the RCRA Permit. Work included the following:

- Advancement of 21 reconnaissance borings at approximately 200-foot centers in a rectangular grid pattern between July 16 and July 31, 1998;
- Advancement of soil borings B4 and B6 to identify the depth of the Silt Unit off-site; and,
- Collection of groundwater samples from select borings and wells for laboratory analysis.

3.1.1.13 Post-Phase III (Off-Site) Investigation—North Field Intermediate Well Investigation (PSC 1999a)

PSC conducted subsurface investigation activities in 1998 to characterize the nature and extent of affected soil and groundwater at the PSC Facility. Work included the following:

- Installation of monitoring wells CG-11-I and CG-12-I at the PSC Facility; and,
- Collection of soil and groundwater samples from select borings and wells for laboratory analysis.

3.1.1.14 Post-Phase III (Off-Site) Investigation—Soil Gas Sampling (PSC 2000a)

PSC conducted subsurface investigation activities in 1998 to characterize the nature and extent of affected soil gas, soil, and groundwater at the PSC Facility. The work included the following:

- Advancement of 16 probes for the collection of soil gas samples; and,

- Collection of soil gas, soil, and groundwater samples from select borings and wells for laboratory analysis.

3.1.1.15 Post-Phase III (Off-Site) Investigation—Technical Memorandum Pumping Test Analysis—Shallow Aquifer (PSC 2000b)

PSC conducted analysis of the 1992 shallow aquifer pumping test. Work included re-assessing the results of the 1992 shallow aquifer pumping test to estimate horizontal hydraulic conductivity and specific yield.

3.1.1.16 Post-Phase III (Off-Site) Investigation—Technical Memorandum Pumping Test Analysis—Intermediate Well (PSC 2000c)

PSC conducted a pumping test using monitoring wells with screens in the Intermediate Zone. Work included the conducting of a pumping test using wells with screen intervals in the Intermediate zone, and analysis of the pumping test results.

3.1.1.17 Post-Phase III (Off-Site) Investigation—Groundwater Model Conceptual Site Model Report (PSC 2000d, 2000e, 2000i)

PSC assessed groundwater conditions by developing a site conceptual model and a numerical groundwater model. Work included the following:

- Developing a site conceptual model on the basis of the available characterization data;
- Presenting the parameters to be used in the numerical groundwater flow model using Visual Modflow;
- Implementing the site conceptual model as a numerical groundwater model using Visual Modflow;
- Calibrating and validating the numerical groundwater flow model results using Visual Modflow; and
- Entering a range of parameters into the numerical groundwater model using Visual Modflow and assessing the results to evaluate the sensitivity of the model.

3.1.1.18 Indoor Air Analysis Investigation (PSC 2000f)

PSC conducted subsurface investigation activities in 2000 to assess the potential for vapor intrusion associated with concentrations of COPCs detected in groundwater. Work included the advancement of 12 reconnaissance borings (borings 5409D-1 through 5409D-4, ISG-5409D-1, and 672L-1 through 672L-7) to collect 11 groundwater samples for laboratory analysis.

3.1.1.19 Post-Phase III (Off-Site) Investigation—Supplemental Offsite Groundwater Characterization, Source Area Off-Site Nature and Extent of Plume Investigation—Technical Memorandum I through Technical Memorandum VI (PSC 2000, 2000g, 2000h, 2000j, 2000k, 2001a, 2001b, 2001c)

PSC conducted subsurface investigation activities between 2000 and 2003 to characterize the nature and extent of affected soil and groundwater at and down-gradient of the PSC Facility. Work included the following:

- Advancement of 38 reconnaissance borings to collect 263 groundwater samples for laboratory analysis to assess the source area on and immediately adjacent to the PSC Facility;
- Advancement of 66 reconnaissance borings to collect 168 groundwater samples for laboratory analysis to assess the down-gradient extent of groundwater impact; and
- Logging the lithologic descriptions of soil samples collected from borings F16, F7, and F9 to assess the depth of the Silt Unit.

3.1.1.20 Post-Phase III (Off-Site) Investigation—Semi-Annual RFI Progress Report (PSC 2001e)

PSC conducted subsurface investigation activities in 2001 to assess the potential for vapor intrusion associated with concentrations of COPCs detected in groundwater. Work included the following:

- Installation of groundwater monitoring wells CG-112-S1 and CG-113-S1 adjacent to the PSC Facility. Installation of co-located soil gas sample points adjacent to both wells.
- Installation of soil gas monitoring points CG-2-SG through CG-6-SG.
- Installation of 2 soil moisture probes.

3.1.1.21 Post-Phase III (Off-Site) Investigation—Technical Memorandum—Soil Gas Investigation (PSC 2001d)

PSC conducted subsurface investigation activities in March 2001 to assess the potential for vapor intrusion associated with concentrations of COPCs detected in groundwater. Work included advancing 6 reconnaissance borings SG-9, SG-10, SG-12, SG-13, SG-14, and SG-15 to collect 6 groundwater samples for laboratory analysis.

3.1.1.22 Comprehensive RCRA Facility Investigation Report (PSC 2001f)

PSC summarized the available site characterization data in a report. Work included presenting the available data in a comprehensive report format.

3.1.1.23 Draft Human Health and Ecological Risk Assessment (FW 2001)

PSC developed a draft Human Health and Ecological Risk Assessment. Work included the development of a human health and ecological risk site conceptual model, and assessment of the potential for human health and ecological risk based on available site characterization data.

3.1.1.24 Supplemental Off-Site Groundwater Characterization (Technical Memorandum VII through Technical Memorandum XII) (PSC 2001j, 2002b, 2002d, 2003a, 2003b, and 2003d)

PSC conducted subsurface investigation activities between 2001 and 2003 to characterize the nature and extent of affected groundwater down-gradient of the PSC Facility. Work included preparation of work plans documenting the proposed investigation activities, and advancement of 180 reconnaissance borings to collect 780 groundwater samples for laboratory analysis to assess the down-gradient extent of groundwater impact.

3.1.1.25 Pre-Hydraulic Control Interim Measure Investigation (URS/GeoMatrix 2003c)

PSC conducted subsurface investigation activities in 2002 to assess groundwater in the vicinity of the proposed barrier wall for the Hydraulic Control Interim Measure (HCIM). Work included advancing 23 reconnaissance borings to collect 141 groundwater samples for laboratory analysis.

3.1.1.26 Post-Phase III (Off-Site) Investigation—RFI Well Installation (PSC 2003e, 2004a, 2004b, 2004c, and 2004d)

PSC conducted subsurface investigation activities in 2002 and 2003 to characterize the nature and extent of affected soil and groundwater up-gradient and down-gradient of the PSC Facility. Work included the following:

- Installation of 21 monitoring wells with screen intervals in the Water Table Zone in locations adjacent to the PSC Facility (Wells CG-106-WT, CG-107-WT, CG-115-WT, CG-122-WT, CG-124-WT, CG-126-WT through CG-132-WT, CG-134-WT, CG-136-WT through CG-138-WT, CG-140-30, CG-140-WT through CG-143-WT).
- Installation of 23 monitoring wells with screen intervals in the Shallow Zone in locations adjacent to the PSC Facility (Wells CG-119-40, CG-121-40, CG-124-40, CG-125-40, CG-127-40, CG-129-40, CG-131-40 through CG-139-40, CG-140-40, CG-141-40, , CG-142-40, CG-143-40, CG-144-35, CG-145-35, CG-151-25).
- Installation of 11 monitoring wells with screen intervals in the Intermediate Zone in locations adjacent to the PSC Facility (monitoring wells CG-106-I, CG-115-75, CG-120-75, CG-121-70, CG-122-60, CG-123-90, CG-124-70, CG-128-70, CG-135-50, CG-138-70, and CG-141-50).

- Installation of monitoring well CG-106-D with a screen interval in the Deep Aquifer in a location adjacent to the PSC Facility.
- Advancement of 12 soil borings (Borings S34, Y26, W23, M29, S15, P18, K21, F16, H14, K10, D13 and D10) to assess changes in subsurface lithology, and to collect soil samples for analysis by a geotechnical laboratory.
- Conducting of tidal studies in May and November 2002 and July 2003 using wells completed in the Water Table and Shallow and Intermediate Zones.
- Collection of groundwater samples from select borings and wells for laboratory analysis.

3.1.1.27 Remedial Investigation Report (PSC 2003e) and Addenda (PSC 2004 2004a, 2004b, 2004c, 2004d)

PSC summarized the available site characterization data in an RI report. Work included presentation of the available data in a comprehensive report format, and preparation of addenda to the RI Report to address Ecology comments.

3.1.1.28 Post-HCIM Well Installation (Geomatrix Consultants, Inc. [Geomatrix] 2004)

PSC conducted investigation activities in 2004 to facilitate monitoring of the HCIM. Work included the following:

- Installation of seven groundwater monitoring wells with screen intervals in the Water Table zone (monitoring wells CG-146-WT through CG-150-WT, CG-152-WT, and CG-153-WT);
- Installation of seven groundwater monitoring wells with screen intervals in the Intermediate Zone (monitoring wells CG-146-80, CG-147-57, CG-148-57, CG-149-68, CG-150-68, CG-152-79, and CG-153-79);
- Installation of groundwater extraction wells EX-1 and EX-2; and
- Conducting of a pumping test using recovery wells installed inside the HCIM barrier wall.

3.1.1.29 Environmental Indicator Data Gap Investigation (Geomatrix 2005)

PSC conducted subsurface investigation activities adjacent to the Duwamish Waterway in 2005 to address Ecology comments regarding the RI data gaps. Work included advancement of reconnaissance borings P26 and K39, and collection of 17 groundwater samples for laboratory analysis.

3.1.1.30 UPRR Argo Yard—Kennedy/Jenks Investigations (Kennedy/Jenks 2005)

Kennedy/Jenks conducted soil sampling activities on behalf of UPRR on UPRR Property along the northern and eastern property boundary of the PSC Facility between October 2004 and March 2005. Work included collection of soil samples S-1, S-2, and S-3 from a utility trench excavated in October 2004 and collection of soil samples from test pits excavated in February and March 2005 (Test Pit Locations TP-1 through TP-10). The soil samples were analyzed for VOCs, SVOCs, metals, and total petroleum hydrocarbons.

3.1.1.31 UPRR Argo Yard—Off-Site Investigation (Geomatrix 2005b and Geomatrix 2006c)

Geomatrix conducted investigation activities on behalf of PSC between August 29 and September 1, 2005 to assess data gaps in the assessment of soil impacts near the PSC Facility. Work included the following:

- Completion of direct-push borings UP-1 through UP-18 to a maximum depth of 10 feet below ground surface (bgs), and direct-push borings SAD-1 through SAD-3 to a maximum depth of 12 feet bgs.
- Collection of soil samples from multiple depths above the water table at each boring location;
- Analysis of soil samples using an on-site mobile laboratory for initial screening and/or the dedicated project laboratory for analysis for total petroleum hydrocarbons, VOCs, SVOCs, PCBs, cyanide, and metals.

3.1.2 Interim Measures

PSC implemented interim measures to address soil contamination at the PSC Facility, hydraulic control of groundwater, and vapor intrusion into indoor air. A summary of the interim measure activities is presented below.

3.1.2.1 Soil Interim Measure

PSC implemented a soil contamination interim measure that consisted of the installation and operation of an SVE system. Work included the following:

- Installation of SVE wells V-1 through V-4 in the North Field of the PSC Facility;
- Installation of SVE system components, including a regenerative blower and a catalytic oxidation unit in March 1994;
- Operation of the SVE system between March 1994 and 2004;
- Removal of approximately 19,050 pounds of VOCs from the subsurface resulting from SVE system operation; and
- Shutting down of SVE system operation in 2004 due to the completion of the HCIM and the decreasing effectiveness of the SVE system.

3.1.2.2 Hydraulic Control Interim Measure

PSC implemented an interim measure for hydraulic control of groundwater in the vicinity of the PSC Facility. Work included the following:

- Installation of a subsurface barrier wall between 2003 and 2004 that surrounds the PSC Facility source area and is keyed into the aquitard underlying the PSC

Facility, and installation of a groundwater recovery system within the barrier wall that is designed to maintain an inward groundwater gradient.

- Operation of the groundwater recovery system to maintain an inward hydraulic gradient in groundwater since 2004.
- Monitoring of the effectiveness of the HCIM using groundwater analytical data from samples collected quarterly from monitoring wells surrounding and inside the PSC Facility.

3.1.2.3 Inhalation Pathway Interim Measure Tier 3 Investigation Activities

PSC conducted investigation activities between 2003 and 2007 to assess the potential for vapor intrusion associated with concentrations of COPCs detected in groundwater at numerous locations, and installed sub-slab depressurization or sub-membrane depressurization systems at select buildings based on investigation activities. Work included:

- Advancement of reconnaissance borings to collect groundwater samples for laboratory analysis, for the purpose of comparing analytical results of groundwater samples to analytical results of indoor air samples;
- Assessment of the potential for vapor intrusion at residential and commercial buildings using quarterly groundwater data;
- Collection of indoor air, ambient air, and sub-slab soil gas samples for laboratory analysis at 24 building locations;
- Installation of 30 sub-slab and/or sub-membrane depressurization systems;
- Inspection of the sub-slab depressurization and sub-membrane depressurization systems on an annual basis; and
- Conducting of repairs and monitoring of the systems on an as-needed basis.

3.1.3 Feasibility Study and Cleanup Action

The RCRA Permit requires that PSC conduct a Site-Wide Feasibility Study (SWFS) to develop a cleanup action approach that is designed to address all areas affected by releases from the PSC Facility. After the RI Report had been completed, additional releases to soil and groundwater from non-PSC sources were identified down-gradient of the PSC Facility, near 4th Avenue South. The specific chemicals released in these down-gradient areas include many of the PSC Facility COPCs. Due to the presence of these down-gradient source areas and the complexity of dealing with impacted groundwater from multiple sources, the scope of the SWFS has been limited (with Ecology concurrence) to the properties currently owned by PSC (i.e., the PSC Facility and the adjacent TASCO property) properties adjacent to the PSC properties (i.e., select portions of the UPRR, Aronson, and Stone, Ashe and Drew (SAD) properties), and the contiguous areas affected by releases from the PSC Facility extending down-gradient (west) to 4th Avenue South.

PSC submitted the Draft SWFS Report to Ecology in September 2005 (Geomatrix 2005a)). In response to Ecology (Ecology 2005) comments received on the initial draft SWFS report, PSC and Ecology agreed to use a collaborative, phased process in preparing a Revised Draft SWFS Report, to ensure consensus among PSC, Ecology, and other interested parties on key issues that affect the SWFS. During this process, PSC developed five separate Technical Memoranda to satisfy RCRA Permit and Washington State Model Toxics Control Act Cleanup Regulation (MTCA) requirements for the complete SWFS. The topics addressed in the five Technical Memoranda developed by PSC are listed below:

- SWFS Technical Memorandum I and SWFS Technical Memorandum I Revised - Cleanup Levels, Constituents of Concern, Point of Compliance, Fate and Transport Modeling, and Corrective Action Schedule (Geomatrix 2006a, 2006c).
- SWFS Technical Memorandum II - Remediation Areas (Geomatrix 2006b).
- Technical Memorandum III - Inhalation Pathway Interim Measure (Pioneer Technologies Corp. 2006).
- SWFS Technical Memorandum IV and Technical Memorandum IV Revised - Technology Identification and Screening (Geomatrix 2006d, 2007a).
- SWFS Technical Memorandum V - Remedial Alternatives Development and Evaluation (Geomatrix 2007b).

Upon Ecology approval of Technical Memorandum V (Geomatrix 2007b), PSC anticipates that future corrective action activities will include finalizing the remedial design/remedial action design documents, implementing an approved cleanup action plan, and conducting compliance monitoring at the PSC Facility, and as otherwise required under the cleanup action plan.

3.2 ART BRASS PLATING, INC.

Based on a review of historical records, including Sanborn Fire Insurance Maps and city directories, the property currently occupied by the ABP Facility was undeveloped or occupied exclusively by residences prior to 1983. The existing ABP Facility building was constructed in three phases: the westernmost portion in 1983, the easternmost portion in 1987, and the central portion in 1991. Since 1983, the ABP Facility has been operated exclusively for metal plating and related work (e.g., metal polishing and powder coating). The facility map on Figure 3.1 depicts the locations of the operations, including the locations of one former and one current vapor degreaser. Although trichloroethene (TCE) was formerly used in both degreasers, chlorinated solvents were phased out of use in 2004.

ABP has conducted several subsurface and indoor air investigations at and around the ABP Facility since 1999. The reports for each investigation are compiled in Appendix B and Volume II of the Draft Interim Cleanup Action Plan (Aspect 2007). The purpose and scope of each investigation are summarized below; the exploration locations are depicted on Figure 3.1 (site and exploration plan).

3.2.1 Subsurface Investigations

3.2.1.1 Soil and Groundwater Sampling (PSI 1999)

PSI conducted a subsurface investigation in March 1999 to evaluate whether plating solution releases from ABP operations had impacted soil or groundwater at the ABP Facility. Work included the following:

- Advancement of two direct-push borings to a depth of 9 feet at the southwestern (down-gradient) corner of the ABP Facility;
- Collection of continuous soil samples, and one groundwater grab sample from the Water Table Zone, from each boring; and
- Submittal of two soil and two grab groundwater samples for analysis for cyanide, chromium, copper, lead, nickel, and zinc.

This investigation did not identify any constituents in soil or groundwater above MTCA Method A cleanup levels, except for a slight exceedance of chromium in groundwater that was attributed to sample bias from turbid groundwater (unfiltered sample).

3.2.1.2 Preliminary Site Investigation (Aspect 2005a)

Aspect conducted a subsurface investigation in June 2005 to evaluate whether TCE detected in groundwater at PSC explorations 217F and N15 may have originated from the ABP Facility (Figure 3.1). Work included the following:

- A review of operations at the ABP Facility and identification of potential areas where TCE was used or handled;
- A review of historical records to identify potential background sources of TCE;
- Advancement of 12 direct-push soil borings in and around the ABP Facility to depths from 12 to 16 feet bgs;
- Collection of continuous soil samples, and one grab groundwater sample from the Water Table Zone, from each boring;
- Collection of soil gas samples from the 1- to 4-foot bgs depth interval at 3 borings located inside the building at the ABP facility;
- Submittal of 18 soil and 12 groundwater samples for analysis for VOCs by EPA Method 8260; and
- Submittal of 3 soil gas samples for analysis for VOCs by EPA Method TO-15.

This work confirmed the probable release of TCE from the two vapor degreasers located on the ABP Facility. Elevated concentrations of TCE were detected in soil and grab groundwater samples collected in close proximity to each degreaser and extending to the down-gradient property line.

3.2.1.3 Follow-up Site Investigation (Aspect 2005b)

Based on the results of the Preliminary Site Investigation, Aspect conducted a follow-up investigation in October 2005 to characterize local hydrogeology and identify vertical and horizontal boundaries of the contamination plume. Work included the following:

- Installation of monitoring wells MW-1 through MW-4 adjacent to and down-gradient of two vapor degreasers that formerly used TCE. Monitoring wells were screened across the Water Table Zone to a depth of 14 feet bgs;
- Surveying of the monitoring well top-of-casing elevations into the PSC well network, measurement of water levels, and estimation of local groundwater flow direction;
- Advancement of 7 direct-push borings down-gradient of the ABP Facility to depths from 11 to 15 feet bgs;
- Advancement of 2 direct-push borings down-gradient of the former TCE-using degreasers to depths between 42 and 45 feet bgs;
- Collection of continuous soil samples from each soil boring;
- Collection of one grab groundwater sample from the Water Table Zone of each shallow boring, and collection of three grab groundwater samples at approximately 15-foot intervals from each of the two deep borings;
- Collection of one groundwater sample from each of the four monitoring wells;
- Submittal of 13 groundwater samples for analysis for VOCs by EPA Method 8260 and total suspended solids by EPA Method 160.2; and
- Submittal of 6 soil samples from the two deep borings for analysis for VOCs by EPA Method 8260.

Monitoring wells installed on the ABP Facility were used to investigate and confirm the prior analytical results for probe-based sampling. Two deeper probe explorations located in the down-gradient right-of-way were used to evaluate the vertical extent of impacts. No VOCs were detected in groundwater collected from depths of approximately 40 feet bgs in either location. Neighborhood-area probe-collected groundwater samples also were used to bound the extent of TCE migration at the Water Table Zone, with non-detectable results to the west at 2nd Avenue South and to the south at Orcas Street when coupled with PSC-collected data (Figure 3.1).

3.2.1.4 Data Gaps Investigation (Aspect 2006a)

Aspect conducted a data gaps investigation in June 2006 to define the vertical and horizontal extent of soil and groundwater contamination at the ABP Facility. Work included the following:

- Installation of three monitoring wells, screened across the Water Table Zone to a depth of 14 feet bgs, to provide permanent monitoring points down-gradient of

- Installation of air sparging wells AS-1 and AS-2 adjacent to the former degreasers, screened from 25 to 28 feet bgs at the base of the shallow sand unit, to vertically delineate contamination in potential source areas, and to provide points to pilot test air sparging.
- Advancement of direct-push borings SP-14 to SP-17 to depths from 12 to 20 feet bgs.
- Collection of continuous soil samples at each boring and monitoring well location.
- Collection of one grab groundwater sample from the Water Table Zone of each direct-push boring.
- Collection of groundwater samples from the five new monitoring and air sparging wells.
- Submittal of 9 groundwater samples for analysis for VOCs by EPA Method 8260.
- Submittal of 19 soil samples from the two deep borings for analysis for VOCs by EPA Method 8260.

Interpretation of the data collected by this investigation refined the understanding of the distribution of TCE-impacted soil and groundwater on the ABP Facility, enabling more focused source-control remediation efforts. The data also indicated a potential historical release of TCE in the former solvent storage area near the northwestern corner of the ABP Facility building. Two air sparging wells were installed in close proximity to the degreasers. Groundwater samples collected from each well yielded non-detectable TCE results at a depth of 30 feet bgs.

3.2.1.5 Soil Vapor Extraction and Air Sparging Pilot Test (Aspect 2007)

Aspect pilot-tested SVE and air sparging was conducted in August 2006 to evaluate the potential applicability of these technologies for source control of VOCs, and to determine design parameters. Work included the following:

- Application of SVE at existing monitoring wells MW-1, MW-2, and MW-5 for 1 to 5.5 hours each;
- Application of air sparging at existing air sparging wells AS-1 and AS-2 for 1.5 to 2 hours each; and
- Monitoring of performance parameters, including pressure/vacuum at active and surrounding wells, dissolved oxygen at surrounding monitoring wells, air injection and extraction flow rates, and VOC concentrations in off-gas.

On the basis of the pilot test results, Aspect concluded that AS/SVE are viable technologies for interim source control remediation, and the results have provided further site-specific performance data for system design.

3.3 CAPITAL INDUSTRIES

Based on a review of historical records, including Sanborn Fire Insurance Maps and city directories, the property currently occupied by the CI Facility was occupied by CI in 1965. Prior to 1965, the property was primarily residential. The existing CI Facility was created in five phases: Capital Plant 2 was constructed in 1965, Capital Plant 3 in 1973, Capital Plant 4 in 1978, Capital Plant 1 in 1980, and Capital Plant 5 in 2006. Since 1965, the CI Facility has been operated exclusively for metal fabrication and related work (e.g., metal polishing, painting). In 1989, a small quantity of TCE degreasing solvent was spilled on the concrete floor at the southern end of the area between Plant 3 and Plant 4 (Capital 2003; ECS 2005). The spill occurred during a refilling operation at the hot vapor solvent degreaser unit that was in service at the time. In 2001, a small diesel spill occurred in the storage yard (now Plant 5) near Plant 1 (ECS 2005). The facility map on Figure 3.2 depicts the locations of the operations.

The CI Plant 2 was destroyed by fire in January 2004 and was reconstructed that year. As part of the reconstruction, soil within the building footprint was excavated and removed to approximately 5 feet bgs. Construction and breathing space monitoring for VOCs in soil gas was conducted during the excavation (Floyd Snider McCarthy, Inc. 2004). The results of the monitoring confirmed that there were no concentrations of VOCs detected in soil vapors within the building footprint. Analytical results of soil samples collected from the excavation area did not detect VOCs above the laboratory detection limit. Approximately 330 cubic yards of soil was transported off site and disposed of as non-hazardous/non-regulated waste. Imported clean backfill was placed and compacted within the building footprint.

CI has conducted several subsurface investigations at and proximate to the CI facility since 2003. These investigations were carried out on behalf of CI by Floyd Snider McCarthy, Inc.; (2004) Environmental Consulting Services, Inc. (ECS) (2004, 2005); and Farallon (pending). The purpose and scope of each investigation are summarized below; the exploration locations are depicted on Figure 3.2.

3.3.1 Soil Vapor Monitoring (Floyd Snider McCarthy, Inc. 2004)

Floyd Snider McCarthy, Inc. (2004) conducted soil vapor monitoring as part of the redevelopment of CI Plant 2 after the plant was destroyed by fire in January 2004. The purpose of the monitoring was to assess whether a source for halogenated volatile organic compounds (HVOCs) was present beneath Plant 2. In addition, soil vapor samples were collected to assess the potential impact of HVOC vapors on indoor air quality in the new Plant 2 scheduled for construction in late 2004. A previous investigation of groundwater quality in the area of to Plant 2 conducted by PSC (2003d) identified HVOCs in groundwater samples collected from direct-push borings and monitoring wells advanced up-gradient and down-gradient of Plant 2. The work conducted by Floyd Snider McCarthy, Inc. included the following:

- Installation of 12 soil vapor probes beneath the concrete slab at Plant 2;

- Collection of 12 soil vapor samples and analyzing the samples in an on-site mobile laboratory for HVOCs and for benzene, toluene, ethyl benzene, and xylenes;
- Collection of five sub-slab soil vapor samples in Summa Canisters (and one ambient air sample), and analyzing the samples for VOCs at an off-site laboratory to confirm the analytical results for a select number of soil vapor samples analyzed by the on-site mobile laboratory; and
- Submittal of Summa Canister samples for analysis for VOCs by EPA Method TO-14A.

The investigation detected TCE in 2 of the 12 soil vapor samples collected, and tetrachloroethene (PCE) in 10 of the 12 soil vapor samples collected. Analytical results for soil vapor samples collected using the Summa Canisters confirmed the analytical results obtained from the on-site mobile laboratory.

Soil vapor intrusion modeling was conducted using the Environmental Quality Management (2000) and EPA (2002) Johnson & Ettinger Model for Surface Vapor Intrusion into Buildings guidance to evaluate the impact of soil vapors beneath Plant 2 on indoor ambient air quality. The model predicted that HVOCs and aromatic petroleum hydrocarbon concentrations in proposed Plant 2 office and shop areas would be below applicable MTCA Method B cleanup levels.

3.3.2 Remedial Investigation (ECS 2004 Field Inspection)

ECS (2005) conducted a remedial field investigation of the CI Facility to evaluate whether TCE detected in groundwater samples collected by PSC (2003d) from monitoring wells CG-137-WT and CG-137-40 located near Plant 2 of the CI Facility may have originated from Plant 2, and to evaluate the impact of up-gradient, cross-gradient, and on-site sources of TCE on groundwater quality at the CI Facility. Work included the following:

- A review of CI operations and historical records for sources of TCE at the CI Facility and facilities adjacent and near to the CI Facility;
- Advancement of 27 direct-push borings in and around the CI Facility to depths from 9 to 37 feet bgs;
- Collection of reconnaissance groundwater samples from all 27 boring depth intervals of 9 to 13, 21 to 25, and/or 33 to 37 feet bgs;
- Collection of continuous soil samples from select borings; and
- Submittal of reconnaissance groundwater and select soil samples for analysis by EPA Method 8260B.

The investigation detected TCE concentrations above laboratory reporting limits in reconnaissance groundwater samples collected at depths from 9 to 13 feet bgs from borings advanced adjacent to and up-gradient of Plant 2 and Plant 3. Concentrations of TCE were detected in the reconnaissance groundwater samples collected at depths from 9 to 13 feet bgs in borings advanced adjacent to and down-gradient of Plant 2. Reconnaissance groundwater samples collected at depths from 9 to 13 feet bgs in borings advanced adjacent to and down-gradient of Plant 4 detected concentrations of PCE, with lesser amounts of TCE. Vinyl chloride (VC) and HVOCs were detected in reconnaissance groundwater samples collected at depths from 21 to 37 feet bgs in borings advanced adjacent to, up-gradient, and down-gradient of Plants 1, 3, and 5.

3.3.3 Remedial Investigation (ECS February 2005 Field Investigation)

ECS (2005) conducted additional remedial field investigation in February 2005 using Gore Sorber passive soil gas samplers to identify HVOC-impacted soil beneath Plant 2 and Plant 4. The locations of soil gas samples were based on analytical results for reconnaissance groundwater samples collected by ECS during the November 2004 field sampling event. Work included installation of 19 soil gas samplers at Plant 2 and 11 soil gas samplers at Plant 4, and submittal of soil gas samplers for sample analysis by EPA Method 8260A.

The investigation detected concentrations of PCE and trichloroethane in soil gas beneath Plant 2. The highest concentrations of PCE and trichloroethane in Plant 2 were detected at the southwestern corner of the Plant 2 canopy area. The investigation also detected TCE and PCE in the soil gas beneath Plant 4. The highest values of TCE and PCE were detected at the southwestern corner of Plant 4 and the Plant 4 canopy area.

3.3.4 Remedial Investigation (ECS April and May 2005 Field Investigation)

ECS conducted additional remedial field investigations in April and May 2005 to identify potential source areas for TCE and/or PCE beneath Plant 2 and Plant 4. Boring locations were based on the results from the February 2005 investigation and on historical operations at Plant 2 and Plant 4. Work included the following:

- Advancement of 5 direct-push borings inside Plant 2, and 10 borings inside Plant 4;
- Collection of soil samples from each boring at variable depths from 0.6 to 7 feet bgs;
- Collection of reconnaissance groundwater samples from each boring at depths from 9 to 13 feet bgs; and
- Submittal of soil and reconnaissance groundwater samples for analysis for VOCs by EPA Method 8260.

The results of the field investigation identified concentrations of TCE in the reconnaissance groundwater samples collected at depths from 9 to 13 feet bgs beneath the Plant 2 canopy area and beneath the southwestern corner of Plant 2. Concentrations of PCE were detected in one soil sample collected from a boring located in the southwestern corner of the Plant 2 canopy area at a depth of 3.8 feet bgs. Concentrations of HVOCs were not detected in other soil samples collected at Plant 2. Concentrations of PCE and TCE were detected in reconnaissance groundwater samples collected at depths from 9 to 13 bgs feet beneath the southern portion of Plant 4 and beneath the Plant 4 canopy area. Concentrations of TCE and PCE were detected in soil samples collected from borings advanced beneath Plant 4 at depths from 0.7 to 6.8 feet bgs.

These analytical results suggest that a source of PCE and TCE is present beneath Plant 4. Analytical results for reconnaissance groundwater samples collected at Plant 2 in combination with results from the November 2005 investigation indicate that a source for TCE in groundwater likely is present beneath Plant 2, with contributions of TCE to groundwater from properties located up-gradient of Plant 2 (ECS 2005).

3.3.5 Remedial Investigation (Farallon 2006 Field Investigation)

Farallon conducted remedial field investigations in January and February 2006 at CI Plant 2 and Plant 4. The purpose of these investigation was to assess the vertical distribution of HVOCs in groundwater near Plant 2 and Plant 4; to locate and install source-area, up-gradient, and groundwater monitoring wells for Plant 2 and Plant 4; to ascertain the groundwater flow direction near Plant 2 and Plant 4; to assess the impact of an up-gradient TCE groundwater plume on groundwater quality at Plant 2; and determine the down-gradient extent of TCE and PCE groundwater plumes originating at Plant 2 and Plant 4. Work included the following:

- Advancement of five direct-push borings in and around Plant 2 to depths from 35 to 38 feet bgs;
- Collection of reconnaissance groundwater samples from all five borings at depth intervals of 10 to 14, 15 to 18, 18 to 22, 22 to 26, 26 to 30, and 30 to 34 feet bgs. A reconnaissance groundwater sample was collected from one boring at a depth interval of 34 to 38 feet bgs;
- Collection of continuous soil samples from select direct-push borings;
- Submittal of reconnaissance groundwater samples and select soil samples for analysis by EPA Method 8260B;
- Installation of two up-gradient and down-gradient groundwater monitoring wells near Plant 2, and one source-area monitoring well inside the Plant 2 canopy area;
- Installation of one up-gradient and one down-gradient groundwater monitoring well near Plant 4, and one source-area monitoring well inside Plant 4; and
- Submittal of groundwater samples for analysis by EPA Method 8260B.

The field investigation detected concentrations of TCE in reconnaissance groundwater samples and groundwater samples collected from monitoring wells in the Plant 2 canopy area up-gradient and down-gradient of Plant 2. Concentrations of PCE and TCE were detected in reconnaissance and monitoring well groundwater samples located inside and down-gradient of Plant 4. Concentrations of PCE and TCE were not detected in reconnaissance or groundwater monitoring well samples collected up-gradient of Plant 4. These results indicated an up-gradient source for TCE-contaminated groundwater at Plant 2, and a source for TCE-contaminated groundwater beneath the Plant 2 canopy area. These results also indicate a source area for PCE- and TCE-contaminated groundwater beneath and down-gradient of Plant 4.

3.4 BLASER DIE CASTING

Based on a review of historical records, including Sanborn Fire Insurance Maps and city directories, BDC has occupied its present location since 1962. Before 1962, the property was residential or unoccupied (Sanborn Fire Insurance Maps 1929 through 1949).

BDC performs die casting at the BDC Facility. BDC's raw materials include zinc ingots (96.5 percent pure zinc), which are melted and poured into molds. BDC uses machine oil for lubrication, and has water-based hydraulic lifts, but has never had underground storage tanks. A TCE soil source area has been identified beneath the southwestern corner of the BDC Facility, beneath a building addition that was constructed in 1996. The building addition is used as a bin storage area, and houses several air compressors.

BDC has conducted soil, groundwater, soil gas, and indoor air investigations in and around its facility since 2005. The purpose and scope of each investigation are summarized below; the exploration locations are depicted on Figure 3.3.

3.4.1 Environmental Site Investigation (PGG 2005)

PGG (2005) conducted an environmental review of the BDC Facility, including several elements required by a Phase I Environmental Site Assessment (ASTM International Standard 1527). Work included the following:

- A review of operations on the BDC Facility to identify potential areas where TCE could have been used or handled;
- A review of historical records to identify potential past or background sources of TCE;
- Interviews with BDC employees regarding potential TCE use at the BDC Facility; and
- A search of environmental databases for sites within a 0.25-mile radius of the BDC Facility.

The review found no evidence of TCE use in BDC manufacturing processes or evidence of incidental use. BDC employees indicated that TCE had never been used in BDC operations, and had never been purchased by BDC. BDC disposed of waste lubricating oil by transferring the waste oil to a waste oil recycler. For liability purposes, the waste oil recycler would not accept waste oil contaminated with solvents, and performed screening sampling regularly for the presence of solvents. BDC's waste lubricating oil records indicate that the waste oil recycler never refused waste oil collections from BDC, indicating that the screening samples never showed solvents. In the review of environmental records, multiple sites within a 0.25-mile radius of the BDC Facility were noted as having a confirmed or suspected presence of HVOCs.

3.4.2 Tier 3 Sampling Report (PSC 2005)

PSC (2005b) conducted a subsurface investigation in October 2005 to evaluate whether releases of TCE detected in PSC well K19 had impacted indoor air, and to investigate the nature and extent in soil and groundwater at the BDC Facility. Work included the following:

- Advancement of nine direct-push borings to a depth of 9 feet bgs at locations northwest (up-gradient) and southwest (down-gradient) corner of the facility;
- Collection of one groundwater grab sample from the water table, from each boring and collection of one duplicate sample;
- Submittal of ten groundwater samples to an independent laboratory for analysis for VOCs by SW-846 Method 8260;
- Collection of two ambient air and three indoor air samples in Summa Canisters; and
- Submittal of five air samples for analysis by EPA Method TO-14/15.

The laboratory analysis of groundwater samples detected elevated concentrations of HVOCs, including TCE, in groundwater samples collected southwest of the BDC Facility. The laboratory analysis of indoor air samples detected concentrations of TCE above Inhalation Pathway Interim Measure Action Levels. On the basis of the investigation results, PSC concluded that an undocumented release of TCE occurred at the BDC Facility.

3.4.3 Soil and Groundwater Investigation (PGG 2006)

PGG conducted a subsurface investigation in May and June 2006 to evaluate whether the TCE detected in groundwater at PSC exploration K19 and in indoor air at the BDC Facility may have originated from the BDC Facility. Work included the following:

- Advancement of 19 direct-push soil borings in and around the BDC facility to depths from 5 to 30 feet bgs;
- Collection of a combination of continuous soil samples and groundwater samples from the borings;
- Collection of soil gas samples from the 1.5- to 2.5-foot bgs depth interval at boring PIG-2, located in the hotspot area;
- Submittal of 31 soil and 17 groundwater samples for analysis for VOCs by EPA Method 8260; and
- Submittal of 1 soil gas sample to Environmental Service Northwest for analysis for VOCs by EPA Method 8260 (data included in a later report).

The investigation found elevated concentrations of TCE in soil and groundwater samples collected at the southwestern corner of the BDC Facility, and extending down-gradient as a groundwater plume.

3.4.4 Indoor Air Summary (PGG 2007b)

PGG conducted two rounds of indoor air sampling in March and September 2006, and observed the installation of a sub-slab depressurization system by Advanced Radon Technologies, Inc. Work summarized in the PGG (2007b) report includes:

- Observation of the installation of sub-slab depressurization system beneath the office area in February 2006;
- Collection of one ambient and two indoor air samples in 8-hour Summa Canisters in March 2006, and analysis by EPA Method TO-15;
- Collection of one ambient and one indoor air sample in 8-hour Summa Canisters in May 2006, and analysis by EPA Method TO-15;
- Collection of one soil gas sample at PGG-2 in May 2006, and analysis by EPA Method 8260;
- Reversal of airflow direction of the sub-slab depressurization system in June 2006; and
- Collection of one ambient and one indoor air sample in 8-hour Summa Canisters in September 2006, and analysis by EPA Method TO-15. Data indicates VOCs were found in indoor air samples collected before and after installation of the mitigation system. Detected VOCs appear to have a fingerprint (chromatograms) distinctly different from that found in subsurface groundwater (PGG 2007b).

3.5 OTHER PROPERTIES

3.5.1 200 South Orcas Street

GeoEngineers, Inc. (2006, 2007) conducted two environmental studies on the commercial property located at 200 South Orcas Street on behalf of a prospective purchaser. Copies of the reports prepared by GeoEngineers, Inc. were obtained from Ecology. The Phase I Environmental Site Assessment (GeoEngineers, Inc. 2006) was a review of existing and available records, and did not involve collection of additional subsurface environmental data. The Phase II Environmental Site Assessment (GeoEngineers, Inc. 2007) involved soil and groundwater quality assessment; the scope of this work is summarized below. The GeoEngineers, Inc. exploration locations are depicted on Figure 3.4.

GeoEngineers, Inc. (2007) conducted a Phase II assessment to evaluate soil and groundwater quality beneath the subject property. The work was initiated in response to the findings of the Phase I Environmental Assessment (GeoEngineers, Inc. 2006) that identified a number of recognized environmental conditions associated with the location of the property within the West of 4th Groundwater Investigation Area. Work included the following:

- Advancement of direct-push borings B-1 and B-2 to depths of 12 and 36 feet bgs at locations on the subject property.

- Collection of representative soil samples during probe drilling, and submittal of two samples from each boring for laboratory analysis. The samples selected for analysis were collected from depth intervals of 0 to 2 and 6 to 8 feet bgs.
- Testing of the soil samples for petroleum hydrocarbons (i.e., gas, diesel, oil), metals (arsenic, cadmium, chromium, lead, and mercury), VOCs, and SVOCs.
- Collection of one grab groundwater sample from each probe boring. The sample from exploration B-1 was collected at a depth of 10 feet bgs, and the sample from B-2 at a depth of 36 feet bgs.
- Analysis of the grab groundwater samples for petroleum hydrocarbons (i.e., gas, diesel, oil), metals (arsenic, cadmium, chromium, lead, and mercury), PCBs, VOCs, and SVOCs.

Specific chlorinated ethenes were the only compounds detected above the MTCA Method A and B screening levels used to evaluate the data. GeoEngineers, Inc. (2007) concluded that soil does not appear to be impacted by petroleum, metals, VOCs, or SVOCs above the MTCA screening levels. GeoEngineers, Inc. (2007) further noted that groundwater was not impacted by petroleum, metals, or PCBs. GeoEngineers, Inc. (2007) did identify groundwater quality exceedances for TCE, VC, and pentachlorophenol. The VC and TCE concentrations detected in the groundwater sample collected at a depth of 36 feet bgs (26 and 230 micrograms per liter [µg/l], respectively) were higher than those detected in the sample collected at a depth of 10 feet bgs (0.26 and 2.3 µg/l, respectively).

3.5.2 Saint-Gobain Containers Facility

Conestoga-Rovers & Associates (CRA) (2005) conducted a focused groundwater investigation at and adjacent to the Saint-Gobain Containers facility located at 5801 East Marginal Way. The work was initiated by Saint-Gobain in response to Ecology's request for a site investigation. The request was based on the presence of concentrations of VOCs detected in groundwater samples collected from public right-of-way areas to the east and south of the Saint-Gobain facility. Two phases of investigation were completed, which consisted of a limited soil and groundwater investigation (CRA 2005) and an initial-phase focused groundwater investigation (CRA 2006). The collective CRA (2005) explorations are depicted on Figure 3.5.

The first round of investigation consisted of 9 soil borings probe-drilled to depths of 10 to 50 feet bgs in August 2005. A total of 23 depth-discrete groundwater samples were collected and submitted for laboratory analysis of VOCs. The second round of investigation consisted of 1 boring drilled to a depth of 15 feet bgs to collect near-surface soil samples near the maintenance shop, 8 borings drilled to a depth of 49 feet bgs to collect depth-specific groundwater at 5-foot-depth intervals, and 1 boring drilled to a depth of 48 feet bgs to generate a stratigraphic log.

During the second round of investigation, 49 samples were submitted for analysis for VOCs. At the time of the probe drilling, CRA conducted pneumatic slug tests using GeoProbe tooling to estimate hydraulic conductivity. Multiple tests were conducted at locations VAS-6, and SVAS-1 at depths ranging from 20 to 49 feet bgs. Hydraulic conductivity estimates ranged from 4.9E-04 to 8.4E-3 centimeters per second, with a geometric mean of 3.5E-03 centimeters per second.

CRA (2005) concluded that there is no evidence to suggest that Saint-Gobain is the source of the VOC plume mapped in this area. The conclusion was based on historical documentation that TCE was never used by Saint-Gobain, the lack of VOC concentrations detected in soils, a pattern of decreasing VOC concentrations in groundwater beneath the site, and the presence of elevated VOC concentrations up-gradient of the site.

3.5.3 Seattle Design Center – 5701 6th Avenue South

Sound Environmental Strategies Corporation (SES) (2007) conducted a Phase II Environmental Site Assessment on the commercial property located at 5701 6th Avenue South on behalf of a prospective purchaser. The Phase II Environmental Site Assessment (SES 2007a) involved soil, groundwater, and indoor air quality assessment; the scope of this work is summarized below. The SES boring locations are depicted on Figure 1.3

SES (2007) conducted a Phase II assessment to evaluate soil and groundwater quality beneath the subject property and indoor air within the Atrium Building. The work was conducted concurrently with a Phase I Environmental Assessment (SES 2007b) that identified a number of recognized environmental conditions associated with the location of the property within the PSC Site Wide Feasibility Study Area. Work included the following:

- Advancement of direct-push borings P1 through P10 to depths of 12 feet bgs at locations near the subject property;
- Collection of representative soil samples during probe drilling, and submittal of one sample from each boring for laboratory analysis of VOCs by SW-846 Method 8260B and for RCRA 8 Metals (arsenic, barium, cadmium, chromium, lead, selenium, and silver) by SW-846 Method 200.8 and for mercury by SW-846 Method 1631E;
- Collection of one grab groundwater sample from the Water Table Zone from each probe location;
- Analysis of the grab groundwater samples for VOCs by SW-846 Method 8260B;
- Collection of four indoor air samples and one ambient air sample in SUMMA canisters; and,
- Analysis of the indoor and ambient air samples for VOC by EPA Method TO-15 SIM.

Laboratory analysis of soil samples did not detect concentrations of VOCs in excess of their respective method detection limits. Laboratory analysis of the groundwater samples detected concentrations of TCE, 1,1,1-TCA, cis-1,2-DCE, 1,1,-DCA, and 1,1-DCE. SES used the MTCA Method A and B screening levels to evaluate the data. SES (2007) concluded that soil was not impacted by metals or VOCs above the MTCA screening levels. SES (2007) did identify groundwater quality exceedances for 1,1-DCE in one boring located up-gradient of the Subject Property. SES concluded that the source of the screening level exceedances in groundwater was an up-gradient facility.

4.0 SOURCE AREA SUMMARY

The following section describes the source areas identified within the West of 4th Groundwater Investigation Area. Information provided in this section includes a description of the nature of the releases at each facility, local hydrogeologic conditions, and the distribution of COPCs in soil and groundwater at each facility. These descriptions are based on data existing at the time when the Data Summary Report was prepared.

4.1 PHILIP SERVICES CORPORATION SOURCE AREA

4.1.1 Summary and Nature of Release

The PSC Facility is located south of downtown Seattle in the Georgetown neighborhood. The PSC Facility is a RCRA-permitted former dangerous waste treatment, storage, and disposal facility located in an area that has a long history of diverse industrial uses. Operations associated with the treatment and storage of materials at the PSC Facility resulted in releases of COPCs to soil and groundwater. PSC is in the process of conducting final corrective action activities at the facility for site closure. Corrective actions conducted by PSC to date include surface closure of solid waste management areas, subsurface investigation at the facility and beyond the facility boundaries, interim measures, routine groundwater monitoring activities, and remedial design/feasibility study activities. Anticipated future corrective action activities include finalizing the remedial design/feasibility study, implementing an approved cleanup action plan, and conducting compliance monitoring.

The results of the corrective action activities, conducted to date to investigate the nature and extent of soil and groundwater with concentrations of COPCs associated with releases at the PSC Facility, indicate that the primary COPCs consist of petroleum and chlorinated solvent-related VOCs and SVOCs, metals, and PCBs. Dense nonaqueous-phase liquids (DNAPL) have not been encountered at the PSC Facility; however, elevated concentrations of chlorinated VOCs detected above the silt-confining layer suggest the presence of DNAPL ganglia. The results of the available historic investigation activities were summarized in the Final Comprehensive RI Report (PSC 2003d). Several addenda subsequently were submitted to Ecology for on the Final Comprehensive RI Report (PSC 2004a, 2004b, 2004c, 2004d).

In 2003 and 2004, PSC installed a subsurface barrier wall that surrounds the PSC Facility Source Area and is keyed into the aquitard underlying the site. A groundwater recovery system is located within the barrier wall that is designed to maintain an inward groundwater gradient. The barrier wall and groundwater recovery system comprise what has been designated the HCIM (PSC 2006).

Investigations at the PSC facility have included soil and groundwater sampling both on and off the site. Because the PSC Facility is not located within the West of 4th Groundwater Investigation Area, for the purposes of the source description, this section includes only a brief description of the conditions at the PSC Facility, and a more detailed description of data collected between 4th and 6th Avenues South.

4.1.2 Hydrogeologic Conditions

4.1.2.1 Geology

The geology of the Duwamish Basin and surrounding area, including the vicinity of the PSC Facility, consists of Duwamish Valley Alluvium underlain by a sequence of glacial and non-glacial sediments underlain by bedrock (Booth and Herman 1998). A detailed description of the regional and local geology for the PSC Facility was provided in the PSC Remedial Investigation Report (2003d) and discussed in previous sections of this report.

4.1.2.2 Local Geology

In the RI Report, PSC (2003d) identified five lithologic units that occur with increasing depth beneath the PSC Facility: (1) the shallow sand unit; (2) the intermediate sand and silt unit; (3) the silt unit; (4) the deep sand and silt unit; and (5) bedrock. The shallow sand unit (including fill) is the uppermost hydrogeologic unit identified at and near the PSC Facility, and consists of poorly graded fine to medium sand with fine gravel, and varies from 21 to 46 feet in thickness. The upper portions of the unit may be composed of fill, including material dredged from the LDW. The shallow sand unit grades into the intermediate sand and silt unit (PSC 2003d).

4.1.2.3 Hydrogeology

A detailed description of the regional and local hydrogeology for PSC Facility was provided in the PSC Remedial Investigation Report (2003d) and discussed in previous sections of this report. The general direction of groundwater flow is west-southwest from the PSC Facility towards the LDW, and shows seasonal fluctuations of between 2 and 4 feet that are moderately well correlated to precipitation. The average horizontal hydraulic gradient in the shallow aquifer is approximately 0.0016 feet per foot (PSC 2003d). Soil conditions beneath PSC conform to the layered system of hydrogeologic units observed elsewhere in the West of 4th Groundwater Investigation Area.

4.1.3 Soil Quality

PSC investigation activities to assess the nature and extent of soil with concentrations of COPCs associated with releases at the PSC facility have identified petroleum and chlorinated solvent-related VOCs and SVOCs, metals, and PCBs in soil at the PSC Facility. Due to the location of the PSC Facility outside the West of 4th Groundwater Investigation Area, a detailed description of the distribution of COPCs in soil at the PSC Facility is not relevant to this Data Summary Report.

4.1.4 Groundwater Quality

The distribution of PSC Facility COPCs in groundwater in the area west of the PSC Facility and east of 4th Avenue South is discussed extensively in the Site Wide Feasibility Study Technical Memorandum I Revised (Geomatrix 2006c) and the Site Wide Feasibility Study Technical Memorandum II (Geomatrix 2006b). PSC and others have collected numerous groundwater samples in this area from temporary well points advanced using direct-push sampling techniques and from permanent monitoring wells using low-flow sampling techniques. The samples collected from direct push borings are considered representative of the conditions at the time the samples were collected, but some samples were collected more than 5 years ago, and may not reflect current conditions. Therefore, laboratory analytical results of samples collected from wells and direct-push borings in the area between 6th and 4th Avenues South (Wells CG-127-WT, CG-127-40, CG-128-WT, CG-128-70, CG-131-WT, CG-131-40, CG-134-WT, CG-134-40, and CG-135-50, and Borings P01 through P09[3]) between the Fourth Quarter of 2006 and March 2007 were used to assess the current quality of groundwater up-gradient of the West of 4th Groundwater Investigation Area. Laboratory analytical data for benzene from samples collected from Boring J9 and for manganese from samples collected from Well CG-128-70 collected prior to 2006 were used in the evaluation due to a lack of recent data for these analytes from the Shallow and Intermediate Zones, respectively. The relevant groundwater quality data are summarized below.

4.1.4.1 Water Table Interval

- Chlorinated Ethenes:
  - PCE concentrations ranged up to 0.46J µg/l, with the highest concentrations from samples collected from well CG-128-WT;
  - TCE concentrations ranged up to 27 µg/l, with the highest concentrations detected in samples collected from well CG-131-WT;
  - cis-1,2-dichloroethene (c-1,2-DCE) concentrations ranged up to 45 µg/l, with the highest concentrations detected in samples collected from well CG-131-WT;
  - 1,1-DCE concentrations ranged up to 1.6 µg/l, with the highest concentrations detected in samples collected from well CG-131-WT; and
  - VC concentrations ranged up to 3.3 µg/l, with the highest concentrations detected in samples collected from well CG-131-WT.
- Chlorinated Ethanes:
  - Trichloroethane concentrations ranged up to 4.4 µg/l, with the highest concentrations detected in the sample collected from boring P09; and
  - 1,1-dichloroethane concentrations ranged up to 14 µg/l, with the highest concentrations detected in samples collected from well CG-131-WT.
- Aromatic Hydrocarbons:

[3] Borings P01 through P09 were advanced by Sound Environmental Strategies on behalf of Hines Real Estate Investment Trust as part of a Phase II Investigation associated with the Seattle Design Center property located at 5701 6th Avenue South.

- Benzene concentrations ranged up to 0.6 µg/l, with the only detected concentrations reported in samples collected from well CG-131-WT.

• SVOCs:

- 1,4-Dioxane concentrations ranged up to 16 µg/l, with the only detected concentrations reported in samples collected from well CG-131-WT.

• Metals

- Arsenic concentrations ranged up to 355 µg/l, with the highest concentrations detected in samples collected from well CG-128-WT; and

- Manganese concentrations ranged up to 355 µg/l, with the highest concentrations detected in samples collected from well CG-128-WT.

4.1.4.2 Shallow Groundwater Interval

• Chlorinated Ethenes:

- TCE concentrations ranged up to 0.011 µg/l, with the highest concentrations detected in samples collected from direct-push boring CG-127-40;

- c-1,2-DCE concentrations ranged up to 41 µg/l, with the highest concentrations detected in samples collected from well CG-134-40;

- 1,1-dichloroethene (1,1-DCE) concentrations ranged up to 0.79 µg/l, with the highest concentrations detected in samples collected from well CG-134-40; and

- VC concentrations ranged up to 17 µg/l, with the highest concentrations detected in samples collected from well CG-134-40.

• Chlorinated Ethanes:

- 1,1-dichloroethane concentrations ranged up to 34 µg/l, with the highest concentrations detected in samples collected from well CG-134-40.

• Aromatic Hydrocarbons:

- Benzene concentrations ranged up to 35 µg/l, with the highest concentration detected in a sample collected from boring J9.

• SVOCs:

- 1,4-Dioxane concentrations ranged up to 520 µg/l, with the highest concentrations detected in samples collected from well CG-127-40; and

- Bis(2-ethylhexyl) phthalate concentrations of 1 µg/l were detected in samples collected from well CG-127-40.

- Metals:
  - Arsenic concentrations ranged up to 0.71 μg/l, with the highest concentrations detected in samples collected from well CG-127-40; and
  - Manganese concentrations ranged up to 1,420 μg/l, with the highest concentration detected in samples collected from well CG-127-40.

4.1.4.3 Intermediate Groundwater Interval

- Chlorinated Ethenes:
  - c-1,2-DCE concentrations ranged up to 2.2 μg/l, with the highest concentrations detected in samples collected from well CG-135-50; and
  - VC concentrations ranged up to 4.2 μg/l, with the highest concentrations detected in samples collected from well CG-135-50.
- Chlorinated Ethanes:
  - 1,1- dichloroethane concentrations ranged up to 1.9 μg/l, with the highest concentrations detected in samples collected from well CG-135-50.
- SVOCs:
  - 1,4-Dioxane concentrations ranged up to 190 μg/l, with the highest concentrations detected in samples collected from well CG-135-50.
- Metals:
  - Arsenic concentrations ranged up to 0.9 μg/l, with the highest concentrations detected in samples collected from well CG-128-70; and
  - Manganese concentrations ranged up to 294 μg/l, with the highest concentration detected in samples collected from well CG-128-70.

4.1.5 Summary and Discussion

The results indicate the following:

- Releases of hazardous substances to soil and groundwater have occurred at the PSC Facility;
- Laboratory analysis of groundwater samples collected immediately up-gradient of the West of 4th Investigation Area has detected concentrations of select COPCs that include original source compounds (e.g. TCE and 1,4-dioxane), degradation compounds (e.g. VC and cis-1,2-DCE) and materials mobilized by altered aquifer conditions (e.g. arsenic and manganese) in excess of the applicable screening levels;
- The reducing geochemical conditions in the affected aquifer zones at, and down-gradient of the PSC Facility are conducive to biodegradation of chlorinated solvents. The

- The vertical and aerial distribution of the detected COPCs in groundwater indicate that, in addition to the PSC source area, an uncharacterized source area is present beneath the Seattle Design Center Plaza Building; and
- The extent of groundwater impact associated with the PSC source area and the Seattle Design Center source area extends across 4th Avenue South.

4.2 ART BRASS PLATING SOURCE AREA

4.2.1 Summary and Nature of Release

TCE was formerly used at the ABP Facility at two vapor degreasers, and was stored in the northwestern corner of the Facility. The highest concentrations of TCE have been detected in and down-gradient of these areas, close to the water table. TCE appears to have migrated through shallow fill soils to the water table. However, TCE has not been detected at depths greater than 20 feet bgs in either medium beneath the ABP Facility. A summary of soil and groundwater data obtained from testing on the facility is summarized on Figure 4.1.

COPCs, other than TCE, are biodegradation products of that chlorinated solvent (i.e., cis-dichloroethene [c-DCE], 1,1-DCE, and VC). Reducing conditions in groundwater observed at the ABP Facility and in groundwater up-gradient of the ABP Facility promote degradation of TCE to the lesser-chlorinated ethenes. Ongoing natural attenuation appears to have limited off-site migration of COPCs, such that the maximum extent of soil and groundwater impacted with TCE above screening levels from the ABP Facility (the ABP plume) appears to be generally contained within the area bounded on the south by South Orcas Street, on the west by 2nd Avenue South, on the north by Lucile Street, and on the east by 4th Avenue South. The extent of VC exceeding screening levels extends farther to the southwest, but at depths below the Water Table Zone due to a downward gradient in this area.

Investigations at the ABP Facility have included soil and groundwater sampling both on and off the site. For the purposes of this description of the ABP source area, this section contains only information pertaining to the ABP Facility. As noted above, COPCs in groundwater from the ABP Facility appear to migrate into deeper water-bearing zones and attenuate down-gradient of the ABP facility.

4.2.2 ABP Facility Hydrogeologic Conditions

Soil conditions beneath the ABP Facility conform to the layered system of hydrogeologic units observed elsewhere in the West of 4th Groundwater Investigation Area. Explorations in close proximity to the ABP Facility were used to characterize conditions from grade to a depth of approximately 50 feet bgs. Observed hydrogeologic units at the ABP Facility include the following:

- Near-surface soils, consisting of heterogeneous fill to approximately 6 to 8 feet below the ABP Facility, including layers of gravelly sand, silt, and silty sand;

- A zone of fine-to-medium sand underlying the fill, extending to a depth of approximately 25 to 30 feet below the ABP Facility; and
- Interbedded silt and silty sand layers below 25 to 30 feet bgs, identified as the Intermediate Interval. At some locations (particularly west of the ABP Facility), this unit may include very limited silt layers, and may not be distinguishable from the Shallow Interval. Regional soil borings indicate that this unit of sand, silt, and silty sand may extend to depths greater than 50 feet bgs in the vicinity of the ABP Facility

Groundwater is encountered at approximately 6 to 8 feet bgs, near the contact between fill and native soils. Groundwater flow direction is to the west-southwest (toward the LDW), with a typical measured gradient at the ABP Facility of 0.002 foot per foot. Vertical gradients measured by PSC within the Shallow Sand and Intermediate Sand and Silt Units between 4th Avenue South and 1st Avenue South generally are neutral or slightly downward.

4.2.3 Soil Quality

Occurrences of constituents exceeding screening levels in soil are described below.

- PCE—Not detected;
- TCE—TCE concentrations in soil ranged up to 55 milligrams/kilograms (mg/kg), with the highest concentrations detected in areas of past TCE use in the southwestern corner of the ABP Facility. The distribution of TCE in soil at the ABP Facility and the estimated extent of TCE exceeding the soil screening level for direct contact are depicted on Figure 4.1. The extent of soil potentially exceeding groundwater protection screening levels is within the area of groundwater exceedances (discussed below). TCE has not been detected in soil samples collected below a depth of 16 feet bgs;
- c-1,2-DCE concentrations in soil ranged up to 12 mg/kg, with occurrences co-located with TCE occurrences. None of the detected concentrations exceeded the soil screening level for direct contact. The extent of soil potentially exceeding groundwater protection screening levels for c-1,2-DCE is within the area of groundwater exceedances (discussed below). As for TCE, c-1,2-DCE has not been detected in soil samples collected below 16 feet bgs; and
- VC—Not detected.

4.2.4 Groundwater Quality

4.2.4.1 Water Table Zone (Depth of 10 to 20 Feet bgs)

Four chemicals at the ABP Facility have been detected above screening levels in groundwater within the Water Table Zone, as follows:

- TCE concentrations in the Water Table Zone ranged up to 5,700 micrograms per liter (µg/l), with the highest concentrations detected near or down-gradient of former TCE degreasing and storage areas;

- c-1,2-DCE occurrences generally are co-located with TCE occurrences, with a maximum concentration of 1,700 µg/l;
- 1,1-DCE was detected only in the areas of highest TCE occurrences, with a maximum concentration detected of 2.5 µg/l; and
- VC occurrences are co-located with TCE and c-1,2-DCE occurrences, with a maximum concentration detected of 1.8 µg/l.

4.2.4.2 Shallow Groundwater Zone (Depth of 20 to 40 Feet bgs)

TCE, c-1,2-DCE, and 1,1-DCE have not been detected above screening levels in the Shallow Groundwater Zone at the ABP Facility. Vinyl chloride was detected at a maximum concentration of 13 µg/l, which is consistent with the concentrations detected up-gradient of the ABP Facility in this interval.

4.2.4.3 Intermediate Groundwater Zone (Depth of 40 to the top of the Silt Unit)

Based on the absence of TCE in the Shallow Groundwater Zone at the ABP Facility, no soil or groundwater samples have been collected from the Intermediate Groundwater Zone.

4.3 CAPITAL INDUSTRIES SOURCE AREA

4.3.1 Summary and Nature of Releases

It is believed that solvents were used at CI Plant 2 to prepare metal surfaces for painting. It is believed that from approximately 1968 to 1978, a "waterfall" paint station was located in the southwestern corner of Plant 2. A chemical and paint storage area located in a Plant 2 canopy area was used to service the waterfall paint station (ECS 2005). CI does not have documentation of use of solvents in this area of Plant 2, due to a January 2004 fire at that plant that destroyed all records pertaining to Plant 2. A summary of soil data is presented in Section 4.3.3 and a summary of groundwater data collected on the facility is discussed in Section 4.3.4 and is shown on Figures 4.2a through 4.2l. In 1978, painting operations were moved to CI Plant 4. Drums of chemicals and paint were stored in a Plant 4 canopy area (ECS 2005). TCE was used in a degreasing unit formerly located in an area between Plant 3 and Plant 4 (ECS 2005). In 1989, a small quantity of a TCE degreasing solvent was spilled on the concrete floor in the area between Plant 3 and Plant 4 during a refilling operation at the hot vapor solvent degreaser unit that was in service at the time (Capital 2003; ECS 2005).

The COPCs for Plant 2 and/or Plant 4 are TCE and/or PCE and their degradation products (i.e., c-1,2-DCE, VC). Reducing conditions in groundwater at CI and up- and down-gradient of the CI Facility promote degradation of TCE, PCE, and degradation products. The down-gradient extent of the TCE groundwater plume originating at Plant 2 and PCE groundwater plume originating at Plant 4 has not been determined south of South Fidalgo Street.

Investigations at Plant 2 and Plant 4 have included soil vapor sampling and soil and groundwater sampling at the plants, and up- and down-gradient of the plants. Section 4.3, Capital Industries Source Area, discusses only the information pertaining to CI.

4.3.2 Facility Hydrologic Conditions

Soil conditions beneath the CI Facility are representative of the hydrogeologic units observed elsewhere in the West of 4th Groundwater Investigation Area. Explorations near the CI Facility were used to characterize conditions from grade to a depth of approximately 40 feet bgs. The observed hydrogeologic units consist of the following:

- Near-surface soil consisting of fill material approximately 1 to 4 feet bgs below Plant 2 and Plant 4. The fill material is comprised primarily of fine sand with some silt;
- Well-graded sand and/or sandy silt underlying the fill. The sand contains some silt and trace amounts of gravel and wood fragments. The sand and silt extend to depths from 8 to 10 feet bgs beneath Plant 2 and Plant 4; and
- Sand and/or silty sand below 8 to 10 feet bgs to the maximum depth explored of approximately 40 feet bgs. Regional soil borings indicate that this unit may extend to depths greater than 40 feet bgs in the vicinity of Plant 2 and Plant 4.

Groundwater was encountered at depths of approximately 6 to 8 feet bgs. The groundwater flow direction is to the southwest of Plant 2 and Plant 4 (toward the LDW), with a measured gradient of 0.002 foot per foot. The vertical gradient measured in May 2007 from the PSC monitoring well pairs installed adjacent to Plant 2 was –0.02 foot per foot.

4.3.3 Soil Quality

Occurrences of constituents exceeding the screening levels in soil at CI Plant 2 and Plant 4 are described below.

- PCE—Concentrations of PCE in soil at Plant 2 ranged from not detected to 2.5 micrograms per kilogram (µg/kg). The highest concentration of PCE was detected at a depth of 3.8 feet bgs near the southwestern corner of the Plant 2 canopy area. .

  Concentrations of PCE in soil at Plant 4 ranged from not detected to 38 µg/kg. The highest concentrations of PCE were detected at the southern portion of Plant 4 near to the former degreasing unit, and at the east wall adjacent to the former ABP located on 4th Avenue South.

- TCE—TCE was not detected in soil at Plant 2.

  Concentrations of TCE in soil at Plant 4 ranged from not detected to 140 µg/kg. The highest concentrations of TCE were detected at the southern portion of Plant 4 near to the former degreasing unit, and at the east wall adjacent to the former ABP located on 4th Avenue South.

- c-1,2-DCE—Concentrations of c-1,2-DCE in soil at Plant 2 ranged from not detected to 2.2 µg/kg. The highest concentration of c-1,2-DCE was detected at a depth of 32.5 feet bgs near the center of the Plant 2 canopy area. The distribution of c-1,2-DCE in soil at Plant 2 and the estimated extent of c-1,2-DCE exceeding the soil screening level for direct contact are depicted on Figure 4.2 .

  Concentrations of c-1,2-DCE in soil at Plant 4 ranged from not detected to 38 µg/kg. The highest concentrations of c-1,2-DCE were detected in the southern portion of Plant 4 near to the former degreasing unit, and at the east wall adjacent to the former ABP located on 4th Avenue South. The distribution of c-1,2-DCE in soil at Plant 4 and the estimated extent of c-1,2-DCE exceeding the soil screening level for direct contact are depicted on Figure 4.2.

- VC—VC was not detected in soil at Plant 2 or Plant 4.

4.3.4 Groundwater Quality

4.3.4.1 Water Table Zone (Depth of 10 to 20 Feet bgs)

Two chemicals each at Plant 2 and Plant 4 have been detected above screening levels in groundwater from the Water Table Zone, as follows:

- TCE in the Water Table Zone at Plant 2 ranged up to 630 µg/l, with the highest concentration located near the former chemical and paint storage area located in the Plant 2 canopy area (Figure 4.2a);
- c-1,2-DCE in the Water Table Zone at Plant 2 ranged up to 160 µg/l, with the highest concentration located near the former chemical and paint storage area located in the Plant 2 canopy area (Figure 4.2d);
- VC in the Water Table Zone at Plant 2 ranged up to 7 µg/l, with the highest concentration located near the down-gradient of the Plant 2 canopy area (Figure 4.2j);
- TCE in the Water Table Zone at Plant 4 ranged up to 45 µg/l, with the highest concentration located at the east wall of Plant 4 adjacent to the former ABP located on 4th Avenue South (Figure 4.2a); and
- PCE in the Water Table Zone at Plant 4 ranged up to 70 µg/l, with the highest concentration located at the east wall of Plant 4 adjacent to the former ABP located on 4th Avenue South (Figure 4.2g).

4.3.4.2 Shallow Groundwater Zone (Depth of 20 to 40 Feet bgs)

Neither c-1,2-DCE nor PCE has been detected above the screening level in the Shallow Groundwater Zone at Plant 2 (Figures 4.2e, 4.2f, 4.2h, and 4.2i). Concentrations of TCE have been detected at maximum concentrations of 360 and VC of 780 µg/l in the Shallow Groundwater Zone (Figures 4.2k and 4.2l). Concentrations of TCE and VC were detected in groundwater samples collected from monitoring wells located up-gradient of

Plant 2. Direct-push borings were not advanced and monitoring wells were not screened in the Shallow Groundwater Zone at Plant 4.

4.3.4.3 Intermediate Groundwater Zone (Depth of 40 to 70 Feet bgs))

Neither TCE, 1,2-DCE, and PCE has been detected above the screening level in Intermediate Groundwater Zone at Plant 2. A single concentration of VC of 162 µg/l was detected in the Intermediate Groundwater Zone. Concentrations of TCE and VC were detected in groundwater samples collected from monitoring wells located up-gradient of Plant 2. Direct-push borings were not advanced and monitoring wells were not screened in the Shallow Groundwater Zone at Plant 4.

4.4 BLASER DIE CASTING SOURCE AREA

4.4.1 Summary and Nature of Release

A release of TCE and degradation products to soil and groundwater was confirmed at the southwestern corner of the BDC building on 3rd Avenue South (PGG 2006). These contaminants have migrated downward through the vadose zone to the Water Table Zone. Chlorinated ethenes at the BDC Facility do not appear to have penetrated far below the Water Table Zone, and dense nonaqueous-phase liquid does not appear to be present in groundwater based on groundwater TCE solubility-concentration relationships. A summary of soil and groundwater quality data collected from the facility are shown on Figure 4.3.

BDC is currently implementing a Source Control Action Plan for the Blaser Facility. The Source Control Action Plan proposes soil source excavation at the southwest corner of the Blaser building (PGG 2007a).

The release of TCE most likely occurred in the southwestern corner of the BDC property where a building addition was constructed in 1996. Soil samples collected by boring through the floor of the new building at the pre-construction ground surface detected the highest concentrations of TCE in soil, consistent with releases to the pre-construction ground surface.

4.4.2 Facility Hydrogeologic Conditions

The BDC Facility is located on fill placed over quaternary fluvial deposits of the LDW. Much of the fill likely consists of material dredged from the LDW, and is similar in character to underlying native materials. The soils generally are fine to medium gray silty sand, with occasional silt interbeds ranging from 1 to 10 centimeters in thickness. Silt layers often do not correlate between nearby boreholes, indicating that they form discontinuous lenses.

The depth to groundwater is approximately 8 feet bgs. The maximum depth explored at the BDC Facility was 31 feet, which was reached at direct-push sampling locations PGG-1 and K19.

4.4.3 Soil Quality

4.4.3.1 Chlorinated Solvents

- PCE—PCE was detected in 2 of the 32 soil samples collected below the southwestern corner of the BDC building. Concentrations of PCE in the soil samples collected at the pre-construction ground surface were 0.400 and 0.087 mg/kg.
- TCE—TCE is the primary COPC at the BDC Facility. Concentrations of TCE are highest in soil samples collected from below the southwestern corner of the BDC building, with concentrations of TCE up to 38 mg/kg at the pre-construction ground surface. Most TCE concentrations in soil at the BDC Facility ranged from 0.050 to 1.3 mg/kg.
- c-1,2-DCE—c-1,2-DCE concentrations generally track TCE concentrations, but at concentrations 10 to 100 times lower, ranging from 0.94 mg/kg to non-detect. The presence of c-1,2-DCE indicates that natural attenuation is occurring in the groundwater plume.
- VC—VC was detected below screening levels in four soil samples. Concentrations ranged from 0.0012 to 0.016 mg/kg.

4.4.3.2 Other Constituents of Potential Concern

No other constituents above MTCA Method A or B soil cleanup levels were detected in the soil analyses.

4.4.4 Groundwater Quality

4.4.4.1 Water Table Zone (Depth of 10 to 20 Feet bgs)

- PCE—PCE was detected in groundwater samples collected from the Water Table Zone above screening levels in borings advanced by PSC along the south side of the Blaser building with a maximum concentration of 0.5 ug/l. PCE was also detected above the screening level at CG-136-WT at 1.4 ug/l).
- TCE—TCE is the primary COPC at the BDC Facility. Concentrations of TCE in groundwater samples collected from the Water Table Zone were highest beneath and immediately down-gradient of the southwestern corner of the BDC building. Vertical profiling near the building corner indicates a narrow zone of TCE concentrations up to 2,000 μg/l at the Water Table Zone at the BDC Facility. Concentrations of TCE decreased to below the detection limit of 0.6 μg/l within 5 feet below the top of the water table at the BDC Facility, based on one set of vertical profiling groundwater samples located at PGG-1. The vertical stratification is supported by down-gradient samples at K19. Concentrations of TCE in groundwater decrease down-gradient and cross-gradient of the BDC Facility (Figure 4.3).

- c-1,2-DCE—c-1,2-DCE concentrations generally track TCE concentrations, but at concentrations 10 to 100 times lower, ranging from 0.94 mg/kg to non-detect. Vertical profiling of c-1,2-DCE is available at locations PGG-1 and K19 at the BDC Facility. These data show the highest concentrations in the shallowest groundwater sample collected from the Water Table Zone, ranging from 1,800 µg/l to non-detect. Approximately 5 feet deeper (at approximately 15 feet bgs) is an interval with c-1,2-DCE concentrations of 1 µg/l or less, beneath which detected concentrations steadily increase to 28 µg/l, and extend into the Shallow Zone below 30 feet bgs, indicating the presence of a separate plume at depth[4]. Concentrations of c-1,2-DCE in groundwater are slightly lower than TCE concentrations at the BDC Facility, ranging from 1,800 µg/l to non-detect. The presence of c-1,2-DCE indicates that natural attenuation likely is occurring in soil.
- 1,1-DCE—1,1-DCE was detected in Water Table Zone groundwater samples above the MTCA Method B (carcinogen) screening level of 0.073 µg/l (MTCA Method A levels have not been established). Most detections were between 2 and 5.5 µg/l, with one detection at 150 µg/l. The highest 1,1-DCE concentration corresponded to the highest concentrations of TCE, c-1,2-DCE, and VC.
- VC—VC concentrations increased in groundwater down-gradient of the BDC Facility. In vertical profiles near the source on the BDC Facility. Concentrations of VC in groundwater are stratified similarly to those of TCE, with a sharp decrease from groundwater in the Water Table Zone (a 550 µg/l VC concentration at 8 to 11 feet bgs) to non-detect or very low concentrations near the detection limit in groundwater samples collected at a greater depth (13 to 26 feet bgs). The presence of VC in the groundwater is consistent with natural attenuation and degradation of chlorinated solvents.
- Other COPCs—No other constituents were detected above applicable MTCA Method A or B screening levels. All groundwater samples from this interval were analyzed by EPA Method SW8260B, VOCs.

4.4.4.2 Shallow Zone

- PCE—PCE was not detected in groundwater in the Shallow Zone at the BDC Facility.
- TCE—TCE was detected in one Shallow Zone groundwater sample at 1 µg/l, but is not attributed to the release at the BDC Facility because of the intervening vertical area of non-detects.
- c-1,2-DCE—c-1,2-DCE was detected in Shallow Zone groundwater samples at 42 and 47.3 µg/l, but is not attributed to the release at the BDC Facility because of the intervening vertical area of non-detects.
- VC—VC was detected in Shallow Zone groundwater samples at 4.4 and 32.6 µg/l, but is not attributed to the release at the BDC Facility because of the intervening vertical area of non-detects.

- Other COPCs—No other constituents were detected above applicable MTCA Method A or B screening levels. All groundwater samples from this interval were analyzed by EPA Method SW8260B, VOCs.

4.4.4.3 Intermediate Zone

Because of the intervening vertical area of non-detects, no soil or groundwater samples were collected in the Intermediate Zone as part of the BDC soil and groundwater investigation (PGG 2006)[4].

[4] PSC and BDC agree that further characterization of the nature and extent of BDC COCs in groundwater is necessary. BDC has conducted further investigation of the Shallow Zone (Blaser Current Situation Report, in press 2008) BDC is currently negotiating the scope of the RI for its site with Ecology.

5.0 GROUNDWATER QUALITY DATA

The West of 4th Group developed a set of summary figures to show the distribution of chlorinated ethenes in the study area (Figure 5.1A through 5.4C). Separate figures show groundwater quality from the water table, shallow, and intermediate intervals for PCE, TCE, cis-1,2-DCE and VC. Included on the figures are groundwater elevation contours developed from the joint area-wide monitoring effort conducted on May 15, 2007. The groundwater quality data include both one-time probe-collected reconnaissance samples in addition to the most recent sample collected from monitoring wells. Symbols on each figure are color coded to indicate concentration ranges relative to the established constituent screening levels.

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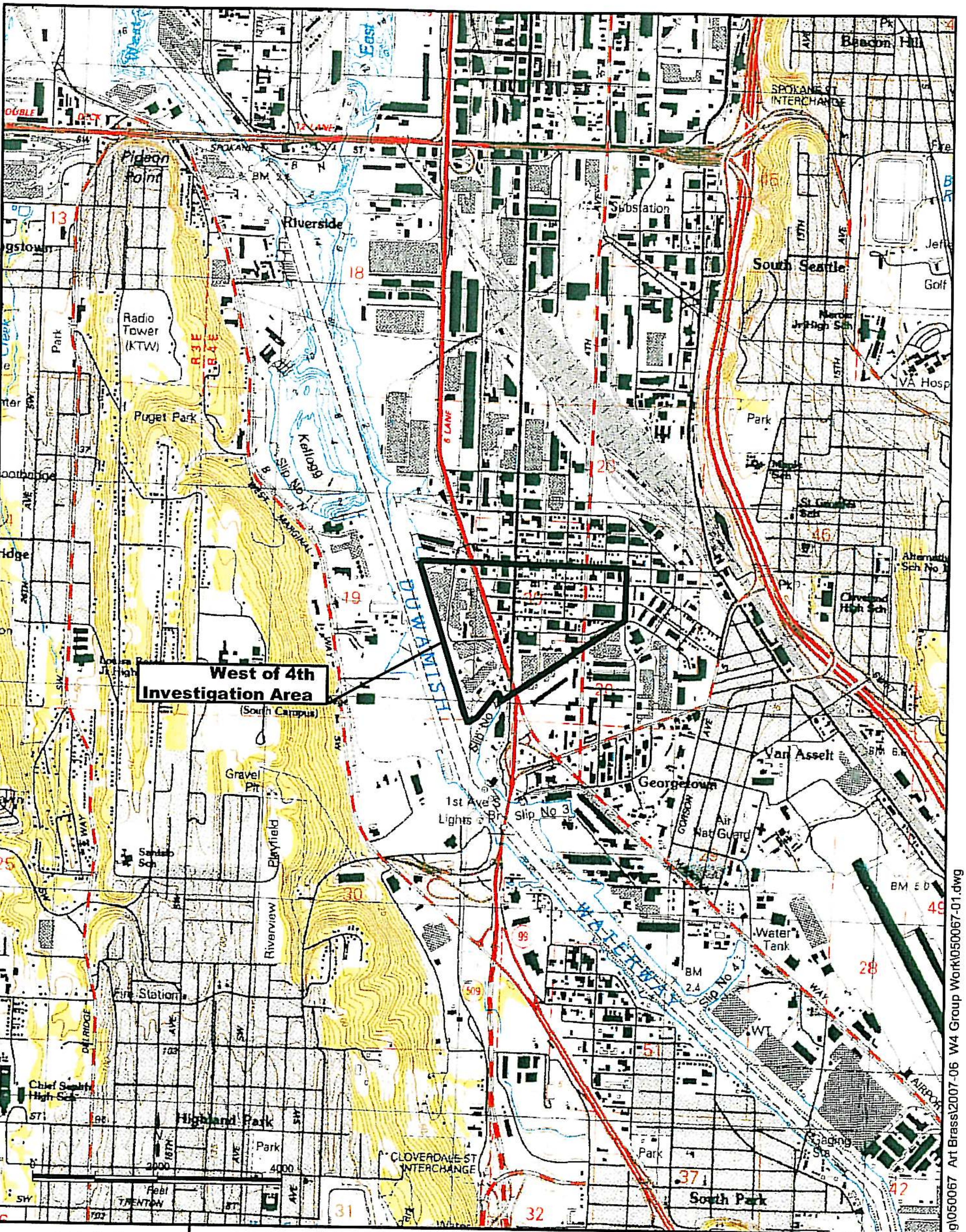
Washington State Department of Ecology (Ecology). 2005. *Letter: Ed Jones (Ecology) to William Carroll (PSC) RE: draft Feasibility Study Report.* November 9.

FIGURES

DATA SUMMARY REPORT
West of 4th Groundwater Investigation Area
Seattle, Washington

Farallon PN: 457-00



W4 Work Group

Investgation Area Location Map

W4 Work Group
Seattle, Washington

DATE: June 2007	PROJECT NO. 050067
DESIGNED BY: DLH	
DRAWN BY: LAL	FIGURE NO. 1.1
REVISED BY: -	

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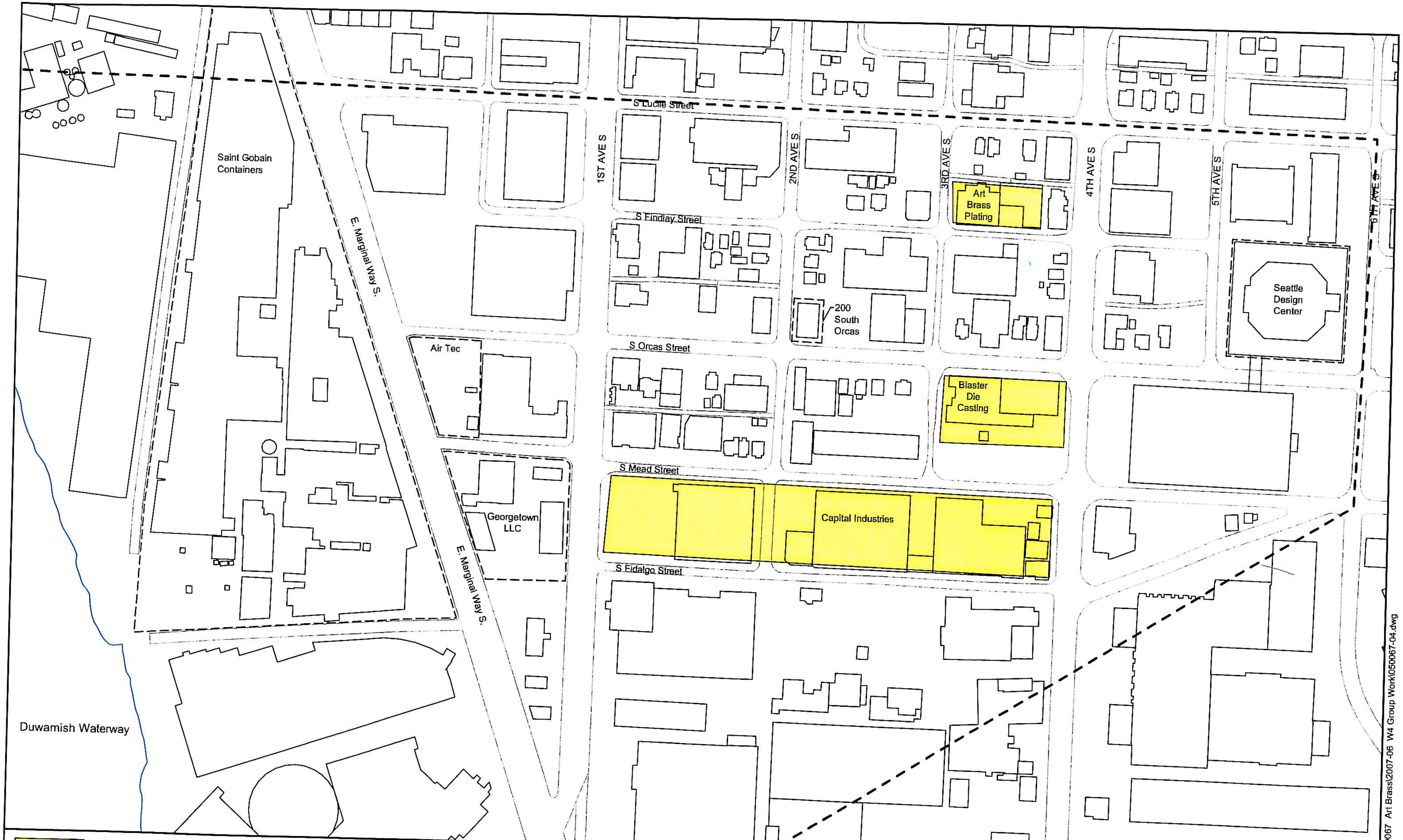

W4 Group Facility Location

Investigation Area Boundary

Additional Properties of Interest in Study Area

N

0 200 400

Feet

W4 Work Group

Investigation Area Map with Facility Locations

W4 Work Group

Seattle, Washington

DATE:	June 2007	PROJECT NO.	050067
DESIGNED BY:	DLH		
DRAWN BY:	LAL	FIGURE NO.	1.2
REVISED BY:	-		

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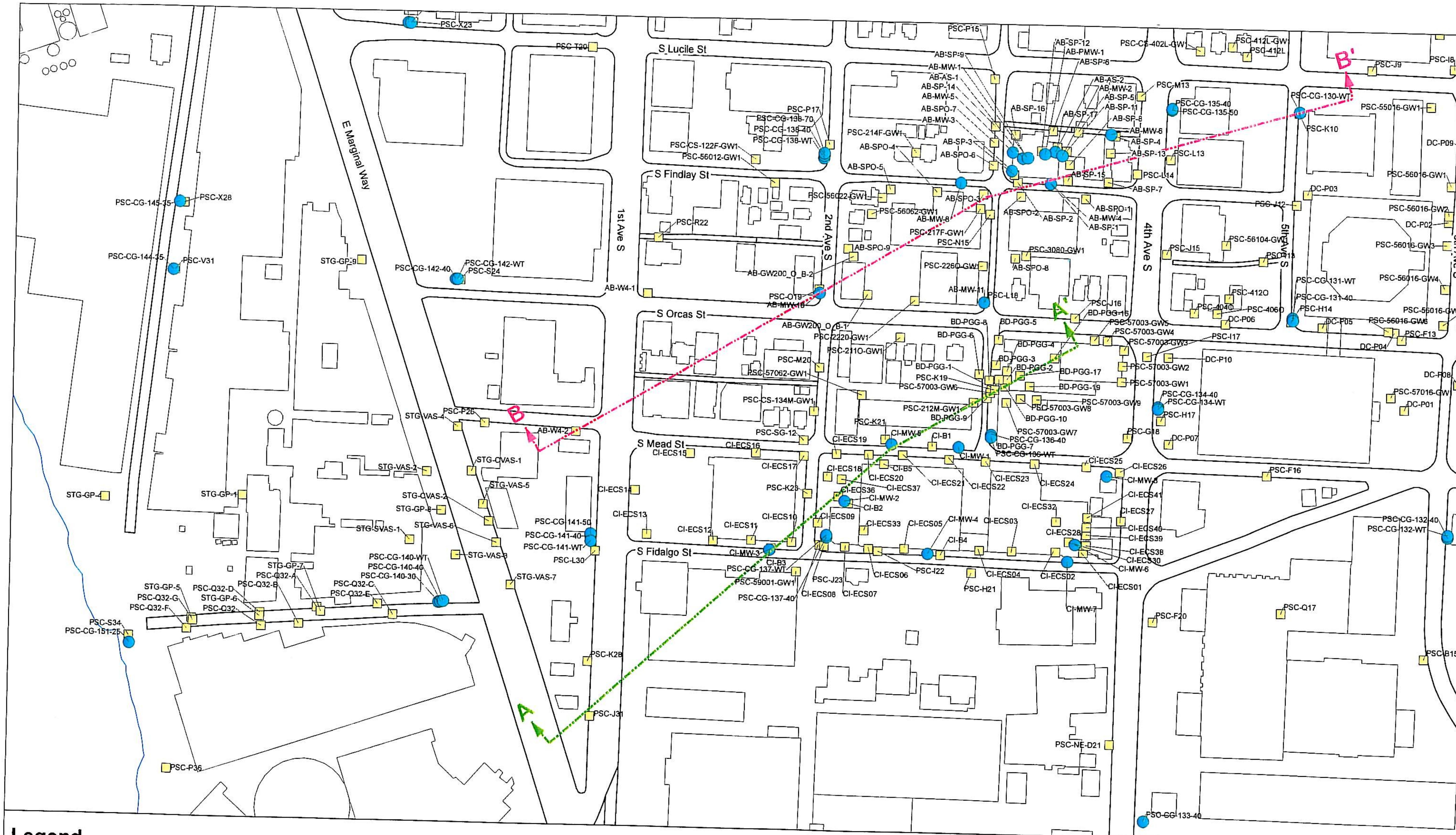

Legend

- Monitoring Wells
- Probe Explorations
- Cross Section B-B' Location
- Cross Section A-A' Location

0 100 200 400 Feet

W4 Work Group

Cross Section Location Map

W4 Work Group
Seattle, WA

DATE: August 2007	PROJECT NO. 050067	
DESIGNED BY: PIONEER		
DRAWN BY: PIONEER	FIGURE NO. 2.1	
REVISED BY: PPW		

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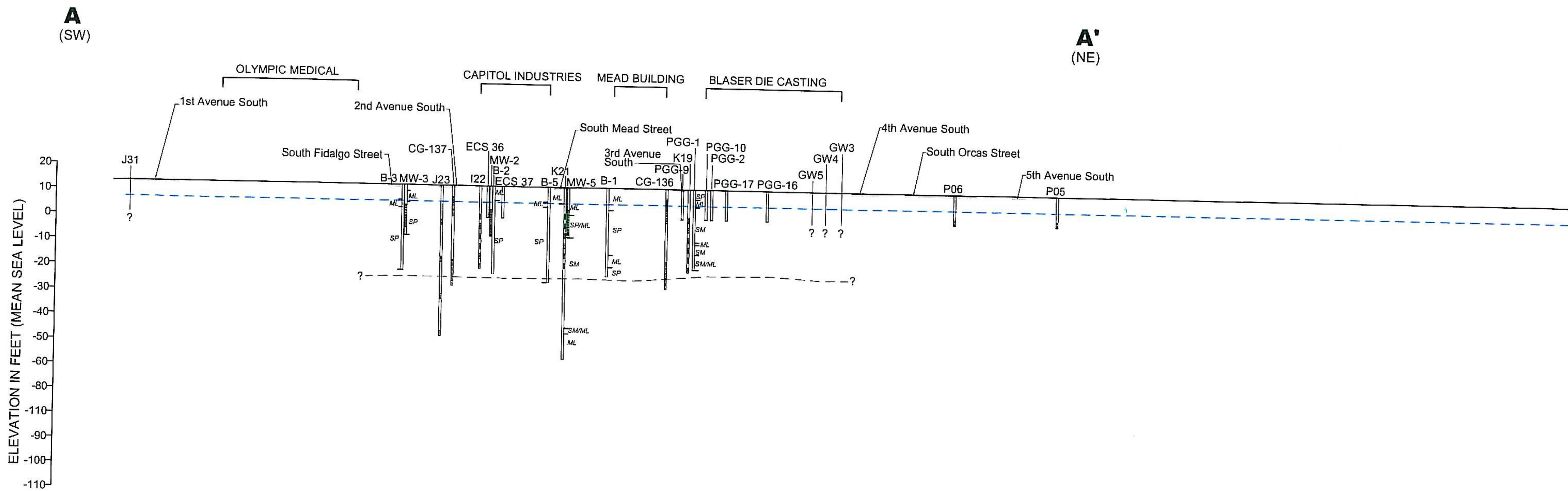


Legend

- Water Table
- Geologic Contact
- Ground Surface
- Indicates Cross-Section Line Crossing City Streets
- Screened Interval for Groundwater Sample Collection
- ML — Silt, Sandy Silt, Gravelly Silt
- SM — Silty Sand, Silty Sand with Gravel
- SP — Sand, Poorly Graded
- SW — Sand with Gravel, Well Graded

Notes:
Vertical Datum for groundwater level is based on NAVD 88.

Horizontal Scale
0 200 400
Feet

Vertical Scale
0 40 80
Feet

Vertical Exaggeration 5X

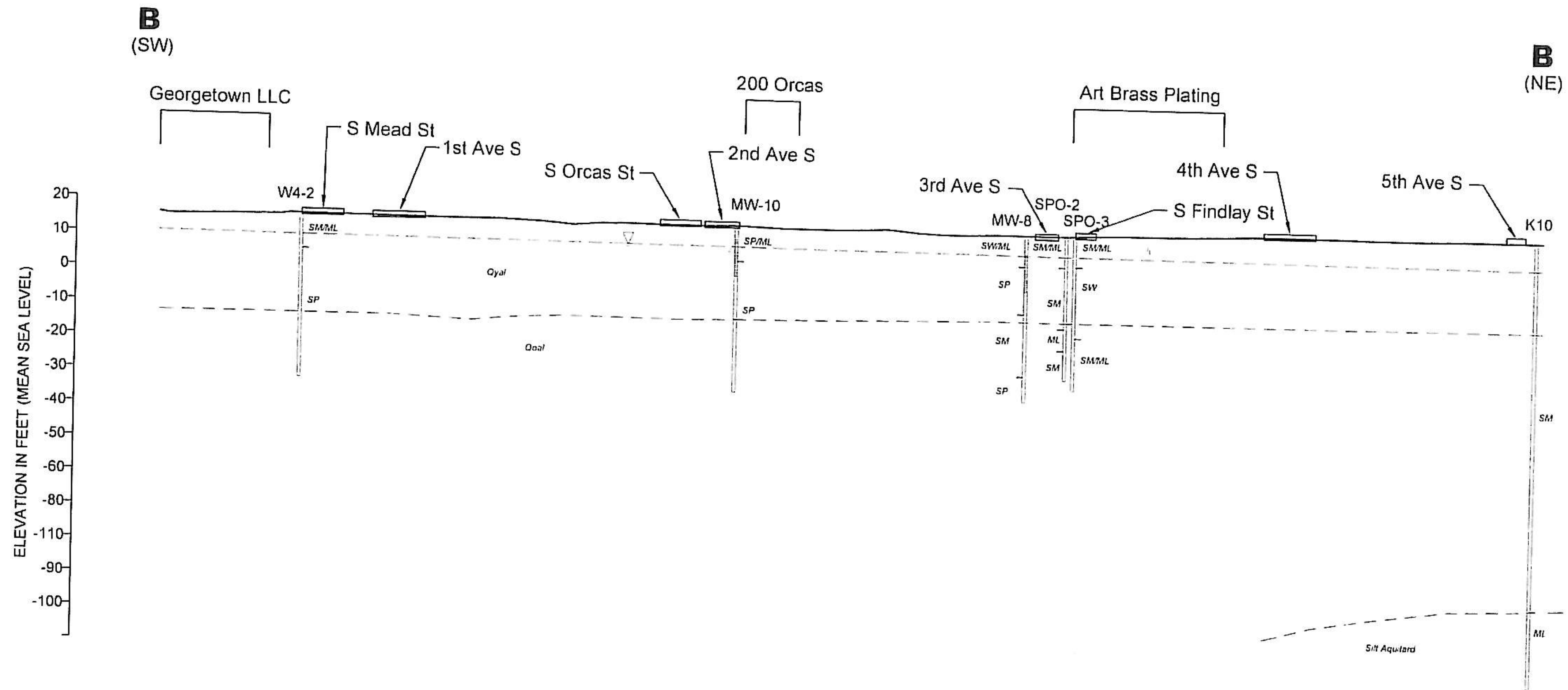
Area Hydrogeologic Units:

Qyal **Younger Alluvium -** Moderately sorted deposits of silt, sand, and sandy silt; soft and containing abundant wood and organics. Typically found within a few feet above of below modern sea level. Represents channel and overbank (floodplain) sediments, deposited by the modern Duwamish River while flowing at an elevation substantially equivalent to that seen today. Age is probably less than a few thousand years.

Qoal **Older Alluvium -** Sands and silts deposited in an estuarine and deltaic environment; contains discontinuous gravel lenses and locally abundant shells and some wood. Moderately dense to dense. Represents the northward-advance wedge of sediment transported by the Duwamish River into the marine embayment of the Duwamish valley while the valley floor still beneath many tens of hundreds of feet of water. Deposited within the last 5,000 years.

Reference: Duwamish Industrial Area, Hydrogeologic Pathways Project (Booth and Herman, 1998)

W4 Work Group	Cross Section A-A' W4 Work Group Seattle, Washington	DATE: June 2007 DESIGNED BY: DLH DRAWN BY: LAL REVISED BY: -	PROJECT NO. 50067 FIGURE NO. 2.2



Legend

Water Table

Geologic Contact

Ground Surface

Indicates Cross-Section Line Crossing City Streets

Screened Interval for Groundwater Sample Collection

ML Silt, Sandy Silt, Gravelly Silt

SM Silty Sand, Silty Sand with Gravel

SP Sand, Poorly Graded

SW Sand with Gravel, Well Graded

Notes.
Vertical Datum for groundwater level is based on NAVD 88

Horizontal Scale
0 200 400
Feet

Vertical Scale
0 40 80
Feet

Vertical Exaggeration 5X

Area Hydrogeologic Units:

Qyal **Younger Alluvium** - Moderately sorted deposits of silt, sand, and sandy silt; soft and containing abundant wood and organics. Typically found within a few feet above of below modern sea level. Represents channel and overbank (floodplain) sediments, deposited by the modern Duwamish River while flowing at an elevation substantially equivalent to that seen today. Age is probably less than a few thousand years.

Qoal **Older Alluvium** - Sands and silts deposited in an estuarine and deltaic environment; contains discontinuous gravel lenses and locally abundant shells and some wood. Moderately dense to dense. Represents the northward-advance wedge of sediment transported by the Duwamish River into the marine embayment of the Duwamish valley while the valley floor still say beneath many tens of hundreds of feet of water. Deposited within the last 5,000 years.

Reference: Duwamish Industrial Area, Hydrogeologic Pathways Project (Booth and Herman, 1998)

W4 Work Group	**Cross Section B-B'** W4 Work Group Seattle, Washington	June 2007 DLH LAL PMB	PROJECT NO 050067 FIGURE NO **2.3**

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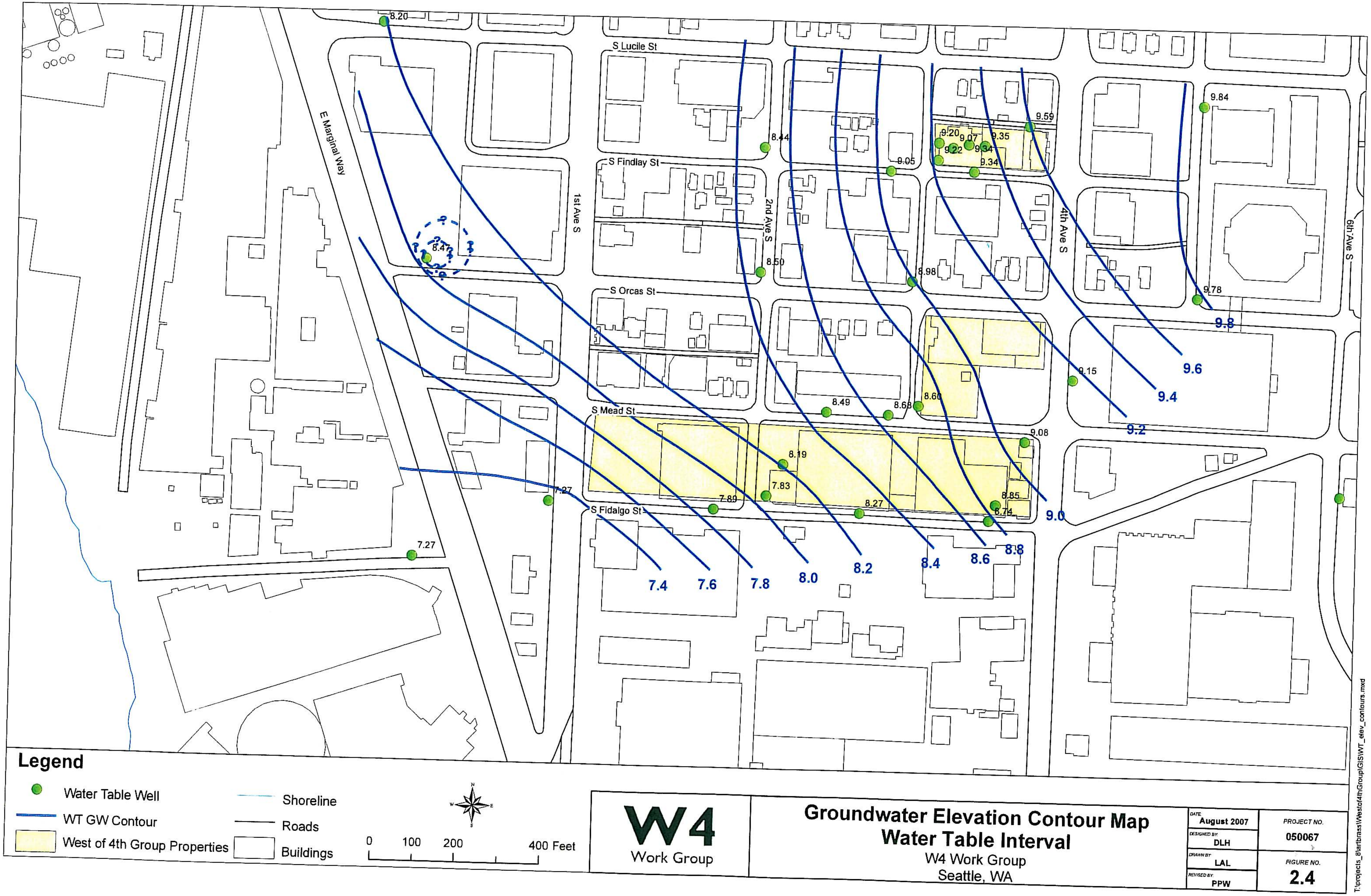

S Lucile St
S Findlay St
S Orcas St
S Mead St
S Fidalgo St
E Marginal Way
1st Ave S
2nd Ave S
4th Ave S
6th Ave S
8.20
8.44
9.05
9.20
9.07
9.35
9.22
9.34
9.34
9.59
9.84
8.47
8.50
8.98
9.78
9.15
8.49
8.68
8.60
9.08
8.19
7.83
7.89
8.27
8.85
8.74
7.27
7.27
7.4
7.6
7.8
8.0
8.2
8.4
8.6
8.8
9.0
9.2
9.4
9.6
9.8
Legend
Water Table Well
WT GW Contour
West of 4th Group Properties
Shoreline
Roads
Buildings
0 100 200 400 Feet
W4 Work Group
Groundwater Elevation Contour Map
Water Table Interval
W4 Work Group
Seattle, WA
DATE August 2007
DESIGNED BY DLH
DRAWN BY LAL
REVISED BY PPW
PROJECT NO. 050067
FIGURE NO. 2.4
T:\projects_8\airbrass\Westof4thGroup\GIS\WT_elev_contours.mxd

Legend

- Shallow Well
- Shallow GW Contour
- West of 4th Group Properties
- Shoreline
- Roads
- Buildings

0 100 200 400 Feet

W4 Work Group

Groundwater Elevation Contour Map
Shallow Interval
W4 Work Group
Seattle, WA

DATE: August 2007	PROJECT NO. 050067
DESIGNED BY: DLH	
DRAWN BY: LAL	FIGURE NO. 2.5
REVISED BY: PPW	

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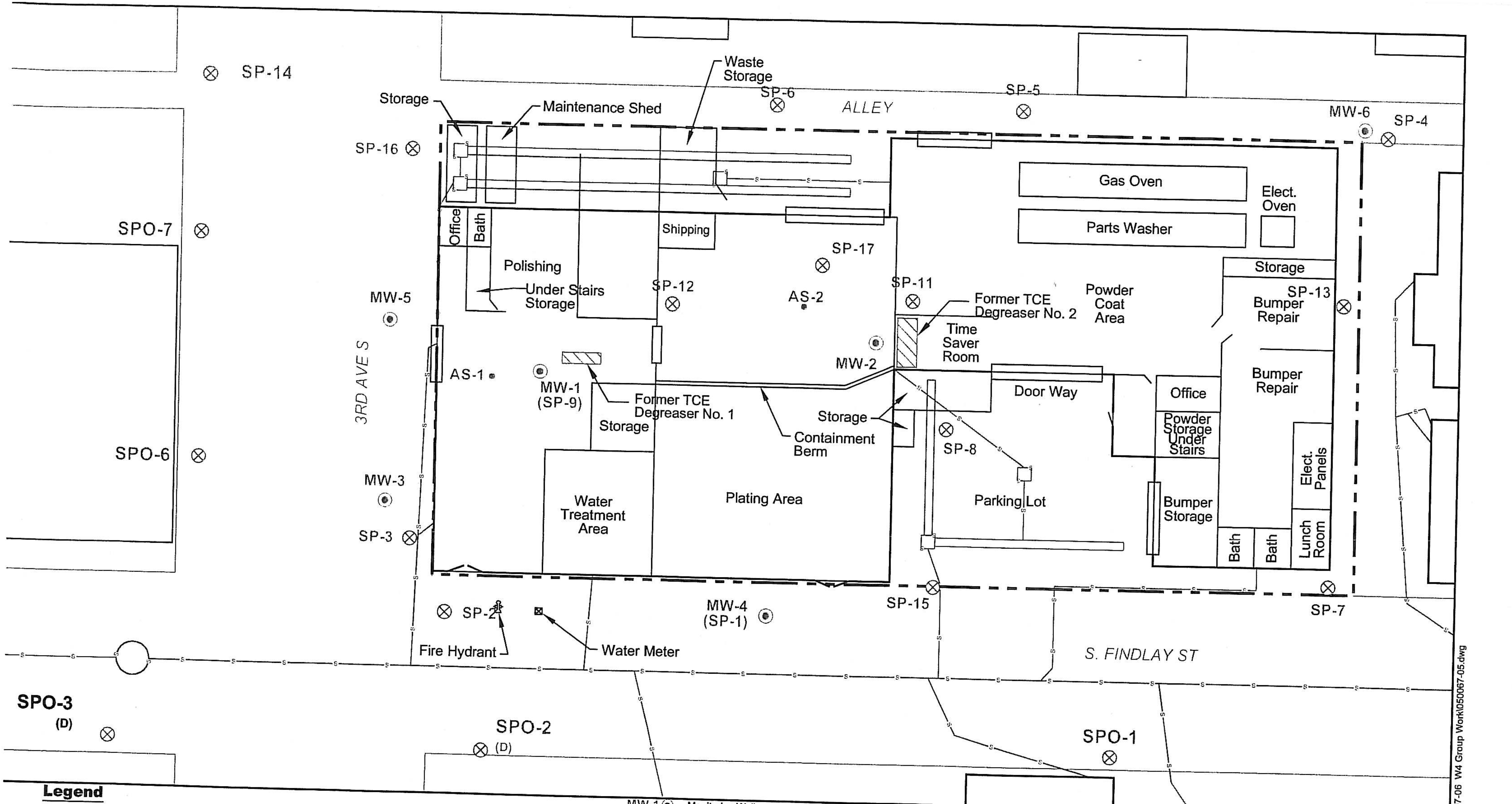


Legend

Approximate Property Boundary	Vapor Degreaser Location	MW-1	Monitoring Well
Catch Basin	Corrugated Metal Pipe (Sewer Retention)	MW-1	SVE Well
Sewer Line (Combined)	SP-3 Soil Boring		SVE Piping
		AS-1	Air Sparging Well

N

0 20 40

Feet

W4 Work Group	**Facility Map** W4 Work Group Seattle, Washington	DATE June 2007; DESIGNED BY JJP; DRAWN BY LAL; REVISED BY -	PROJECT NO. 050067; FIGURE NO. 3.1

Q:\Art Brass Plating\050067 Art Brass\2007-06 W4 Group Work\050067-05.dwg

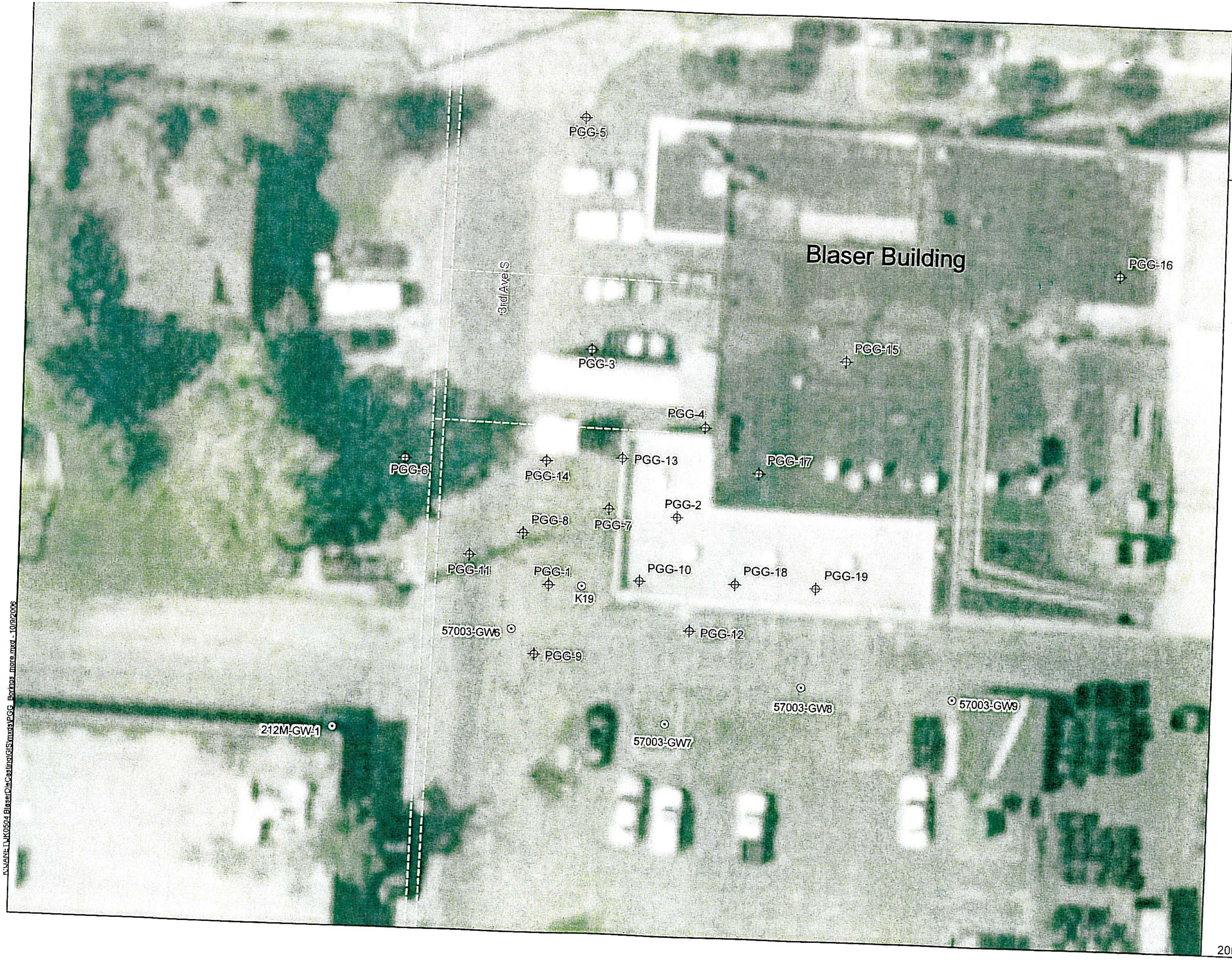

ORCAS
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
OTTER MOON MOTOR WORKS
MEAD BUILDING
BLASER DIE CASTING
CAPITAL CONTAINER YARD
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
0 80
APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2005)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)(2002)
DRAFT
N
FARALLON CONSULTING
FIGURE 3.2
CAPITOL INDUSTRIAL EXPLORATION PLAN
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004

Figure 3.3

Blaser Die Casting

JK0504

PgG



Previous Geoprobe Work

PGG Geoprobe

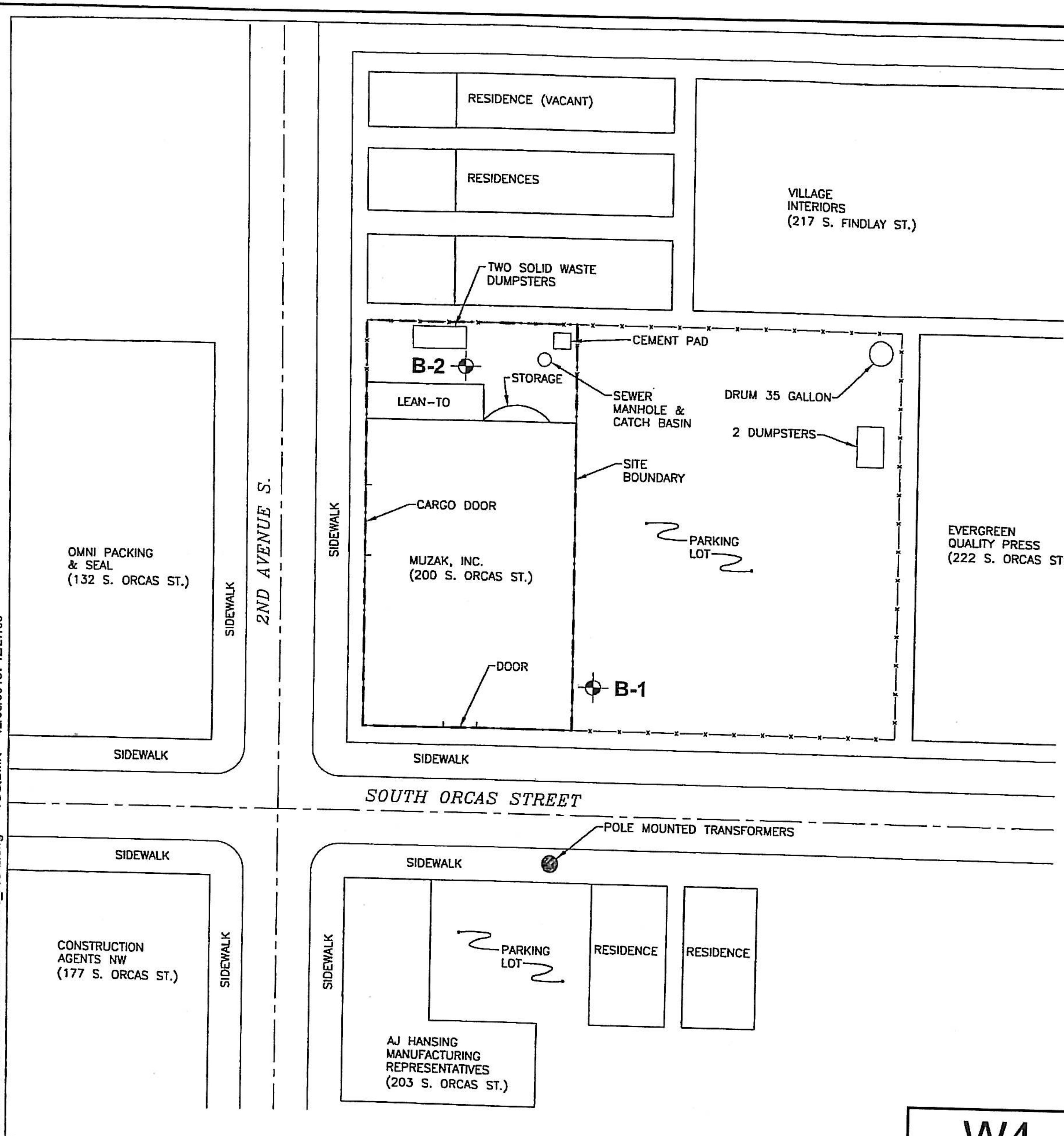
Approximate Location of Utility Infrastructure

0 Feet 20

N

2002 USGS Urban Areas Orthophoto

K:\VANET\JK0504 BlaserDieCasting\GIS\mxds\PGG_Borings_more.mxd - 10/9/2006



TACO\10\1057100300\CAD\1057100300_FIG-2.dwg TSG:BMK 12/05/06 rev 12/27/06

Legend

- – · – Site boundary
- B-1 Boring number and approximate location

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing created from sketch provided by GeoEngineers' personnel.

Not to Scale

W4 Work Group	200 South Orcas Street Exploration Location Plan W4 Work Group Seattle, Washington	DATE: June 2007 DESIGNED BY: GeoEngineers DRAWN BY: GeoEngineers REVISED BY: -	PROJECT NO. 050067 FIGURE NO. 3.4

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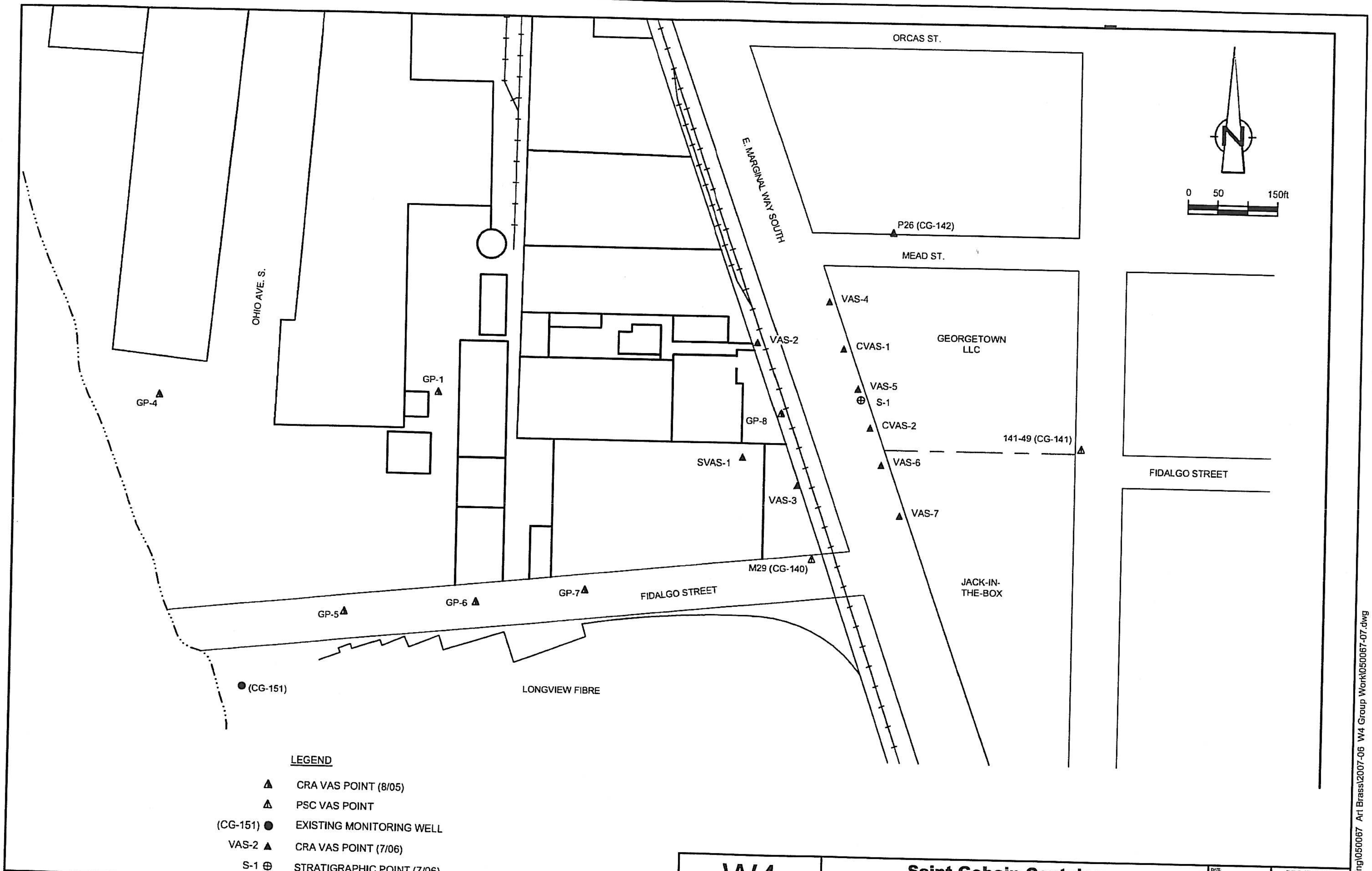

42419-10(004)GN-DE003 AUG 23/2006

W4 Work Group

Saint Gobain Containers Exploration Location Plan

W4 Work Group

Seattle, Washington

DATE	June 2007
DESIGNED BY	CRA
DRAWN BY	CRA
REVISED BY	-
PROJECT NO.	050067
FIGURE NO.	3.5

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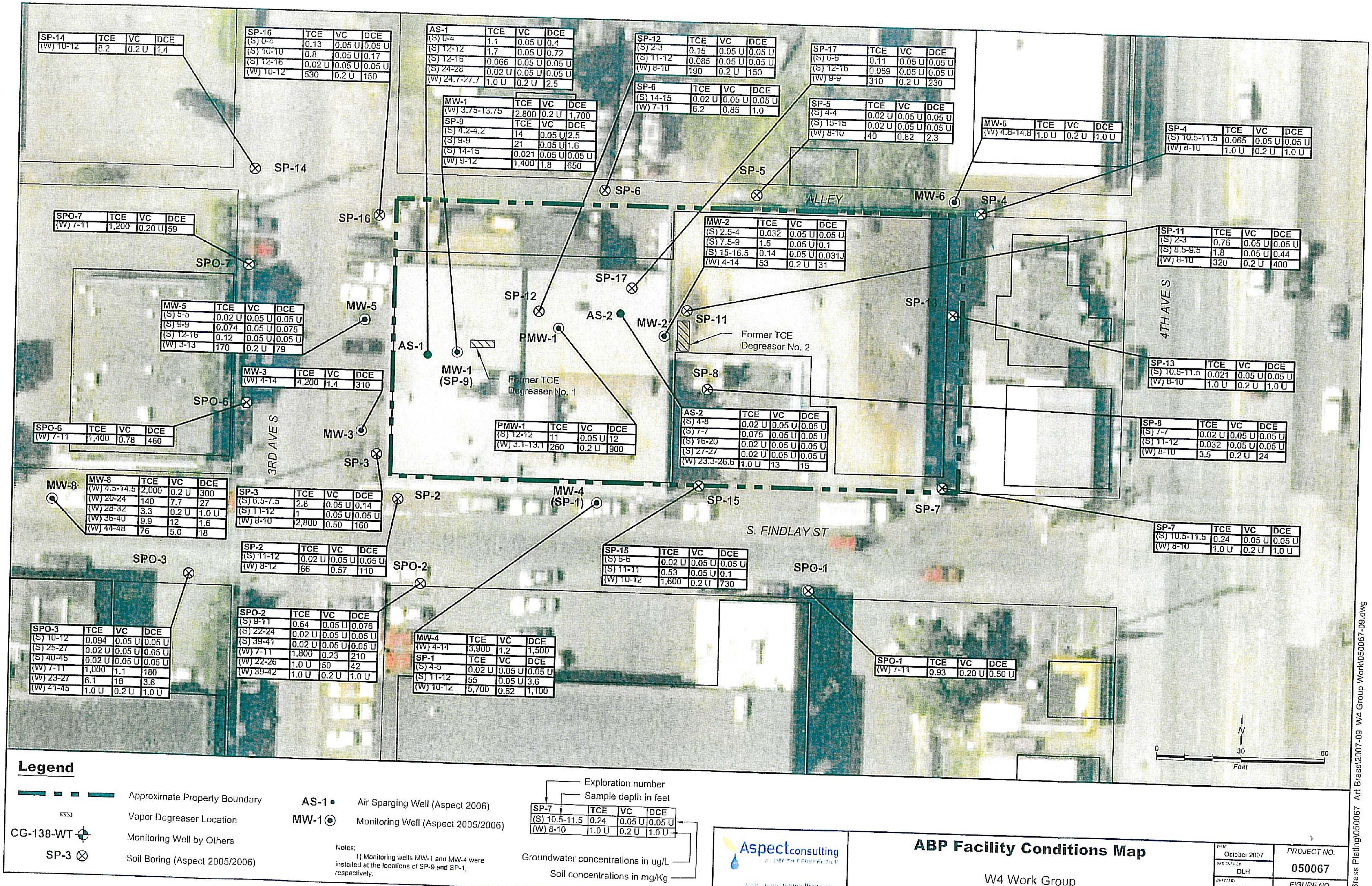

Aspect consulting

ABP Facility Conditions Map

W4 Work Group
Seattle, Washington

DATE	October 2007
DESIGNED BY	DLH
DRAWN BY	LAL
REVISED BY	SCC
PROJECT NO.	050067
FIGURE NO.	4.1

Q:\Art Brass Plating\050067 Art Brass\2007-09 W4 Group Work\050067-09.dwg


ORCAS
BLASER DIE CASTING
CAPITAL CONTAINER YARD
OTTER MOON MOTOR WORKS
MEAD BUILDING
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
MW-5 300
B1 18/13
MW-1 16
ECS15 <2/<2
ECS16 <2/<2
ECS17 <2/<2
ECS14 <2/<2
ECS13 <2/<2
ECS12 <2/<2
ECS11 <2/<2
B3 6.8/5.2
ECS10 41/29
MW-3 5.6
ECS18 <2/<2
ECS19 <2/<2
B5
ECS20 370/30
ECS21 15/18
ECS22 40/18
ECS37 120/—
ECS36 630/—
MW-2 300
B2 480/110
ECS9 510/6
ECS8 65/50
ECS7 29/100
ECS33 34/—
ECS6 92/360
MW-4 3.6
ECS5 0.6/<2
B4 <0.2/<0.2
ECS23 44/40
ECS24 <2/<2
ECS25 <2/<2
ECS26 <2/<2
MW-8 <0.2
ECS32 11/—
ECS41 2/—
ECS40 3/—
ECS39 8/—
ECS30 20/—
MW-6 19
ECS28 45/—
ECS38 18/—
ECS27 0.7/<2
ECS4 <2/<2
ECS3 21/<2
ECS2 35/6
MW-7 38
ECS1 13/4
(31.60)
(360)
[47.7]
0 80
APPROXIMATE SCALE IN FEET
PROPERTY BOUNDARY
LEGEND
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)(2002)
DIRECT-PUSH SOIL BORING BY PSC (2000-2005)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
<2/<2 TRICHLOROETHENE (TCE) CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (9'-13'/15'-19')
<0.2/<0.2 TCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (10'-14'/14'-18')
16 TCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL FARALLON SAMPLE INTERVALS (11.90' to 14.31')
TCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (12'-14'/15'-17')
(31.60) TCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL PSC SAMPLE INTERVALS (5' to 15')
[0.5] TCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVAL-SAMPLE DEPTH UNKNOWN
— NOT SAMPLED
DRAFT
N
FARALLON CONSULTING
975 5th Avenue Northwest Issaquah, WA 98027
FIGURE 4.2a
TCE CONCENTRATIONS WATER TABLE SAMPLE INTERVAL INTERVAL (10'–20' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004


ORCAS
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
OTTER MOON MOTOR WORKS
MEAD BUILDING
BLASER DIE CASTING
CAPITAL CONTAINER YARD
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
0 80
APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
<2 TRICHLOROETHENE (TCE) CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (21' to 25')
<0.4/<0.4/<1 TCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (18'-22'/22'-26'/26'-30')
<1/<1/<1 TCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (19'-20'/22'-25'/27'-29')
— NOT SAMPLED
DRAFT
N
FARALLON CONSULTING
975 5th Avenue Northwest
Issaquah, WA 98027
FIGURE 4.2b
TCE CONCENTRATIONS
SHALLOW SAMPLE INTERVAL
INTERVAL (20'–30' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004


ORCAS
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
OTTER MOON MOTOR WORKS
MEAD BUILDING
BLASER DIE CASTING
CAPITAL CONTAINER YARD
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
0 80 APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
<2 TRICHLOROETHENE (TCE) CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (33' to 37')
<1/— TCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (30'-34'/34'-38')
<1 TCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (31' to 33')
(0.07) TCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL PSC SAMPLE INTERVALS (30' to 40')
— NOT SAMPLED
DRAFT
0 40 APPROXIMATE SCALE IN FEET
N
FARALLON CONSULTING
975 5th Avenue Northwest Issaquah, WA 98027
FIGURE 4.2c
TCE CONCENTRATIONS SHALLOW SAMPLE INTERVAL INTERVAL (30'–40' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004


ORCAS
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
OTTER MOON MOTOR WORKS
MEAD BUILDING
BLASER DIE CASTING
CAPITAL CONTAINER YARD
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
0 80
APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
<2/<2 (cis) 1,2-DICHLOROETHENE (1,2-DCE) CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (9'-13'/15'-19')
1.9/26 (cis) 1,2-DCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (10'-14'/14'-18')
78 (cis) 1,2-DCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL FARALLON SAMPLE INTERVALS (11.90' to 14.31')
993/<1 (cis) 1,2-DCE CONCENTRATIONS IN GROUNDWATER RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (12'-14'/15'-17')
(60.3) (cis) 1,2-DCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL PSC SAMPLE INTERVALS (5' to 15')
[<1] (cis) 1,2-DCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVAL-SAMPLE DEPTH UNKNOWN
— NOT SAMPLED
DRAFT
N
FARALLON CONSULTING
975 5th Avenue Northwest Issaquah, WA 98027
FIGURE 4.2d
(cis) 1,2-DCE CONCENTRATIONS WATER TABLE SAMPLE INTERVAL INTERVAL (10'-20' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004

ORCAS
BLASER DIE CASTING
OTTER MOON MOTOR WORKS
MEAD BUILDING
CAPITAL CONTAINER YARD
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
K19
1.31/16.21/28.4
CG-136-WT/CG-136-40
MW-5
MW-1
B1
K21
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
ECS15 32
ECS16 150
ECS17 99
ECS19 55
B5
ECS20 16
ECS21
ECS22 27
ECS23 30
ECS24 58
ECS25 29
ECS26 37
MW-8
ECS18 3
ECS37
ECS14
K23
<1/9.93/35.2
ECS36
MW-2
B2
8.2/6.5/11
ECS9 14
ECS32
ECS47
ECS40
ECS39
ECS30
ECS28
ECS38
MW-6
ECS27 12
ECS33
ECS13 23
ECS12 71
ECS11 40
B3
19/11/2.9
ECS10 12
MW-3
CG-137-WT/CG-137-40
ECS8 1.8
ECS7 92
ECS6 53
MW-4 49
ECS5
B4
56/31/<1
ECS4 26
ECS3 14
ECS2 15
MW-7
ECS1 5
SOUTH FIDALGO STREET
59001-GW1
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
0 80
APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
15 (cis) 1,2-DICHLOROETHENE (1,2-DCE) CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (21' to 25')
56/31/<1 (cis) 1,2-DCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (18'-22'/22'-26'/26'-30')
1.31/16.21/28.4 (cis) 1,2-DCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (16'-20'/22'-25'/27'-29')
— NOT SAMPLED
DRAFT
N
FARALLON CONSULTING
FIGURE 4.2e
(cis) 1,2-DCE CONCENTRATIONS SHALLOW SAMPLE INTERVAL INTERVAL (20'-30' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004

LEGEND

PROPERTY BOUNDARY

ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)

B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)

MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)

CG-136 WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)

K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)

ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER

3/— TETRACHLOROETHENE (PCE) CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (9'-13'/15'-19')

<0.2/<0.2 PCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (10'-14'/14'-16')

<0.2 PCE CONCENTRATIONS IN GROUNDWATER MONITORING SAMPLE WELL FARALLON SAMPLE INTERVALS (11.90' to 14.31')

<0.20/— PCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (12'-14'/15'-17')

(2.86) PCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL PSC SAMPLE INTERVALS (5' to 15')

[<0.4] PCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVAL-SAMPLE DEPTH UNKNOWN

— NOT SAMPLED

DRAFT

N

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975 5th Avenue Northwest
Issaquah, WA 98027

FIGURE 4.2g

PCE CONCENTRATIONS
WATER TABLE SAMPLE INTERVAL
INTERVAL (10'-20' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON

FARALLON PN: 457-004

Drawn By:DEW	Checked By:TC	Date:10/30/07	Disk Reference: 457004


ORCAS
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
OTTER MOON MOTOR WORKS
MEAD BUILDING
BLASER DIE CASTING
CAPITAL CONTAINER YARD
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
0
80
APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
<2 TETRACHLOROETHENE (PCE) CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (21' to 25')
<0.4/<0.4/<1 PCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (18'-22'/22'-26'/26'-30')
<1.0/<1.0/<1.0 PCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (19'-20'/22'-25'/27'-29')
(136) PCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL PSC SAMPLE INTERVALS (20' to 30')
— NOT SAMPLED
DRAFT
N
FARALLON CONSULTING
975 5th Avenue Northwest Issaquah, WA 98027
FIGURE 4.2h
PCE CONCENTRATIONS SHALLOW SAMPLE INTERVAL INTERVAL (20'-30' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004

ORCAS
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
OTTER MOON MOTOR WORKS
MEAD BUILDING
BLASER DIE CASTING
CAPITAL CONTAINER YARD
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
K19 <1.0
CG-136-WT/CG-136-40 (<0.05)
K21 <1.0
MW-5
B1 <0.2/—
MW-1
ECS15 <2
ECS16 <2
ECS17 <2
ECS19
B5 <0.2/<1
ECS20
ECS21 <2
ECS22 <2
ECS23
ECS24 <2
ECS25 <2
ECS26 <2
MW-8
ECS14 <2
ECS18 <2
ECS37
K23 <20
ECS36
MW-2
B2 <1/—
ECS9 <2
ECS32
ECS47
ECS40
ECS39
ECS30
ECS28
ECS38
MW-6
ECS27 <2
ECS13 <2
ECS12 <2
ECS11 <2
B3 <1/—
ECS10 <2
MW-3
CG-137-WT/CG-137-40 (<0.05)
ECS8 <2
ECS7 <2
ECS33
ECS6 <2
K22 <20
MW-4
ECS5
B4 <1/—
ECS4 <2
ECS3 <2
ECS2 <2
MW-7
ECS1 <2
59001-GW1
0 80
APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
<2 TETRACHLOROETHENE (PCE) CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (33' to 37')
<1/— PCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (30'-34'/34'-38')
<1.0 PCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (31'-33')
(136) PCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL PSC SAMPLE INTERVALS (30' to 40')
— NOT SAMPLED
DRAFT
N
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975 5th Avenue Northwest Issaquah, WA 98027
FIGURE 4.2i
PCE CONCENTRATIONS SHALLOW SAMPLE INTERVAL INTERVAL (30'-40' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004

ORCAS
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
OTTER MOON MOTOR WORKS
MEAD BUILDING
BLASER DIE CASTING
CAPITAL CONTAINER YARD
K19
47.3
CG-136-WT/CG-136-40
{1.75}
MW-5
B1
MW-1
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
ECS15
120
ECS16
120
ECS17
<2
ECS14
3
ECS13
<2
ECS12
<2
ECS11
15
B3
MW-3
ECS10
<2
ECS18
5
K23
ECS19
B5
ECS20
ECS21
<2
ECS22
<2
ECS23
48
ECS24
<2
ECS25
2
MW-8
ECS26
4
ECS37
ECS36
MW-2
B2
1.7/--
ECS9
5
CG-137-WT/CG-137-40
ECS8
<2
(<1)
ECS7
69
ECS33
ECS6
27
122
MW-4
ECS5
B4
ECS4
6
ECS3
28
ECS2
5
MW-7
ECS1
<2
ECS32
ECS41
ECS40
ECS39
ECS30
MW-6
ECS28
ECS38
ECS27
<2
59001-GW1
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
0
80
APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
5 (cis) 1,2-DICHLOROETHENE (1,2-DCE) CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (33' to 37')
<1/-- (cis) 1,2-DCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (30'-34'/34'-38')
47.3 (cis) 1,2-DCE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (31' to 33')
{1.75} (cis) 1,2-DCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL PSC SAMPLE INTERVALS (30' to 40')
— NOT SAMPLED
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N
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Issaquah, WA 98027
FIGURE 4.2f
(cis) 1,2-DCE CONCENTRATIONS
SHALLOW SAMPLE INTERVAL
INTERVAL (30'-40' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004

FIGURE 4.j
VINYL CHLORIDE CONCENTRATIONS WATER TABLE SAMPLE INTERVAL INTERVAL (10'-20' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004

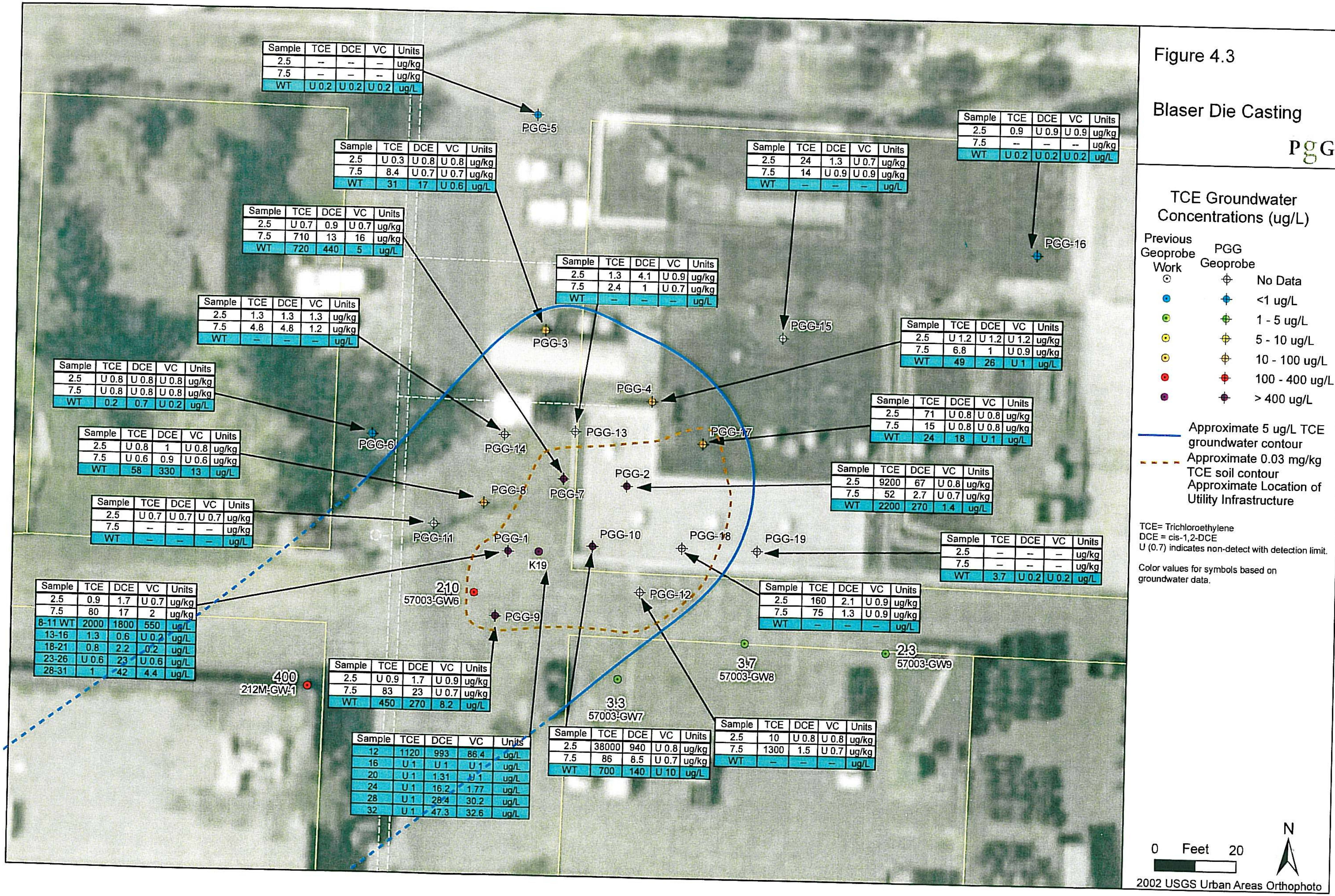

ORCAS
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
OTTER MOON MOTOR WORKS
MEAD BUILDING
BLASER DIE CASTING
CAPITAL CONTAINER YARD
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
0
80
APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
<2 VINYL CHLORIDE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (21' to 25')
17/52/110 VINYL CHLORIDE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (16'-22'/22'-26'/26'-30')
<1/1.77/30.2 VINYL CHLORIDE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (19'-20'/22'-25'/27'-29')
--- NOT SAMPLED
DRAFT
N
FARALLON CONSULTING
975 5th Avenue Northwest
Issaquah, WA 98027
FIGURE 4.2k
VINYL CHLORIDE CONCENTRATIONS
SHALLOW SAMPLE INTERVAL
INTERVAL (20'-30' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004


ORCAS
1st AVENUE SOUTH
2nd AVENUE SOUTH
3rd AVENUE SOUTH
4th AVENUE SOUTH
SOUTH MEAD STREET
SOUTH FIDALGO STREET
OTTER MOON MOTOR WORKS
MEAD BUILDING
BLASER DIE CASTING
CAPITAL CONTAINER YARD
PLANT 5
PLANT 1
PLANT 2
PLANT 3
PLANT 4
FORMER ART BRASS
OFFICE
OLYMPIC MEDICAL
WAREHOUSE
MOBILE CRANE COMPANY
ALLIED SECURITY
K19 32.6
CG-136-WT/CG-136-40 (63.20)
K21 19
MW-5
B1 0.74/--
MW-1
ECS15 260
ECS16 220
ECS17 41
ECS19
B5 70/210
ECS20
ECS21 16
ECS22 <2
ECS23 45
ECS24 5
ECS25 14
ECS26 5
MW-8
ECS18 170
ECS37
ECS14 780
K23 597
ECS36
MW-2
B2 92/--
ECS9 62
ECS32
ECS47
ECS40
ECS39
ECS30
ECS28
ECS38
MW-6
ECS27 6
ECS13 <2
ECS12 330
ECS11 110
B3 120/--
ECS10 120
MW-3
CG-137-WT/CG-137-40 (33.95)
ECS8 22
ECS7 1.0
ECS6 11
K22
ECS33
MW-4
ECS5
B4 140/--
ECS4 20
ECS3 11
ECS2 24
MW-7
ECS1 5
59001-GW1
0 80
APPROXIMATE SCALE IN FEET
LEGEND
PROPERTY BOUNDARY
ECS32 DIRECT-PUSH BORING BY ENVIRONMENTAL CONSULTING SERVICES (ECS) (2004-2005)
B4 DIRECT-PUSH BORING BY FARALLON BORING LOCATION-PLANT 2 (JANUARY 2006)
MW-8 MONITORING WELL BY FARALLON (FEBRUARY 2006)
CG-136-WT/CG-136-40 MONITORING WELL BY PHILIP SERVICES CORPORATION (PSC) (2002)
K19 DIRECT-PUSH SOIL BORING BY PSC (2000-2003)
ALL ANALYTICAL RESULTS IN MICROGRAMS PER LITER
5 VINYL CHLORIDE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE ECS SAMPLE INTERVALS (33' to 37')
140/-- VINYL CHLORIDE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE FARALLON SAMPLE INTERVALS (30'-34'/34'-38')
32.6 VINYL CHLORIDE CONCENTRATIONS IN RECONNAISSANCE GROUNDWATER SAMPLE PSC SAMPLE INTERVALS (31'-33')
(63.20) PCE CONCENTRATIONS IN GROUNDWATER MONITORING WELL PSC SAMPLE INTERVALS (30' to 40')
-- NOT SAMPLED
DRAFT
N
FARALLON CONSULTING
975 5th Avenue Northwest Issaquah, WA 98027
FIGURE 4.2I
VINYL CHLORIDE CONCENTRATIONS SHALLOW SAMPLE INTERVAL INTERVAL (30'-40' bgs)
CAPITAL INDUSTRIES, INC.
SEATTLE, WASHINGTON
FARALLON PN: 457-004
Drawn By: DEW
Checked By: TC
Date: 10/30/07
Disk Reference: 457004

Figure 4.3

Blaser Die Casting

PgG



Sample	TCE	DCE	VC	Units
2.5	--	--	--	ug/kg
7.5	--	--	--	ug/kg
WT	U 0.2	U 0.2	U 0.2	ug/L

Sample	TCE	DCE	VC	Units
2.5	U 0.3	U 0.8	U 0.8	ug/kg
7.5	8.4	U 0.7	U 0.7	ug/kg
WT	31	17	U 0.6	ug/L

Sample	TCE	DCE	VC	Units
2.5	U 0.7	0.9	U 0.7	ug/kg
7.5	710	13	16	ug/kg
WT	720	440	5	ug/L

Sample	TCE	DCE	VC	Units
2.5	1.3	4.1	U 0.9	ug/kg
7.5	2.4	1	U 0.7	ug/kg
WT	--	--	--	ug/L

Sample	TCE	DCE	VC	Units
2.5	1.3	1.3	1.3	ug/kg
7.5	4.8	4.8	1.2	ug/kg
WT	--	--	--	ug/L

Sample	TCE	DCE	VC	Units
2.5	U 0.8	U 0.8	U 0.8	ug/kg
7.5	U 0.8	U 0.8	U 0.8	ug/kg
WT	0.2	0.7	U 0.2	ug/L

Sample	TCE	DCE	VC	Units
2.5	U 0.8	1	U 0.8	ug/kg
7.5	U 0.6	0.9	U 0.6	ug/kg
WT	58	330	13	ug/L

Sample	TCE	DCE	VC	Units
2.5	U 0.7	U 0.7	U 0.7	ug/kg
7.5	--	--	--	ug/kg
WT	--	--	--	ug/L

Sample	TCE	DCE	VC	Units
2.5	0.9	1.7	U 0.7	ug/kg
7.5	80	17	2	ug/kg
8-11 WT	2000	1800	550	ug/L
13-16	1.3	0.6	U 0.2	ug/L
18-21	0.8	2.2	0.2	ug/L
23-26	U 0.6	23	U 0.6	ug/L
28-31	1	42	4.4	ug/L

Sample	TCE	DCE	VC	Units
2.5	U 0.9	1.7	U 0.9	ug/kg
7.5	83	23	U 0.7	ug/kg
WT	450	270	8.2	ug/L

Sample	TCE	DCE	VC	Units
12	1120	993	86.4	ug/L
16	U 1	U 1	U 1	ug/L
20	U 1	1.31	U 1	ug/L
24	U 1	16.2	1.77	ug/L
28	U 1	28.4	30.2	ug/L
32	U 1	47.3	32.6	ug/L

Sample	TCE	DCE	VC	Units
2.5	38000	940	U 0.8	ug/kg
7.5	86	8.5	U 0.7	ug/kg
WT	700	140	U 10	ug/L

Sample	TCE	DCE	VC	Units
2.5	10	U 0.8	U 0.8	ug/kg
7.5	1300	1.5	U 0.7	ug/kg
WT	--	--	--	ug/L

Sample	TCE	DCE	VC	Units
2.5	160	2.1	U 0.9	ug/kg
7.5	75	1.3	U 0.9	ug/kg
WT	--	--	--	ug/L

Sample	TCE	DCE	VC	Units
2.5	--	--	--	ug/kg
7.5	--	--	--	ug/kg
WT	3.7	U 0.2	U 0.2	ug/L

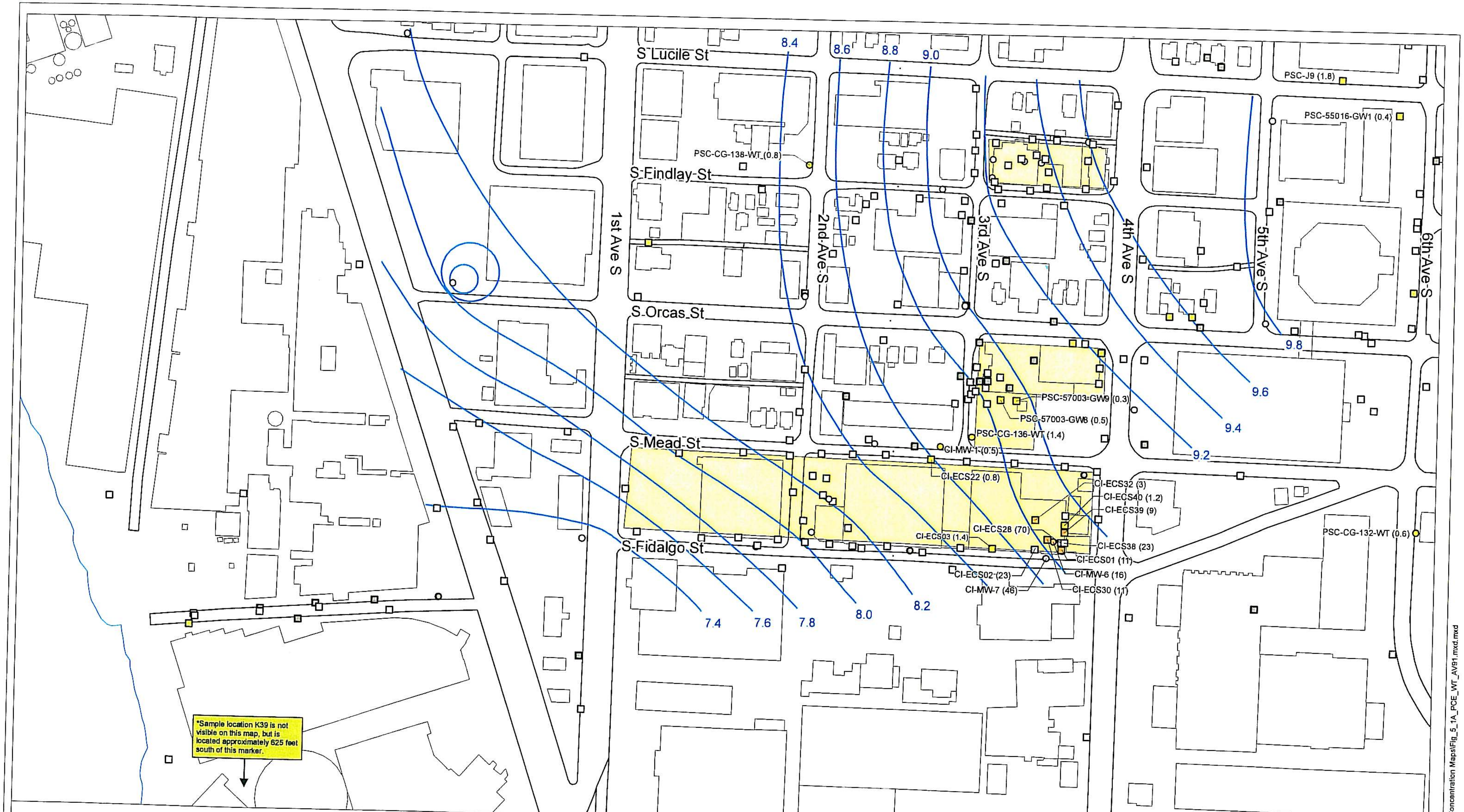
Sample	TCE	DCE	VC	Units
2.5	9200	67	U 0.8	ug/kg
7.5	52	2.7	U 0.7	ug/kg
WT	2200	270	1.4	ug/L

Sample	TCE	DCE	VC	Units
2.5	71	U 0.8	U 0.8	ug/kg
7.5	15	U 0.8	U 0.8	ug/kg
WT	24	18	U 1	ug/L

Sample	TCE	DCE	VC	Units
2.5	U 1.2	U 1.2	U 1.2	ug/kg
7.5	6.8	1	U 0.9	ug/kg
WT	49	26	U 1	ug/L

Sample	TCE	DCE	VC	Units
2.5	24	1.3	U 0.7	ug/kg
7.5	14	U 0.9	U 0.9	ug/kg
WT	--	--	--	ug/L

Sample	TCE	DCE	VC	Units
2.5	0.9	U 0.9	U 0.9	ug/kg
7.5	--	--	--	ug/kg
WT	U 0.2	U 0.2	U 0.2	ug/L



Legend

Direct Push (ug/L)
- > 0 - 0.2
- 0.2 - 2
- 2 - 20
- 20 - 200
- > 200

Monitoring Well (ug/L)
- > 0 - 0.2
- 0.2 - 2
- 2 - 20
- 20 - 200
- > 200

Not Detected - Detection Limit > Screening Level
- Direct Push
- Monitoring Well

Not Detected - Detection Limit <= Screening Level
- Direct Push
- Monitoring Well

- Shoreline
- Roads
- Buildings
- West of 4th Group Properties
- Water Table GW Contour

0 100 200 400 Feet

Notes

Screening Level: Tetrachloroethylene = 0.2 ug/L

This screening level was based on Philip Services Corporation's cleanup level and is based on the protection of indoor air and surface water.

Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

Tetrachloroethylene - Water Table

Figure 5.1 A

West of 4th Group Georgetown
August 2007

W4
Work Group

Legend

Monitoring Wells (ug/L)
- > 0 - 0.2
- 0.2 - 2
- 2 - 20
- 20 - 200
- > 200

Direct Push (ug/L)
- > 0 - 0.2
- 0.2 - 2
- 2 - 20
- 20 - 200
- > 200

Not Detected - Detection Limit > Screening Level
- Direct Push
- Monitoring Well

Not Detected - Detection Limit <= Screening Level
- Direct Push
- Monitoring Well

- Shoreline
- Roads
- Buildings
- West of 4th Group Properties
- Shallow GW Contour

N W E S

0 100 200 400 Feet

Notes

Screening Level: Tetrachloroethylene = 0.2 ug/L

This screening level was provided by the West of 4th Group and is based on the protection of surface water.

Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

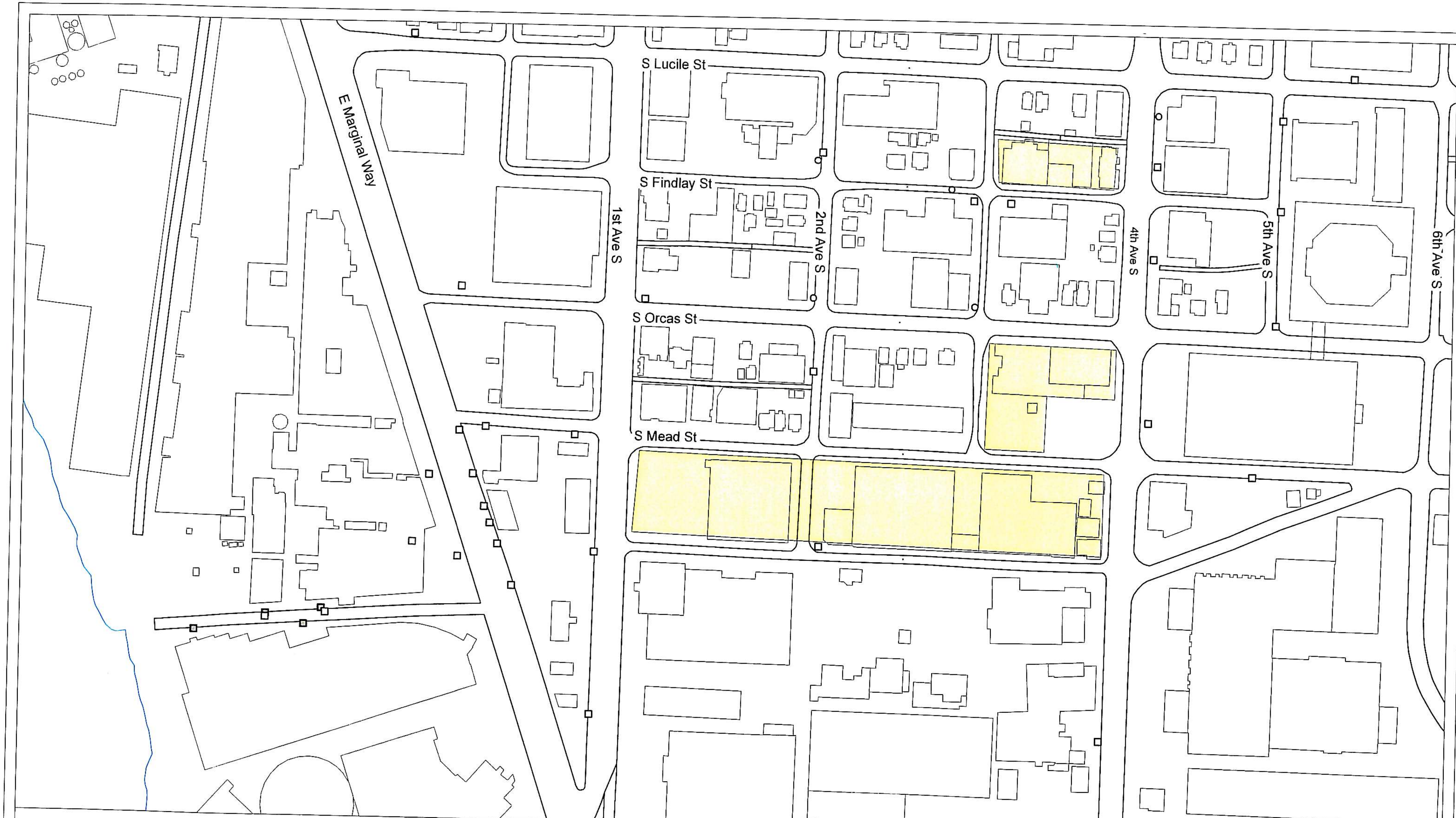
Tetrachloroethylene - Shallow

Figure 5.1 B

West of 4th Group Georgetown
August 2007

W4
Work Group

T:\projects_8\artbrass\Westof4thGroup\GIS\Concentration Maps\Fig_5_1B_PCE_Shal_AV91.mxd



Legend

Monitoring Wells (ug/L)
- > 0 - 0.2
- 0.2 - 2
- 2 - 20
- 20 - 200
- > 200

Direct Push (ug/L)
- > 0 - 0.2
- 0.2 - 2
- 2 - 20
- 20 - 200
- > 200

Not Detected - Detection Limit > Screening Level
- Direct Push
- Monitoring Well

Not Detected - Detection Limit <= Screening Level
- Direct Push
- Monitoring Well

- Shoreline
- Roads
- Buildings
- West of 4th Group Properties

0 100 200 400 Feet

Notes

Screening Level: Tetrachloroethylene = 0.2 ug/L

This screening level was provided by the West of 4th Group and is based on the protection of surface water.

Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ()

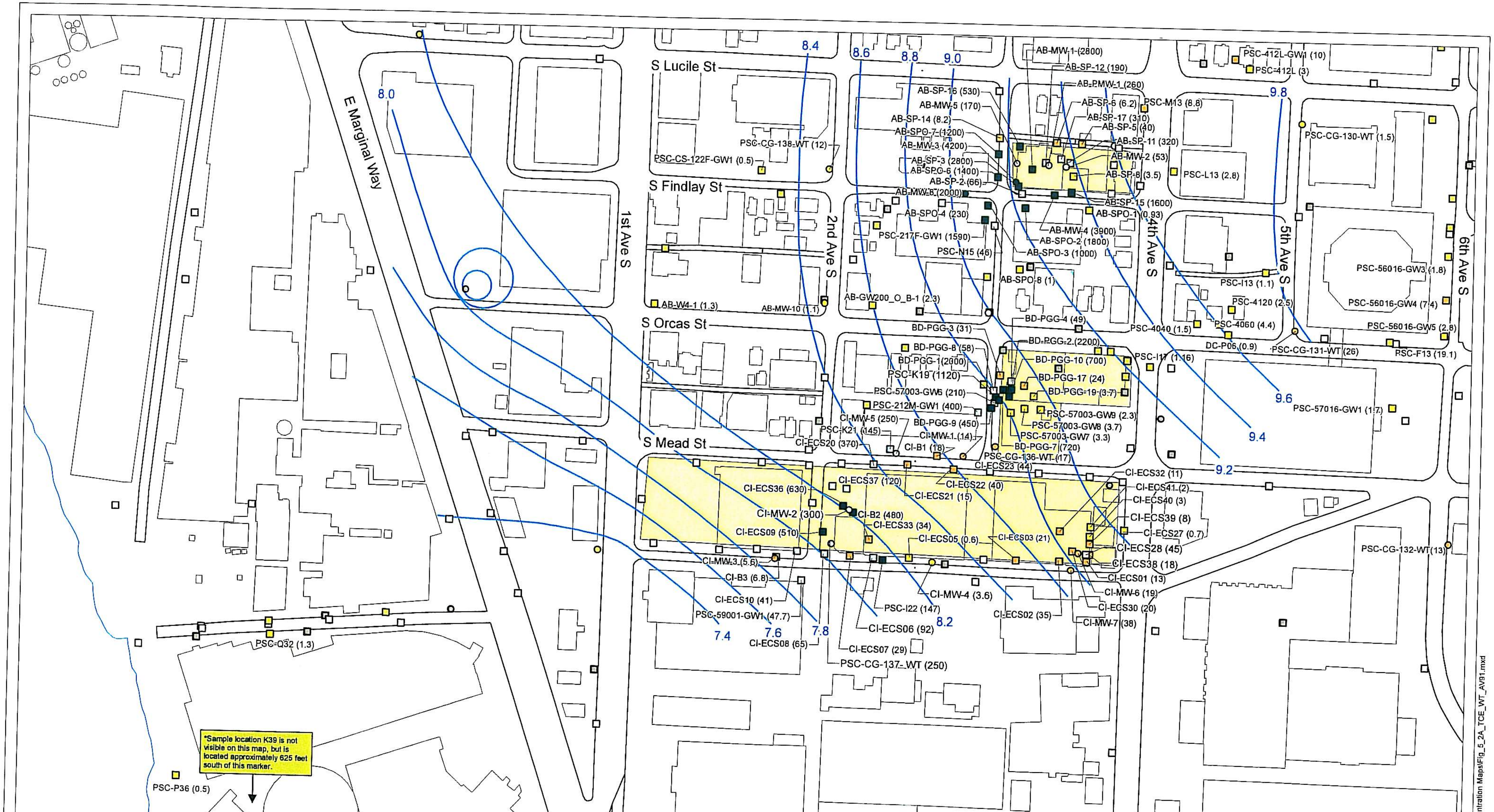
Tetrachloroethylene - Intermediate

Figure 5.1 C

West of 4th Group Georgetown
August 2007

W4
Work Group

T:\projects_B\arbrass\Westof4thGroup\GIS\Concentration Maps\Fig_5_1C_PCE_Int_AV91.mxd



Legend

Monitoring Wells (ug/L)
- > 0 - 0.4
- 0.4 - 4
- 4 - 40
- 40 - 400
- 400 - 5700

Direct Push (ug/L)
- > 0 - 0.4
- 0.4 - 4
- 4 - 40
- 40 - 400
- 400 - 5700

Not Detected - Detection Limit > Screening Level
- Direct Push
- Monitoring Well

Not Detected - Detection Limit <= Screening Level
- Direct Push
- Monitoring Well

- Shoreline
- Roads
- Buildings
- West of 4th Group Properties
- Water Table GW Contour

0 100 200 400 Feet

Notes

Screening Level: Trichloroethylene = 0.4 ug/L

This screening level was based on Philip Services Corporation's cleanup level and is based on the protection of indoor air and surface water.

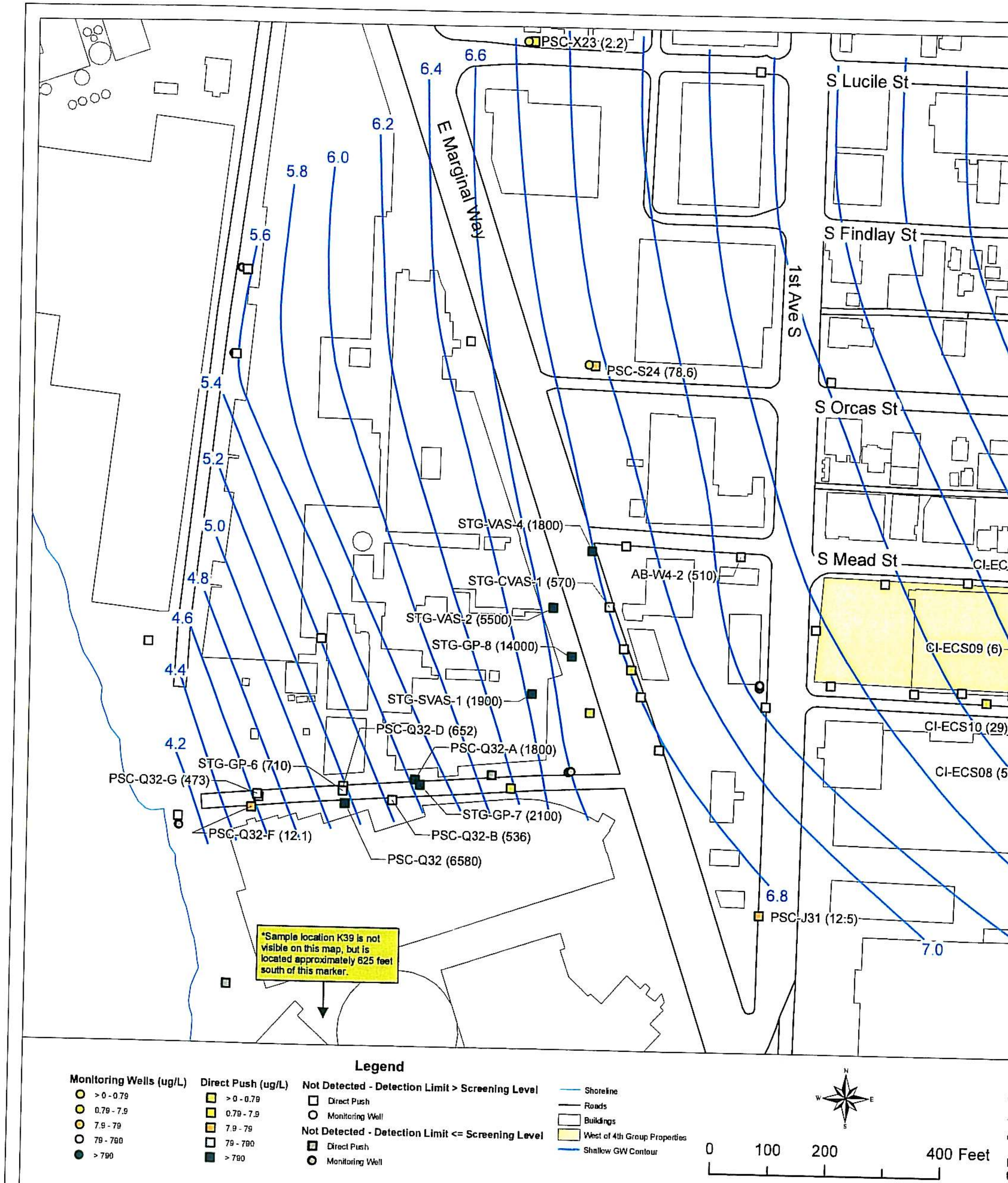
Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

Trichloroethylene - Water Table **Figure 5.2 A**

West of 4th Group Georgetown
August 2007

W4
Work Group

T:\projects_8\artbrass\Westof4thGroup\GIS\Concentration Maps\Fig_5_2A_TCE_WT_AV91.mxd



Notes

Screening Level: Trichloroethylene = 0.79 ug/L

This screening level is based on Philip Services Corporation's cleanup level and is based on the protection of surface water.

Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

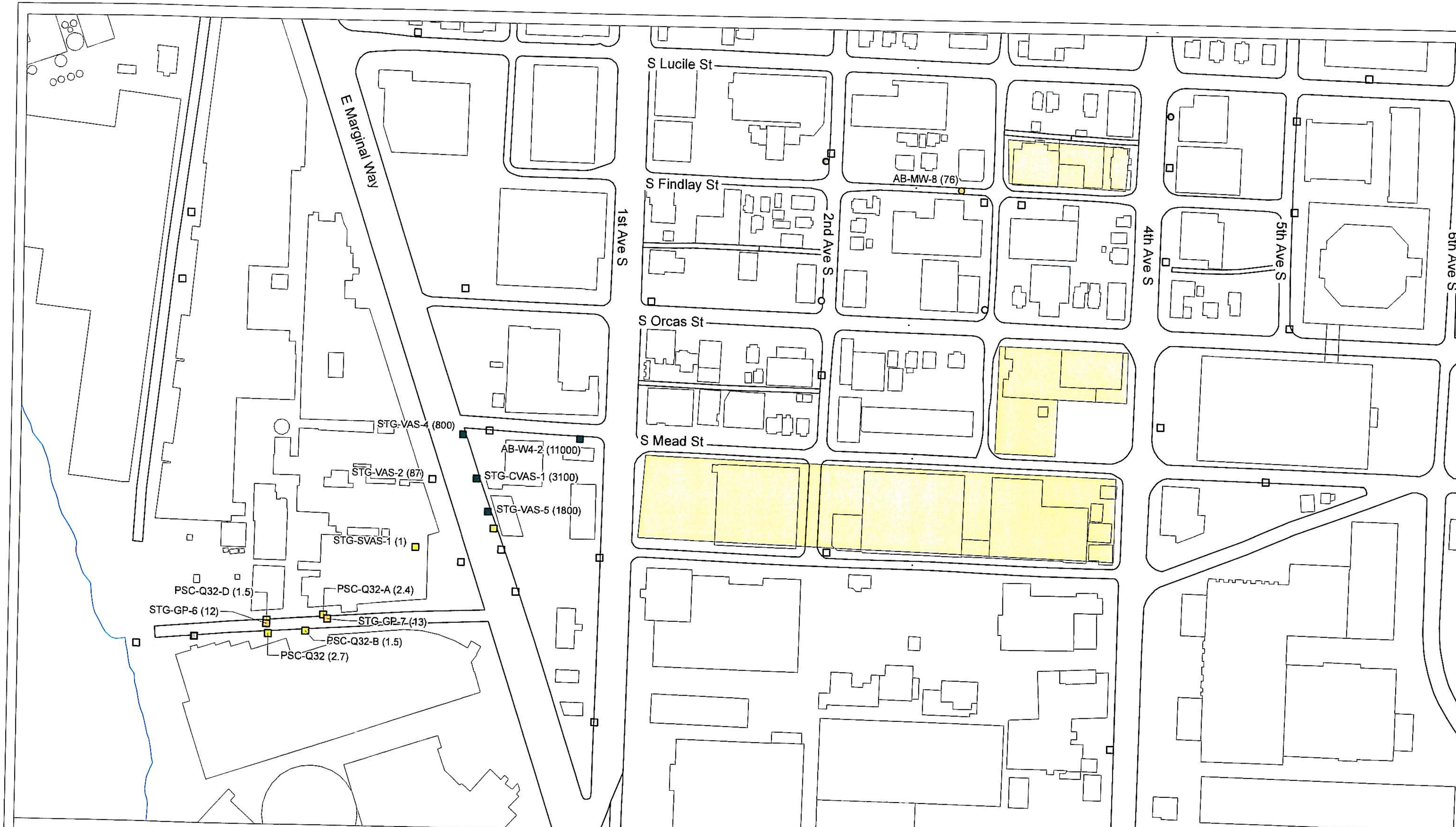
Trichloroethylene - Shallow

Figure 5.2 B

West of 4th Group Georgetown
August 2007

W4
Work Group

T:\projects_8\artbrass\Westof4thGroup\GIS\Concentration Maps\Fig_5_2B_TCE_Shal_AV91.mxd



Legend

Monitoring Wells (ug/L)
- > 0 - 0.79
- 0.79 - 7.9
- 7.9 - 79
- 79 - 790
- > 790

Direct Push (ug/L)
- > 0 - 0.79
- 0.79 - 7.9
- 7.9 - 79
- 79 - 790
- > 790

Not Detected - Detection Limit > Screening Level
- Direct Push
- Monitoring Well

Not Detected - Detection Limit <= Screening Level
- Direct Push
- Monitoring Well

- Shoreline
- Roads
- Buildings
- West of 4th Group Properties

Notes

Screening Level: Trichloroethylene = 0.79 ug/L

This screening level was provided by the West of 4th Group and is based on the protection of surface water.

Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

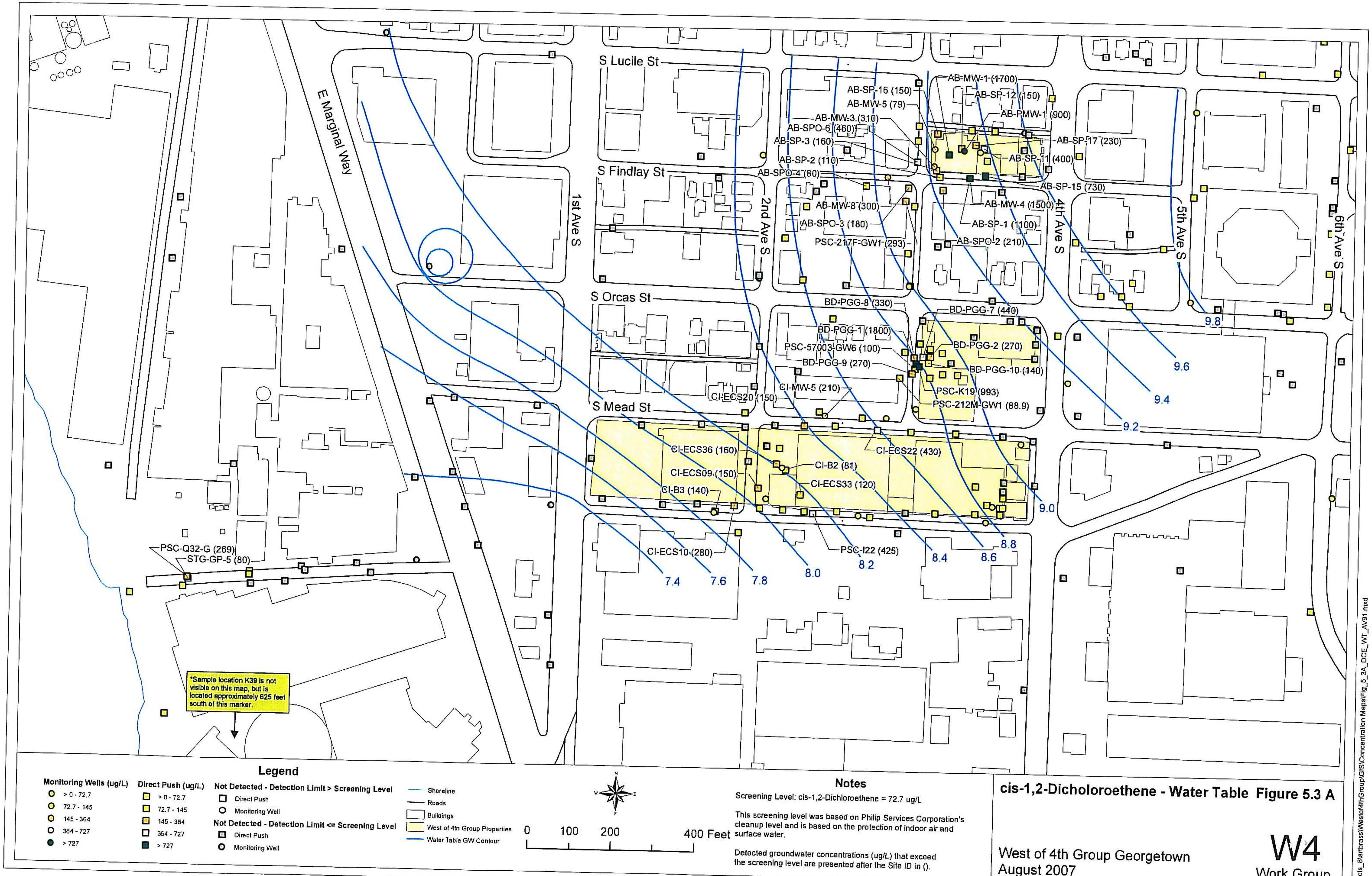
Trichloroethylene - Intermediate

Figure 5.2 C

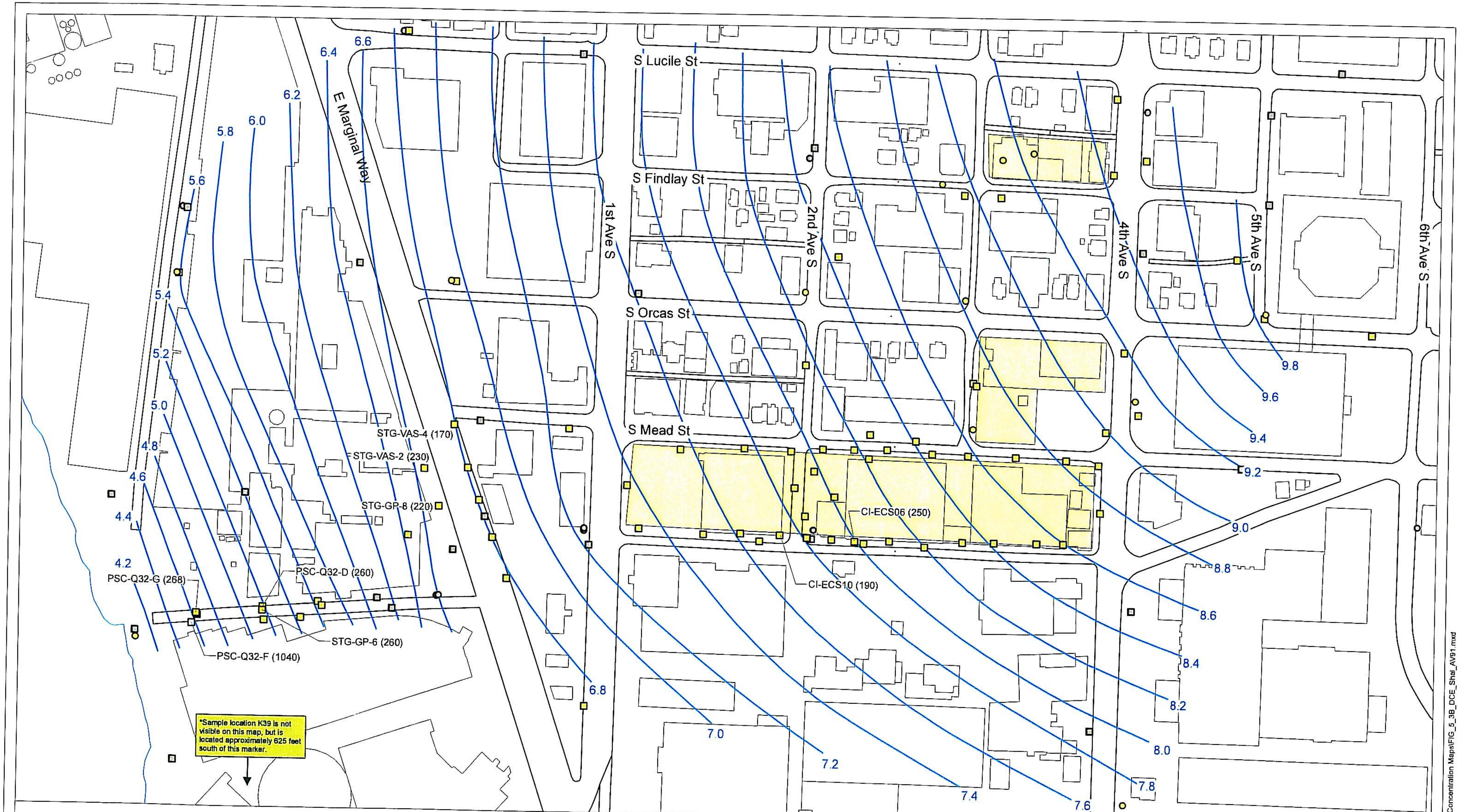
West of 4th Group Georgetown
August 2007

W4
Work Group

T:\projects_8\artbrass\West of 4th Group\GIS\Concentration Maps\Fig_5_2C_TCE_Int_AV91.mxd



S Lucile St
S Findlay St
S Orcas St
S Mead St
E Marginal Way
1st Ave S
2nd Ave S
4th Ave S
5th Ave S
6th Ave S
AB-MW-1 (1700)
AB-SP-16 (150)
AB-SP-12 (150)
AB-MW-5 (79)
AB-PMW-1 (900)
AB-MW-3 (310)
AB-SPO-6 (460)
AB-SP-3 (160)
AB-SP-17 (230)
AB-SP-2 (110)
AB-SP-11 (400)
AB-SPO-4 (80)
AB-SP-15 (730)
AB-MW-8 (300)
AB-MW-4 (1500)
AB-SPO-3 (180)
AB-SP-1 (1100)
PSC-217F-GW1 (293)
AB-SPO-2 (210)
BD-PGG-8 (330)
BD-PGG-7 (440)
BD-PGG-1 (1800)
BD-PGG-2 (270)
PSC-57003-GW6 (100)
BD-PGG-9 (270)
BD-PGG-10 (140)
CI-MW-5 (210)
PSC-K19 (993)
CI-ECS20 (150)
PSC-212M-GW1 (88.9)
CI-ECS36 (160)
CI-ECS22 (430)
CI-B2 (81)
CI-ECS09 (150)
CI-ECS33 (120)
CI-B3 (140)
PSC-I22 (425)
CI-ECS10 (280)
PSC-Q32-G (269)
STG-GP-5 (80)
9.8
9.6
9.4
9.2
9.0
8.8
8.6
8.4
8.2
8.0
7.8
7.6
7.4
*Sample location K39 is not visible on this map, but is located approximately 625 feet south of this marker.
Legend
Monitoring Wells (ug/L)
> 0 - 72.7
72.7 - 145
145 - 364
364 - 727
> 727
Direct Push (ug/L)
> 0 - 72.7
72.7 - 145
145 - 364
364 - 727
> 727
Not Detected - Detection Limit > Screening Level
Direct Push
Monitoring Well
Not Detected - Detection Limit <= Screening Level
Direct Push
Monitoring Well
Shoreline
Roads
Buildings
West of 4th Group Properties
Water Table GW Contour
N
S
E
W
0
100
200
400 Feet
Notes
Screening Level: cis-1,2-Dichloroethene = 72.7 ug/L
This screening level was based on Philip Services Corporation's cleanup level and is based on the protection of indoor air and surface water.
Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().
cis-1,2-Dicholoroethene - Water Table Figure 5.3 A
West of 4th Group Georgetown
August 2007
W4
Work Group
T:\projects_8\arbrass\West of 4th Group\GIS\Concentration Maps\Fig_5_3A_DCE_WT_AV91.mxd



Legend

Monitoring Wells (ug/L)
- > 0 - 165
- 165 - 330
- 330 - 825
- 825 - 1650
- > 1650

Direct Push (ug/L)
- > 0 - 165
- 165 - 330
- 330 - 825
- 825 - 1650
- > 1650

Not Detected - Detection Limit > Screening Levels
- Direct Push
- Monitoring Well

Not Detected - Detection Limit <= Screening Levels
- Direct Push
- Monitoring Well

- Shoreline
- Roads
- Buildings
- West of 4th Group Properties
- Shallow GW Contour

0 100 200 400 Feet

Notes

Screening Level: cis-1,2-Dichloroethene = 165 ug/L

This screening level was provided by the West of 4th Group and is based on the protection of surface water.

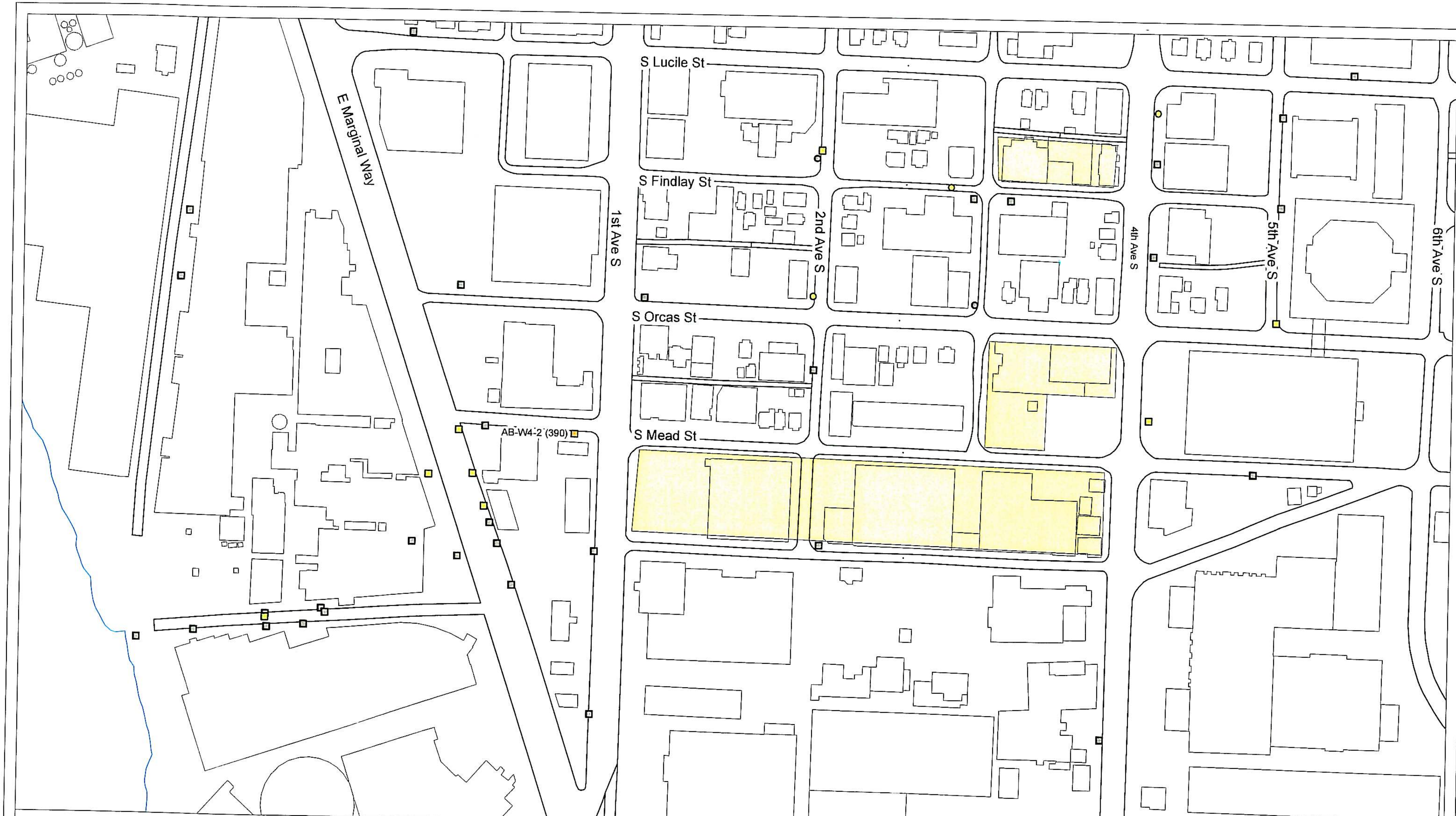
Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

cis-1,2-Dichloroethene - Shallow

Figure 5.3 B

West of 4th Group Georgetown
August 2007

W4
Work Group



Legend

Monitoring Wells (ug/L)
- > 0 - 165
- 165 - 330
- 330 - 825
- 825 - 1280
- > 1280

Direct Push (ug/L)
- > 0 - 165
- 165 - 330
- 330 - 825
- 825 - 1280
- > 1280

Not Detected - Detection Limit > Screening Level
- Direct Push
- Monitoring Well

Not Detected - Detection Limit <= Screening Level
- Direct Push
- Monitoring Well

- Shoreline
- Roads
- Buildings
- West of 4th Group Properties

0 100 200 400 Feet

Notes

Screening Level: cis-1,2-Dichloroethene = 165 ug/L

This screening level was provided by the West of 4th Group and is based on the protection of surface water.

Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

cis-1,2-Dichloroethene - Intermediate **Figure 5.3 C**

West of 4th Group Georgetown
August 2007

W4
Work Group

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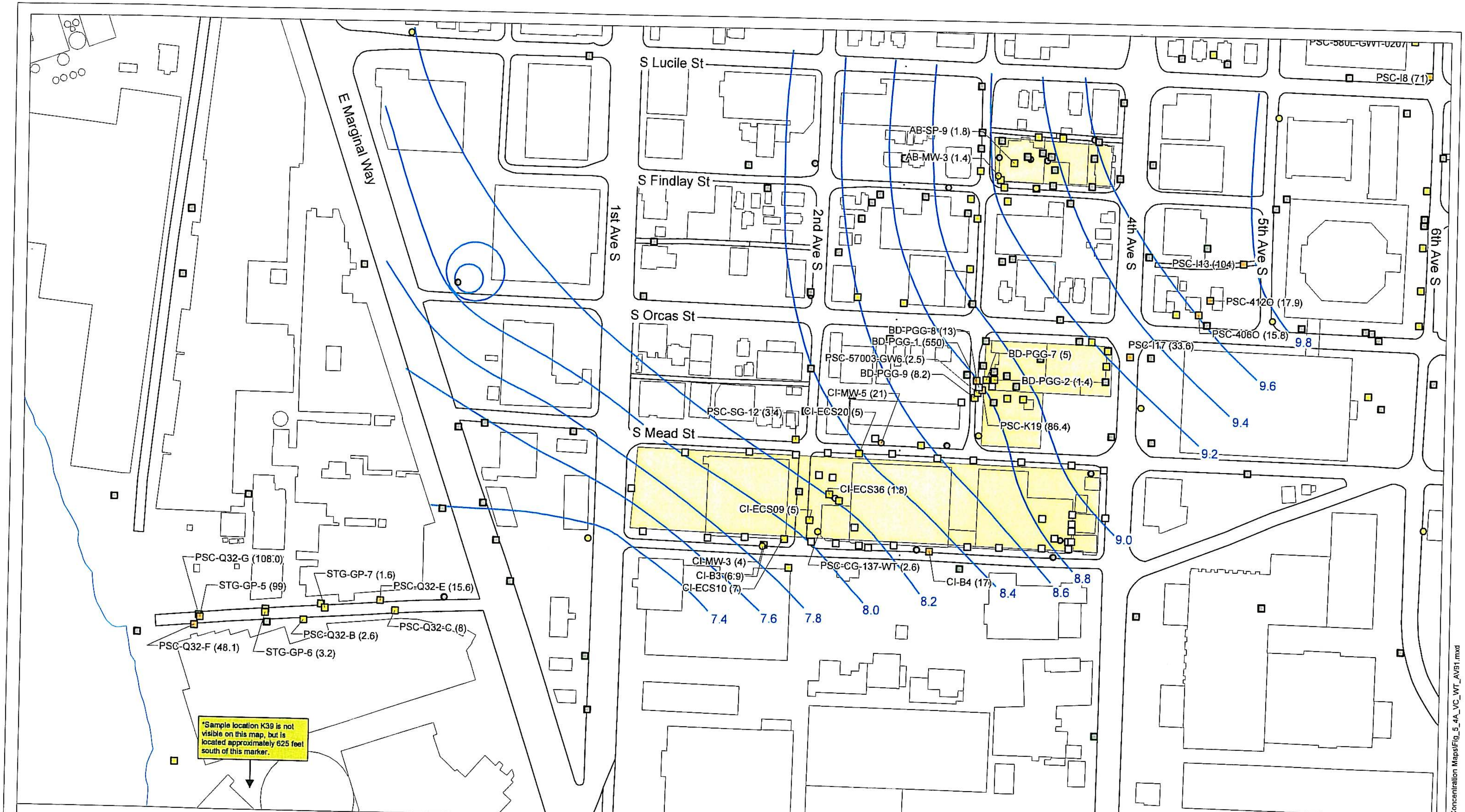

Legend

Monitoring Wells (ug/L)
- > 0 - 1.28
- 1.28 - 12.8
- 12.8 - 128
- 128 - 1280
- > 1280

Direct Push (ug/L)
- > 0 - 1.28
- 1.28 - 12.8
- 12.8 - 128
- 128 - 1280
- > 1280

Not Detected - Detection Limit > Screening Level
- Direct Push
- Monitoring Well

Not Detected - Detection Limit <= Screening Level
- Direct Push
- Monitoring Well

- Shoreline
- Roads
- Buildings
- West of 4th Group Properties
- Water Table GW Contour

0 100 200 400 Feet

Notes

Screening Level: Vinyl Chloride = 1.28 ug/L

This screening level was based on Philip Services Corporation's cleanup levels and is based on the protection of indoor air and surface water.

Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

Vinyl Chloride - Water Table

Figure 5.4 A

West of 4th Group Georgetown
August 2007

W4
Work Group

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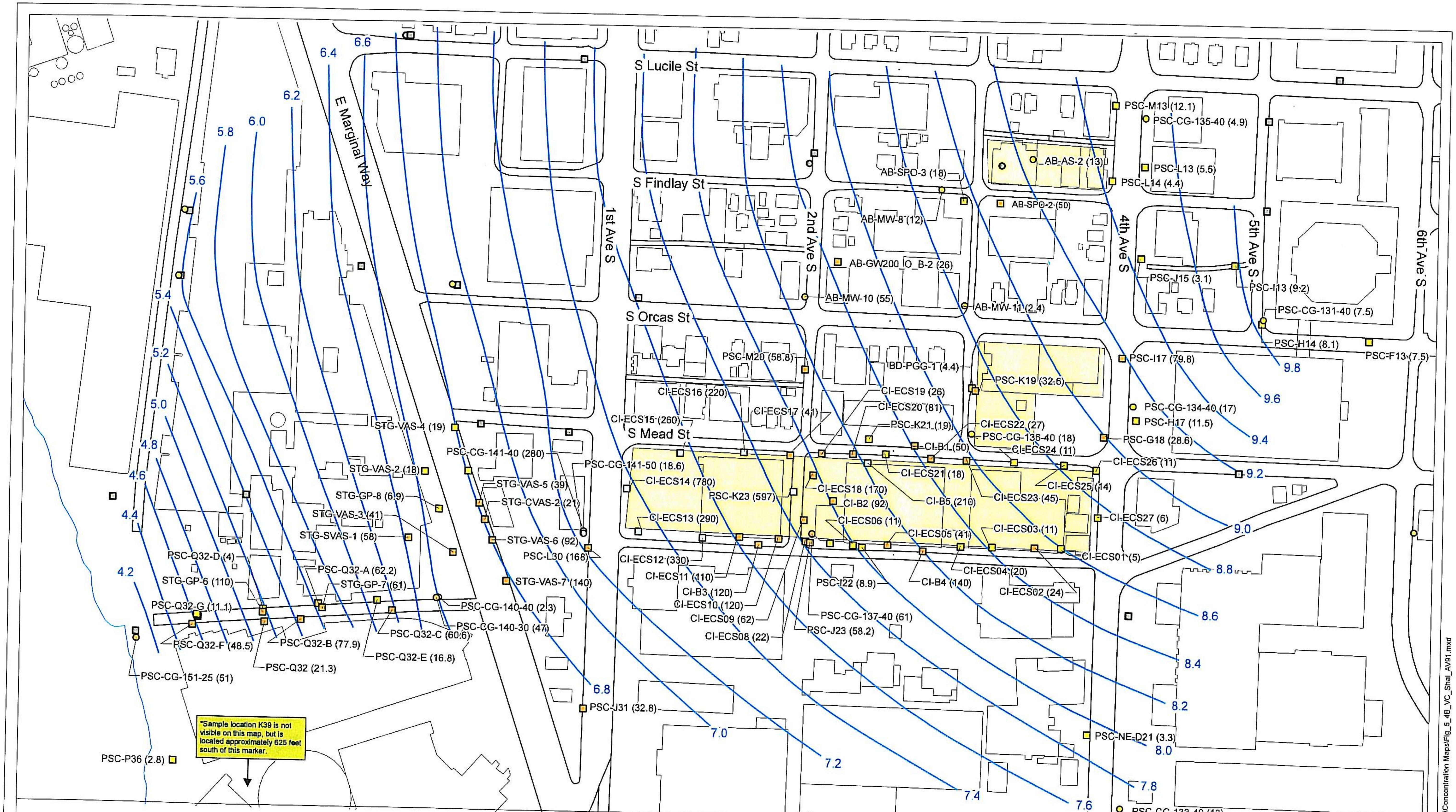


Legend

Monitoring Wells (ug/L)
- > 0 - 2.04
- 2.04 - 20.4
- 20.4 - 204
- 204 - 2040
- > 2040

Direct Push (ug/L)
- > 0 - 2.04
- 2.04 - 20.4
- 20.4 - 204
- 204 - 2040
- > 2040

Not Detected - Detection Limit > Screening Level
- Direct Push

Not Detected - Detection Limit <= Screening Level
- Direct Push
- Monitoring Well

- Shoreline
- Roads
- Buildings
- West of 4th Group Properties
- Shallow GW Contour

0 100 200 400 Feet

Notes

Screening Level: Vinyl Chloride = 2.04 ug/L

This screening level was provided by the West of 4th Group and is based on the protection of surface water.

Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

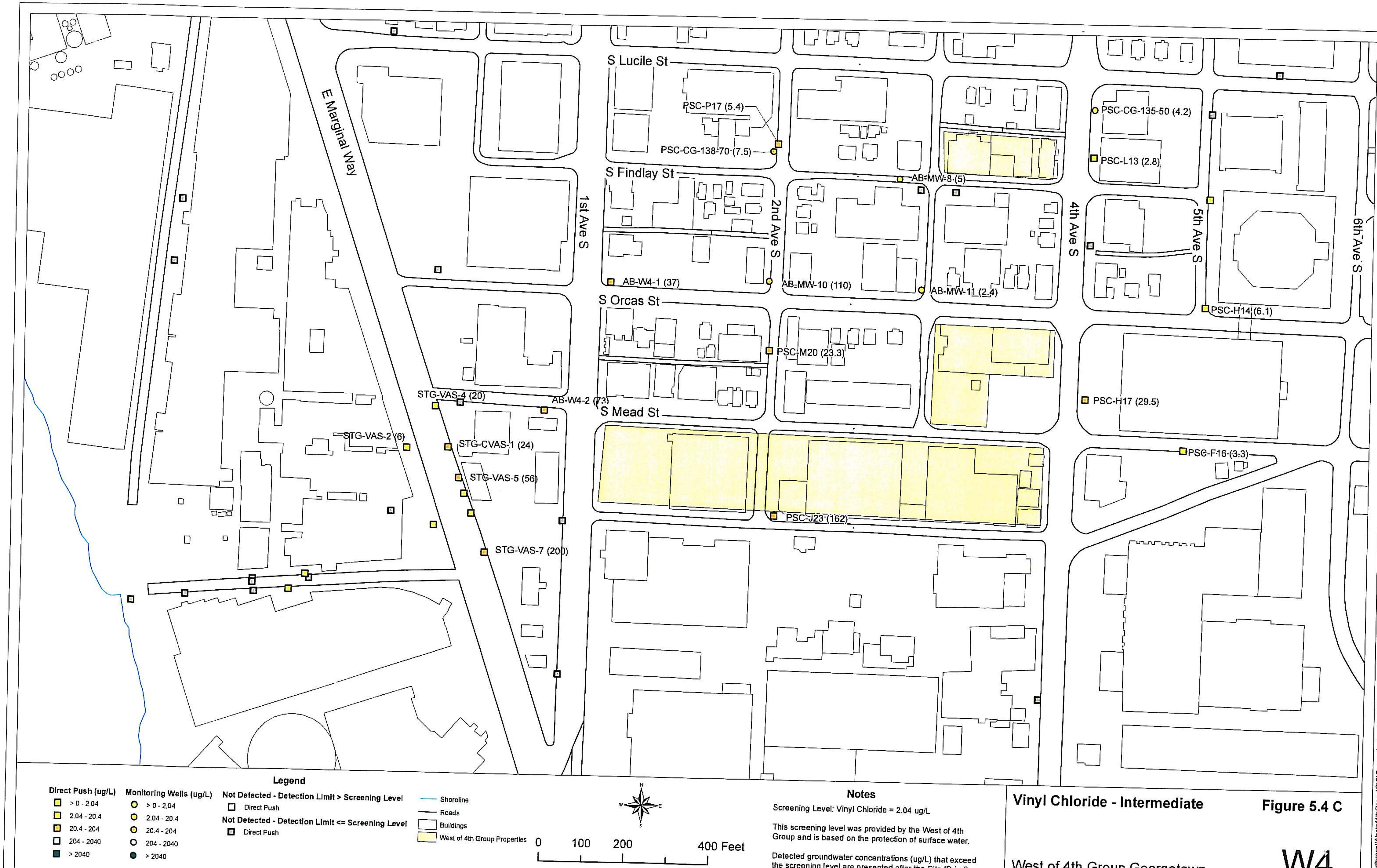
Vinyl Chloride - Shallow

Figure 5.4 B

West of 4th Group Georgetown
August 2007

W4
Work Group

T:\projects_8\artbrass\West of 4th Group\GIS\Concentration Maps\Fig_5_4B_VC_Shal_AV91.mxd



Notes

Screening Level: Vinyl Chloride = 2.04 ug/L

This screening level was provided by the West of 4th Group and is based on the protection of surface water.

Detected groundwater concentrations (ug/L) that exceed the screening level are presented after the Site ID in ().

Vinyl Chloride - Intermediate

Figure 5.4 C

West of 4th Group Georgetown
August 2007

W4
Work Group

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TABLES

DATA SUMMARY REPORT
West of 4th Groundwater Investigation Area
Seattle, Washington

Farallon PN: 457-00

Table 1
Water Table Zone Groundwater Screening Levels
West of Fourth Groundwater Investigation,
Seattle, Washington

Constituent	PQL (µg/L)	Groundwater Screening Level (µg/L)	Basis of Groundwater Screening Level
1,1,1-Trichloroethane	5.00E-01	1.10E+01	Ecological RA: ORNL
1,1,2-Trichlorotrifluoroethane	5.00E-01	1.21E+03	Method B - Residential GW to Air
1,1-Dichloroethane	5.00E-01	4.70E+01	Ecological RA: ORNL
1,1-Dichloroethylene	2.00E-02	2.50E+01	Ecological RA: ORNL
1,2,4-Trimethylbenzene	1.00E+00	1.30E+01	Method B - Residential GW to Air
1,2-Dichlorobenzene	5.00E-01	1.40E+01	Ecological RA: ORNL
1,2-Dichloroethane	4.50E-02	1.29E+01	Method B - Residential GW to Air
1,3,5-Trimethylbenzene	1.00E+00	9.76E+00	Method B - Residential GW to Air
1,4-Dichlorobenzene	1.33E-01	2.50E+00	Method B Modified - API Fisher
1,4-Dioxane	1.00E-01	9.49E+01	Method B Modified - API Fisher
1-Methyl naphthalene	2.00E-02	2.10E+00	Ecological RA: ORNL
2-Hexanone	2.00E+01	9.90E+01	Ecological RA: ORNL
2-Methylphenol	5.00E-01	1.30E+01	Ecological RA: ORNL
2,4-Dimethylphenol	2.00E+00	2.85E+01	Method B Modified - API Fisher
2-Methylnaphthalene	2.00E-02	2.10E+00	Ecological RA: ORNL
4-Methylphenol	5.00E-01	1.08E+02	Method B Modified - API Fisher
Aroclor 1016	5.00E-03	5.00E-03	PQL
Aroclor 1232	5.00E-03	5.00E-03	PQL
Arsenic	3.00E-02	5.06E-02	Method B Modified - API Fisher
Barium	5.00E-02	4.00E+00	Ecological RA: ORNL
Benzene	5.00E-01	9.60E+00	Method B - Residential GW to Air
Benzo(a)anthracene	2.00E-02	2.00E-02	PQL
Benzo(b)fluoranthene	1.94E-02	1.94E-02	PQL
Benzo(k)fluoranthene	1.34E-02	1.80E-02	AWQC Human,, Organism Only
Benzoic acid	5.00E+00	4.20E+01	Ecological RA: ORNL
Bis(2-ethylhexyl) phthalate	2.00E+00	2.00E+00	PQL
C10-C12 (EPH) Aromatics	5.00E+01	5.00E+01	PQL
C8-C10 (EPH) Aliphatics	5.00E+01	5.00E+01	PQL
C8-C10 (EPH) Aromatics	5.00E+01	2.75E+02	Method B - Residential GW to Air
C8-C10 (VPH) Aromatics	5.00E+01	2.75E+02	Method B - Residential GW to Air
Carbon disulfide	5.00E-01	9.20E-01	Ecological RA: ORNL
Chlorobenzene	5.00E-01	5.19E+01	Method B - Residential GW to Air
Chloroethane	5.00E-01	4.61E+02	Method B Modified - API Fisher
Chloroform	5.00E-01	4.11E+00	Method B - Residential GW to Air
Chromium	2.00E-01	1.00E+01	Ecological RA: State AWQC
Chrysene	1.24E-02	1.80E-02	AWQC Human,, Organism Only
cis-1,2-Dichloroethylene	5.00E-01	7.27E+01	Method B - Residential GW to Air
Copper	1.00E-01	3.10E+00	Ecological RA: State AWQC
Cumene	6.80E-01	7.30E+00	Ecological RA: ORNL
Cyanide	1.00E+01	1.00E+01	PQL
Dibenzo(a,h)anthracene	1.62E-02	1.62E-02	PQL
Dichlorodifluoromethane	5.00E-01	6.36E+00	Method B - Residential GW to Air
Diesel	1.00E+02	5.00E+02	Method A
Ethylbenzene	5.00E-01	7.30E+00	Ecological RA: ORNL
Gasoline	1.30E+02	8.00E+02	Method A
Hexavalent Chromium	2.00E-01	1.00E+01	Ecological RA: State AWQC
Indeno(1,2,3-cd)pyrene	2.00E-02	2.00E-02	PQL
Iron	2.00E+01	1.00E+03	AWQC Ecological
Lead	2.00E-02	2.50E+00	Ecological RA: State AWQC
Lube Oil Hydrocarbons	--	5.00E+02	Method A
Manganese	5.00E-02	1.00E+02	AWQC Human, Organism Only
Methyl isobutyl ketone (MIBK)	1.80E+01	1.70E+02	Ecological RA: ORNL
Methylene chloride	1.00E+00	3.21E+02	Method B - Residential GW to Air
Methylphenol	5.00E-01	1.65E+03	Ecological RA: AQUIRE
Naphthalene	1.00E+00	1.20E+01	Ecological RA: ORNL
n-Hexane	1.00E+00	1.00E+00	PQL
Nickel	2.00E-01	8.20E+00	Ecological RA: State AWQC
Pentachlorophenol	2.83E-01	2.53E+00	Method B Modified - API Fisher
Phenol	1.96E-01	1.18E+02	Ecological RA: AQUIRE
p-Isopropyltoluene	1.00E+00	7.49E+01	Method B - Residential GW to Air
Propylbenzene	9.80E-01	7.30E+00	Ecological RA: ORNL

Table 1
Water Table Zone Groundwater Screening Levels
West of Fourth Groundwater Investigation,
Seattle, Washington

Constituent	PQL (µg/L)	Groundwater Screening Level (µg/L)	Basis of Groundwater Screening Level
sec-Butylbenzene	1.00E+00	4.59E+00	Method B Modified - API Fisher
Selenium	1.00E+00	5.00E+00	Ecological RA: State AWQC
Styrene	5.00E-01	5.00E-01	PQL
Tetrachloroethylene	2.00E-02	2.02E-01	Method B Modified - API Fisher
Toluene	5.00E-01	9.80E+00	Ecological RA: ORNL
trans-1,2-Dichloroethylene	5.00E-01	6.53E+01	Method B - Residential GW to Air
Trichloroethylene	2.00E-02	4.04E-01	Method B - Residential GW to Air
Vanadium	2.00E-01	2.00E+01	Ecological RA: ORNL
Vinyl chloride	2.00E-02	1.28E+00	Method B - Residential GW to Air
Xylenes (Total)	5.00E-01	1.41E+02	Method B Modified - API Fisher
Zinc	5.00E-01	8.10E+01	Ecological RA: State AWQC

Notes:
-- = No value was available
PQL = Practical Quantitation Limit
RA = Risk Assessment
ORNL = Oak Ridge National Laboratory Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effect:
- available online at http://www esd.ornl gov/programs/ecorisk/ecorisk html and go to screening benchmark reports

MTCA = Model Toxics Control Act
Method A cleanup levels = (WAC 173-340 - Table 720-1)
Method B cleanup levels = (WAC 173-340-705)
Method B - PQL set per WAC 173-340-707
GW = Groundwater
API = Asian Pacific Islander
AWQC = Ambient Water Quality Criteria
AQUIRE = U S EPA AQUIRE Database - available on-line at http://www epa gov/ecotox/
RI = Remedial Investigation
Table Modified from PSC Revised Tech Memo 1, June 2006

Table 2
Shallow Zone Groundwater Screening Levels
West of Fourth Groundwater Investigation,
Seattle, Washington

Constituent	PQL (µg/L)	Groundwater Screening Level (µg/L)	Basis of Groundwater Screening Level
1,1,1-Trichloroethane	5.00E-01	1.10E+01	Ecological RA: ORNL
1,1-Dichloroethane	5.00E-01	4.70E+01	Ecological RA: ORNL
1,1-Dichloroethylene	2.00E-02	2.50E+01	Ecological RA: ORNL
1,2,4-Trimethylbenzene	1.00E+00	7.77E+01	Method B Modified - API Fisher
1,2-Dichloroethane	4.50E-02	3.06E+01	Method B Modified - API Fisher
1,3,5-Trimethylbenzene	1.00E+00	5.57E+01	Method B Modified - API Fisher
1,4-Dioxane	1.00E-01	9.49E+01	Method B Modified - API Fisher
1-Methyl naphthalene	2.00E-02	2.10E+00	Ecological RA: ORNL
2,4-Dimethylphenol	2.00E+00	2.85E+01	Method B Modified - API Fisher
2-Methylnaphthalene	2.00E-02	2.10E+00	Ecological RA: ORNL
2-Methylphenol	5.00E-01	1.30E+01	Ecological RA: ORNL
Arsenic	3.00E-02	5.06E-02	Method B Modified - API Fisher
Barium	5.00E-02	4.00E+00	Ecological RA: ORNL
Benzene	5.00E-01	1.17E+01	Method B Modified - API Fisher
Benzo(a)anthracene	2.00E-02	2.00E-02	PQL
Benzo(b)fluoranthene	1.94E-02	1.94E-02	PQL
Benzo(k)fluoranthene	1.34E-02	1.80E-02	AWQC Human,, Organism Only
Bis(2-ethylhexyl) phthalate	2.00E+00	2.00E+00	PQL
Carbon disulfide	5.00E-01	9.20E-01	Ecological RA: ORNL
Chloroethane	5.00E-01	4.61E+02	Method B Modified - API Fisher
Chromium	2.00E-01	1.00E+01	Ecological RA: State AWQC
Chrysene	1.24E-02	1.80E-02	AWQC Human, Organism Only
cis-1,2-Dichloroethylene	5.00E-01	1.65E+02	Method B Modified - API Fisher
Copper	1.00E-01	3.10E+00	Ecological RA: State AWQC
Cumene	6.80E-01	7.30E+00	Ecological RA: ORNL
Cyanide	1.00E+01	1.00E+01	PQL
Dibenzo(a,h)anthracene	1.62E-02	1.62E-02	PQL
Diesel	1.00E+02	5.00E+02	Method A
Ethylbenzene	5.00E-01	7.30E+00	Ecological RA: ORNL
Gasoline	1.30E+02	8.00E+02	Method A
Hexavalent Chromium	2.00E-01	1.00E+01	Ecological RA: State AWQC
Indeno(1,2,3-cd)pyrene	2.00E-02	2.00E-02	PQL
Iron	2.00E+01	1.00E+03	AWQC Ecological
Lead	2.00E-02	2.50E+00	Ecological RA: State AWQC
Manganese	5.00E-02	1.00E+02	AWQC Human, Organism Only
Methylene chloride	1.00E+00	4.95E+02	Method B Modified - API Fisher
Methyl isobutyl ketone (MIBK)	1.80E+01	1.70E+02	Ecological RA: ORNL
Naphthalene	1.00E+00	1.20E+01	Ecological RA: ORNL
Nickel	2.00E-01	8.20E+00	Ecological RA: State AWQC
Pentachlorophenol	2.83E-01	2.53E+00	Method B Modified - API Fisher
Phenol	1.96E-01	1.18E+02	Ecological RA: AQUIRE
p-Isopropyltoluene	1.00E+00	1.00E+04	Ecological RA: AQUIRE
Propylbenzene	9.80E-01	7.30E+00	Ecological RA: ORNL

Table 2
Shallow Zone Groundwater Screening Levels
West of Fourth Groundwater Investigation,
Seattle, Washington

Constituent	PQL (µg/L)	Groundwater Screening Level (µg/L)	Basis of Groundwater Screening Level
sec-Butylbenzene	1.00E+00	4.59E+00	Method B Modified - API Fisher
Selenium	1.00E+00	5.00E+00	Ecological RA: State AWQC
Tetrachloroethylene	2.00E-02	2.02E-01	Method B Modified - API Fisher
Toluene	5.00E-01	9.80E+00	Ecological RA: ORNL
trans-1,2-Dichloroethylene	5.00E-01	1.69E+03	Method B Modified - API Fisher
Trichloroethylene	2.00E-02	7.88E-01	Method B Modified - API Fisher
Vanadium	2.00E-01	2.00E+01	Ecological RA: ORNL
Vinyl chloride	2.00E-02	2.04E+00	Method B Modified - API Fisher
Xylenes (Total)	5.00E-01	1.41E+02	Method B Modified - API Fisher
Zinc	5.00E-01	8.10E+01	Ecological RA: State AWQC

Notes:
SWFS = Site Wide Feasibility Study
PQL = Practical Quantitation Limit
RA = Risk Assessment
ORNL = Oak Ridge National Laboratory Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquati
• available online at http://www.esd.ornl.gov/programs/ecorisk/ecorisk.html and go to screening benchmark reports
MTCA = Model Toxics Control Act
Method A cleanup levels = (WAC 173-340 - Table 720-1)
Method B cleanup levels = (WAC 173-340-705)
Method B - PQL based on WAC 173-340-707
GW = Groundwater
API = Asian Pacific Islander
AWQC = Ambient Water Quality Criteria
AQUIRE = U.S. EPA AQUIRE Database - available on-line at http://www.epa.gov/ecotox/
RI = Remedial Investigation
Table Modified from PSC Revised Tech Memo 1, June 2006.

Table 3
Intermediate Zone Screening Levels
West of Fourth Groundwater Investigation,
Seattle, Washington

Constituent	PQL (µg/L)	Groundwater Screening Level (µg/L)	Basis of Groundwater Screening Level
1,1,1-Trichloroethane	5.00E-01	1.10E+01	Ecological RA: ORNL
1,1-Dichloroethane	5.00E-01	4.70E+01	Ecological RA: ORNL
1,1-Dichloroethylene	2.00E-02	2.50E+01	Ecological RA: ORNL
1,2,4-Trimethylbenzene	1.00E+00	7.77E+01	Method B Modified - API Fisher
1,2-Dichlorobenzene	5.00E-01	1.40E+01	Ecological RA: ORNL
1,2-Dichloroethane	4.50E-02	3.06E+01	Method B Modified - API Fisher
1,4-Dioxane	1.00E-01	9.49E+01	Method B Modified - API Fisher
1-Methyl naphthalene	2.00E-02	2.10E+00	Ecological RA: ORNL
2-Methylnaphthalene	2.00E-02	2.10E+00	Ecological RA: ORNL
2-Methylphenol	5.00E-01	1.30E+01	Ecological RA: ORNL
2,4-Dimethylphenol	2.00E+00	2.85E+01	Method B Modified - API Fisher
4-Methylphenol	5.00E-01	1.08E+02	Method B Modified - API Fisher
Arsenic	3.00E-02	5.06E-02	Method B Modified- API Fischer
Barium	5.00E-02	4.00E+00	Ecological RA: ORNL
Benzene	5.00E-01	1.17E+01	Method B Modified - API Fisher
Benzo(a)anthracene	2.00E-02	2.00E-02	PQL
Benzo(b)fluoranthene	1.94E-02	1.94E-02	PQL
Benzo(k)fluoranthene	1.34E-02	1.80E-02	AWQC Human,, Organism Only
Benzoic acid	5.00E+00	4.20E+01	Ecological RA: ORNL
Bis(2-ethylhexyl) phthalate	2.00E+00	2.00E+00	PQL
Carbon disulfide	5.00E-01	9.20E-01	Ecological RA: ORNL
Chloroethane	5.00E-01	4.61E+02	Method B Modified - API Fisher
Chromium	2.00E-01	1.00E+01	Ecological RA: State AWQC
Chrysene	1.24E-02	1.80E-02	AWQC Human, Organism Only
cis-1,2-Dichloroethylene	5.00E-01	1.65E+02	Method B Modified - API Fisher
Copper	1.00E-01	3.10E+00	Ecological RA: State AWQC
Cyanide	1.00E+01	1.00E+01	PQL
Dibenzo(a,h)anthracene	1.62E-02	1.80E-02	AWQC Human, Organism Only
Diesel	1.00E+02	5.00E+02	Method A
Ethylbenzene	5.00E-01	7.30E+00	Ecological RA: ORNL
Gasoline	1.30E+02	8.00E+02	Method A
Indeno(1,2,3-cd)pyrene	2.00E-02	2.00E-02	PQL
Iron	2.00E+01	1.00E+03	AWQC Ecological
Lead	2.00E-02	2.50E+00	Ecological RA: State AWQC
Lube Oil Hydrocarbons	--	5.00E+02	Method A
Manganese	5.00E-02	1.00E+02	AWQC Human Health, Organism Only
Methylene chloride	1.00E+00	4.95E+02	Method B Modified - API Fisher
Naphthalene	1.00E+00	1.20E+01	Ecological RA: ORNL
n-Hexane	1.00E+00	1.00E+00	PQL
Nickel	2.00E-01	8.20E+00	Ecological RA: State AWQC
Pentachlorophenol	2.83E-01	2.53E+00	Method B Modified - API Fisher
Phenol	1.96E-01	1.18E+02	Ecological RA: AQUIRE
Propylbenzene	9.80E-01	7.30E+00	Ecological RA: ORNL

Table 3
Intermediate Zone Screening Levels
West of Fourth Groundwater Investigation,
Seattle, Washington

Constituent	PQL (µg/L)	Groundwater Screening Level (µg/L)	Basis of Groundwater Screening Level
Selenium	1.00E+00	5.00E+00	Ecological RA: State AWQC
Styrene	5.00E-01	5.00E-01	PQL
Tetrachloroethylene	2.00E-02	2.02E-01	Method B Modified - API Fisher
Toluene	5.00E-01	9.80E+00	Ecological RA: ORNL
trans-1,2-Dichloroethylene	5.00E-01	1.69E+03	Method B Modified - API Fisher
Trichloroethylene	2.00E-02	7.88E-01	Method B Modified - API Fisher
Vanadium	2.00E-01	2.00E+01	Ecological RA: ORNL
Vinyl chloride	2.00E-02	2.04E+00	Method B Modified - API Fisher
Xylenes (Total)	5.00E-01	1.41E+02	Method B Modified - API Fisher
Zinc	5.00E-01	8.10E+01	Ecological RA: State AWQC

Notes:
PQL = Practical Quantitation Limit
RA = Risk Assessment
ORNL = Oak Ridge National Laboratory Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effect
- available online at http://www.esd.ornl.gov/programs/ecorisk/ecorisk.html and go to screening benchmark reports

MTCA = Model Toxics Control Act
Method A cleanup levels = (WAC 173-340 - Table 720-1)
Method B cleanup levels = (WAC 173-340-705)
Method B - PQL based on WAC 173-340-707
GW = Groundwater
API = Asian Pacific Islander
AWQC = Ambient Water Quality Criteria
AQUIRE = U.S. EPA AQUIRE Database - available on-line at http://www.epa.gov/ecotox/
RI = Remedial Investigation
Table Modified from PSC Revised Tech Memo 1, June 2006.

Table 4
Soil Screening Levels
West of Fourth Groundwater Investigation Area
Seattle, Washington

Constituent	Minimum Industrial Risk-Based Soil Cleanup Level (mg/kg)	Minimum Industrial Risk-Based Soil Cleanup Level Basis	GW Protection Cleanup Level (mg/kg)	Puget Sound Natural Background Levels (mg/kg)	Applicable PQLs (mg/kg)	Soil Screening Level (mg/kg)	Soil Screening Level Basis
1,1,1-Trichloroethane	5.38E-01	Min. Method C Cleanup Level	7.95E-02	--	5.00E-03	7.95E-02	Protection of Groundwater
1,1-Dichloroethane	1.44E-01	Min. Method C Cleanup Level	1.55E-01	--	5.00E-03	1.44E-01	Min. Method C Cleanup Level
1,1-Dichloroethylene	1.75E-02	Min. Method C Cleanup Level	1.92E-01	--	5.00E-03	1.75E-02	Min. Method C Cleanup Level
1,2,4-Trichlorobenzene	9.02E+00	Min. Method C Cleanup Level	4.05E-01	--	5.00E-03	4.05E-01	Protection of Groundwater
1,2,4-Trimethylbenzene	1.47E-01	Min. Method C Cleanup Level	7.36E-01	--	5.00E-03	1.47E-01	Min. Method C Cleanup Level
1,2-Dichlorobenzene	1.33E+00	Min. Method C Cleanup Level	1.27E-01	--	5.00E-03	1.27E-01	Protection of Groundwater
1,2-Dichloroethane	1.18E-03	Min. Method C Cleanup Level	2.71E-02	--	5.00E-03	5.00E-03	PQL
1,3,5-Trimethylbenzene	2.45E-02	Min. Method C Cleanup Level	1.57E-01	--	5.00E-03	2.45E-02	Min. Method C Cleanup Level
2,4-Dimethylphenol	1.56E+03	Min. Method C Cleanup Level	1.53E-01	--	5.00E-02	1.53E-01	Protection of Groundwater
2-Hexanone	8.44E+03	Min. Method C Cleanup Level	1.26E-01	--	2.00E-02	1.26E-01	Protection of Groundwater
2-Methylnaphthalene	8.45E+02	Min. Method C Cleanup Level	3.60E-01	--	3.40E-03	3.60E-01	Protection of Groundwater
2-Methylphenol	3.89E+03	Min. Method C Cleanup Level	4.18E-02	--	1.00E-02	4.18E-02	Protection of Groundwater
4-Methylphenol	3.89E+02	Min. Method C Cleanup Level	2.30E-01	--	1.00E-02	2.30E-01	Protection of Groundwater
Acetone	7.00E+04	Min. Method C Cleanup Level	1.76E+00	--	5.00E-03	1.76E+00	Protection of Groundwater
Aroclor 1016/1242	1.46E+00	Min. Method C Cleanup Level	--	--	1.00E-02	1.46E+00	Min. Method C Cleanup Level
Aroclor 1254	1.46E+00	Min. Method C Cleanup Level	--	--	1.00E-02	1.46E+00	Min. Method C Cleanup Level
Aroclor 1260	1.46E+00	Min. Method C Cleanup Level	--	--	1.00E-02	1.46E+00	Min. Method C Cleanup Level
Arsenic	4.66E+00	Min. Method C Cleanup Level	6.84E-03	7.3	5.00E-01	7.30E+00	Puget Sound Background
Barium	1.24E+04	Min. Method C Cleanup Level	3.28E+00	--	5.00E-02	3.28E+00	Protection of Groundwater
Benzene	1.10E-03	Min. Method C Cleanup Level	3.36E-02	--	5.00E-03	5.00E-03	PQL
Benzo(a)anthracene	2.00E+00	Method A Ind. Cleanup Level	1.43E-01	--	1.60E-03	1.43E-01	Protection of Groundwater
Benzo(a)pyrene	2.57E-01	Min. Method C Cleanup Level	1.01E+01	--	2.20E-03	2.57E-01	Min. Method C Cleanup Level
Benzo(b)fluoranthene	2.00E+00	Method A Ind. Cleanup Level	4.66E-01	--	4.80E-03	4.66E-01	Protection of Groundwater
Benzo(ghi)perylene	--	--	---	--	2.30E-03	--	
Benzo(k)fluoranthene	2.00E+00	Method A Ind. Cleanup Level	4.32E-01	--	3.30E-03	4.32E-01	Protection of Groundwater
Benzoic acid	6.83E+05	Min. Method C Cleanup Level	4.89E-02	--	2.00E-01	2.00E-01	PQL
Bis(2-ethylhexyl) phthalate	2.08E+02	Min. Method C Cleanup Level	4.45E+00	--	1.70E-02	4.45E+00	Protection of Groundwater
Cadmium (food)	2.00E+00	Method A Ind. Cleanup Level	3.38E-02	1	5.00E-02	5.00E-02	PQL
Chloroethane	6.58E-01	Min. Method C Cleanup Level	1.67E+00	--	5.00E-03	6.58E-01	Min. Method C Cleanup Level
Chloroform	4.70E-04	Min. Method C Cleanup Level	1.20E-02	--	5.00E-03	5.00E-03	PQL
Chromium	2.00E+03	Method A Ind. Cleanup Level	2.00E+02	48.2	2.00E-01	2.00E+02	Protection of Groundwater

Table 4
Soil Screening Levels
West of Fourth Groundwater Investigation Area
Seattle, Washington

Constituent	Minimum Industrial Risk-Based Soil Cleanup Level (mg/kg)	Minimum Industrial Risk-Based Soil Cleanup Level Basis	GW Protection Cleanup Level (mg/kg)	Puget Sound Natural Background Levels (mg/kg)	Applicable PQLs (mg/kg)	Soil Screening Level (mg/kg)	Soil Screening Level Basis
Chrysene	2.00E+00	Method A Ind. Cleanup Level	1.44E-01	--	4.10E-03	1.44E-01	Protection of Groundwater
cis-1,2-Dichloroethylene	9.93E-03	Min. Method C Cleanup Level	1.95E-01	--	5.00E-03	9.93E-03	Min. Method C Cleanup Level
cis-1,3-Dichloropropene	--	--	2.84E-04	--	5.00E-03	5.00E-03	PQL
Copper	6.91E+03	Min. Method C Cleanup Level	1.37E+00	36.4	1.00E-01	3.64E+01	Puget Sound Background
Cumene	1.52E-02	Min. Method C Cleanup Level	4.87E+00	--	5.00E-03	1.52E-02	Min. Method C Cleanup Level
Cyanide	3.73E+03	Min. Method C Cleanup Level	1.18E-02	--	1.00E-01	1.00E-01	PQL
Dibenzo(a,h)anthracene	6.42E-01	Min. Method C Cleanup Level	6.44E-01	--	2.60E-03	6.42E-01	Min. Method C Cleanup Level
Dibenzofuran	8.45E+02	Min. Method C Cleanup Level	2.91E-01	--	1.70E-03	2.91E-01	Protection of Groundwater
Diesel	2.00E+03	Method A Cleanup Level	--	--	2.50E+01	2.00E+03	Method A Cleanup Level
Di-n-butyl phthalate	7.78E+03	Min. Method C Cleanup Level	1.14E+00	--	1.00E-02	1.14E+00	Protection of Groundwater
di-n-octyl-phthalate	1.56E+03	Min. Method C Cleanup Level	6.92E+04	--	1.00E-02	1.56E+03	Min. Method C Cleanup Level
Ethylbenzene	8.02E-01	Min. Method C Cleanup Level	4.93E-02	--	5.00E-03	4.93E-02	Protection of Groundwater
Fluoranthene	3.11E+03	Min. Method C Cleanup Level	4.57E+00	--	3.40E-03	4.57E+00	Protection of Groundwater
Gasoline	3.00E+01	Method A Cleanup Level	--	--	5.00E+00	3.00E+01	Method A Cleanup Level
Indeno(1,2,3-cd)pyrene	2.00E+00	Method A Ind. Cleanup Level	1.40E+00	--	2.40E-03	1.40E+00	Protection of Groundwater
Lead	1.00E+03	Method A Ind. Cleanup Level	5.00E+02	16.8	5.00E-02	5.00E+02	Protection of Groundwater
Lube Oil	2.00E+03	Method A Cleanup Level	--	--	2.50E+01	2.00E+03	Method A Cleanup Level
Mercury	2.00E+00	Method A Ind. Cleanup Level	1.25E-02	0.07	2.00E-02	7.00E-02	Puget Sound Background
Methyl Isobutyl Ketone (MIBK)	8.50E+01	Min. Method C Cleanup Level	2.65E-01	--	5.00E-03	2.65E-01	Protection of Groundwater
Methylene chloride	1.05E-02	Min. Method C Cleanup Level	5.71E-01	--	5.00E-03	1.05E-02	Min. Method C Cleanup Level
Mineral Spirits	1.00E+02	Method A, TPH-G (no benzene)	--	--	9.00E+00	1.00E+02	Method A, TPH-G (no benzene)
Naphthalene	2.64E-01	Min. Method C Cleanup Level	3.01E-01	--	5.00E-03	2.64E-01	Min. Method C Cleanup Level
n-Butylbenzene	1.52E-01	Min. Method C Cleanup Level	2.49E-01	--	5.00E-03	1.52E-01	Min. Method C Cleanup Level
Nickel	3.73E+03	Min. Method C Cleanup Level	1.07E+01	38.2	2.00E-01	3.82E+01	Puget Sound Background
Pentachlorophenol	2.43E+01	Min. Method C Cleanup Level	3.29E-02	--	1.50E-01	1.50E-01	PQL
Phenanthrene	--	--	4.86E-01	--	3.30E-03	4.86E-01	Protection of Groundwater
Phenol	2.33E+04	Min. Method C Cleanup Level	2.04E-01	--	1.90E-02	2.04E-01	Protection of Groundwater
p-Isopropyltoluene	1.85E+08	Min. Method C Cleanup Level	2.49E-01	--	5.00E-03	2.49E-01	Protection of Groundwater
Propylbenzene	2.25E-01	Min. Method C Cleanup Level	1.31E-01	--	5.00E-03	1.31E-01	Protection of Groundwater
Pyrene	2.33E+03	Min. Method C Cleanup Level	1.82E+02	--	3.60E-03	1.82E+02	Protection of Groundwater
sec-Butylbenzene	1.52E-01	Min. Method C Cleanup Level	2.11E-02	--	5.00E-03	2.11E-02	Protection of Groundwater

Table 4
Soil Screening Levels
West of Fourth Groundwater Investigation Area
Seattle, Washington

Constituent	Minimum Industrial Risk-Based Soil Cleanup Level (mg/kg)	Minimum Industrial Risk-Based Soil Cleanup Level Basis	GW Protection Cleanup Level (mg/kg)	Puget Sound Natural Background Levels (mg/kg)	Applicable PQLs (mg/kg)	Soil Screening Level (mg/kg)	Soil Screening Level Basis
Selenium	1.75E+03	Min. Method C Cleanup Level	5.06E-01	--	1.00E-01	5.06E-01	Min. Method C Cleanup Level
Silver	9.33E+02	Min. Method C Cleanup Level	3.18E-01	--	2.00E-02	3.18E-01	Protection of Groundwater
Stoddard Solvent	1.00E+02	Method A, TPH-G (no benzene)	--	--	9.00E+00	--	Method A, TPH-G (no benzene)
Styrene	8.64E+00	Min. Method C Cleanup Level	9.96E-03	--	5.00E-03	9.96E-03	Protection of Groundwater
Tetrachloroethylene	1.90E-03	Min. Method C Cleanup Level	2.02E-03	--	3.10E-03	3.10E-03	PQL
Toluene	2.56E-01	Min. Method C Cleanup Level	5.13E-02	--	5.00E-03	5.13E-02	Protection of Groundwater
trans-1,2-Dichloroethylene	9.69E-03	Min. Method C Cleanup Level	2.46E-01	--	5.00E-03	9.69E-03	Min. Method C Cleanup Level
trans-1,3-Dichloropropene	--	--	1.02E-04	--	5.00E-03	5.00E-03	PQL
Trichloroethylene	6.24E-05	Min. Method C Cleanup Level	2.03E-03	--	2.80E-03	2.80E-03	PQL
Trichlorofluoromethane	8.61E+04	Min. Method C Cleanup Level			5.00E-03	1.70E+00	Protection of Groundwater
Vinyl chloride	1.20E-04	Min. Method C Cleanup Level	8.66E-03	--	5.00E-03	5.00E-03	PQL
Xylenes (Total)	1.80E-01	Min. Method C Cleanup Level	9.99E-01	--	5.00E-03	1.80E-01	Min. Method C Cleanup Level
Zinc	5.60E+04	Min. Method C Cleanup Level	1.01E+02	85.1	5.00E-01	1.01E+02	Protection of Groundwater

Notes:
MTCA = Model Toxics Control Act (WAC 173-340)
-- = No value was available.
SWFS = Site Wide Feasibility Study
PQL = Practical Quantitation Limit; PQL for constituents other than mineral spirits and stoddard solvent were established per WAC 173-340-707. The PQLs for mineral spirits and stoddard solvent were not available from CAS; the values cited are the lowest reported reporting limits obtained from laboratory reports received for the off-site investigation.
Minimum Ind. Soil Cleanup Level calculated using cumulative constituent Cancer Risk Goal = 1E-06 and Hazard Quotient = 0.1 and compared to Method A Soil Cleanup Levels.
Soil-to-Groundwater Cleanup Level Based on SWFS Groundwater Cleanup Level.
Puget Sound Ecology Background Levels from Natural Background Soil Metals Concentrations in Washington State. Toxics Cleanup Program, Washington State Department of Ecology. Publication # 94-115. October 1994.
Table Modified from PSC Revised Tech Memo 1, June 2006.