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Draft Remedial Investigation Report

Capital Industries Site,
Seattle, Washington

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JUNE 2005

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1.0 Executive Summary

Phillip Services Corporation's (PSC's) Georgetown facility released contaminants to soil and groundwater. Consequently, PSC was required to conduct a remedial investigation and risk assessment to assess the effect of its releases on adjacent and nearby properties. The Remedial Investigation Report (RI) that PSC submitted to the Washington State Department of Ecology (Ecology) documented the presence of tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE), and solvent degradation products in groundwater upgradient and downgradient from the Capital Industries, Inc. (Capital) site. In its RI, PSC claims that Capital is potentially a source of contamination (PSC 2003, PSC 2004c, PSC 2004d).

Ecology requested that Capital undertake appropriate testing to make an actual determination of the impact of the groundwater on the Capital operations (Ecology 2004). This request caused Capital to initiate the work that is summarized in this report.

1.1 POTENTIAL UPGRADIENT SOURCES OF TCE IN GROUNDWATER

The following properties are located upgradient of Capital's facility and may be contributors to the TCE found in groundwater as it begins to flow under Capital.

Blaser Tool & Mold Property – 5700 3rd Avenue South

The PSC RI report shows a TCE groundwater plume, identified by PSC as the K19 plume, originating from a location adjacent to this facility. Blaser has been operating at this address or at nearby addresses since approximately 1973. The current ownership purchased the property from Scougel Rubber Corporation in 1996.

Pre-Blaser Businesses in the Vicinity of 5700 3rd Avenue South

Sanborn maps identified structures that were used as a machine shop and for waterproofing, glass crafting, and aluminum casting prior to the presence of Blaser in approximately 1970. These structures are also in the vicinity of the K19 plume.

Properties East of Capital Between South Mead and South Fidalgo Streets

The PSC RI report indicates that the concentrations of chlorinated solvents in the groundwater increase as the groundwater flows from 6th Avenue South to Capital. These businesses may have contributed to the solvents in the groundwater:

- Former Art Brass (5815 and 5810 4th Avenue South) properties. A vapor degreaser is part of the process Art Brass likely used to prepare metals for plating.
- Former Coin-Op Dry Cleaner (5700 6th Avenue South). Dry cleaners historically used PCE as part of their cleaning process.
- Former Bob's Launderette (5812 4th Avenue South). A candidate property if dry cleaning occurred there.

- Pacific Marine Testing (5807 4th Avenue South), located directly east of Capital. The nature of this business is not known.
- Former Wear Cote Property, now part of Pacific Foods (5811 4th Avenue South), located directly east of Capital. The nature of this business is not known.

1.2 RESULTS OF FIELD INVESTIGATIONS – GROUNDWATER

Twenty-seven temporary Geoprobe wells were installed around the perimeter of Capital. An additional ten temporary Geoprobe wells were installed within Capital facilities.

TCE was detected in groundwater beneath the Plant 2 Canopy. The relatively high concentrations in this area are continuous with an off site and upgradient source.

TCE was detected in groundwater beneath the southwestern portion of Plant 2. The relatively high concentrations in this area are continuous with an off site and upgradient source.

PCE and TCE were detected in groundwater beneath Plant 4 and along Plant 4's east (upgradient) property line. PCE and TCE were also detected in vadose zone soil beneath Plant 4. The data indicate a likely release of these chemicals from Plant 4 that is impacting groundwater. The data also indicate a possible source upgradient of Plant 4 that may also be impacting groundwater.

DCE and vinyl chloride are also present in groundwater beneath Capital. There is no evidence these chemicals were ever used at Capital. The data indicate that some of the DCE and vinyl chloride are coming from upgradient sources while the rest is forming from the degradation of TCE, and potentially from PCE, in the Plant 4 area.

1.3 RESULTS OF FIELD INVESTIGATIONS – SOILS BELOW CAPITAL FACILITIES

Geoprobe soil samples were collected in November 2004. These samples were collected at locations ECS6 through ECS9 outside of the southwest walls of Plant 2 and the Plant 2 Canopy. No chlorinated ethenes were detected in soil above the water table at these locations. This means that the TCE detected in groundwater by PSC and by Capital in these areas did not come from releases onto the ground surface outside of Plant 2 and the Plant 2 Canopy.

In February 2005, thirty Gore Sorbers were installed in three areas that were judged to be locations where historical Capital practices may have released chlorinated solvents and where TCE concentrations in groundwater were the highest. TCE was not detected in the soil gas adsorbed by the Gore Sorbers installed in soil below Plant 2 or the Plant 2 Canopy. Very low quantities of PCE and TCA were detected. TCE and PCE were detected in the soil gas adsorbed by the Gore Sorbers installed in soil below approximately the southern third of Plant 4 and the Plant 4 Canopy.

The results of the Gore Sorber samples were used to identify the five locations each within Plant 2 and the Plant 2 Canopy, and within Plant 4 and the Plant 4 Canopy that were judged to contain the highest concentrations of chlorinated ethenes. Geoprobe samples of vadose zone soil were obtained at these locations during April 2005.

PCE was detected (at 2.5 μg/kg) at one location on top of a silt layer that is located below the Plant 2 Canopy. PCE was not detected below the silt layer at this location. No PCE was detected in groundwater below the Plant 2 or Plant 2 Canopy areas. No TCE was detected in the soil below the Plant 2 or Plant 2 Canopy areas.

These direct soil analytical results, together with the Gore Sorber results obtained during February 2005 and the continuous nature of the TCE groundwater plume, indicate that the TCE in groundwater beneath Plant 2 and the Plant 2 Canopy is likely caused by sources upgradient from Capital and not from TCE releases by Capital in these areas.

PCE and TCE were detected in the vadose zone soil at concentrations exceeding target levels beneath the southern third of Plant 4 and the Plant 4 Canopy during Geoprobe sampling in April and May 2005. TCE and PCE were also found in groundwater collected from the eastern boundary of Capital in May 2005.

Analyses of vadose zone soil, together with the Gore Sorber results obtained during February 2005 and the May 2005 groundwater testing along the eastern boundary of Capital, indicate that activities associated with Capital's historic use of Plant 4 and the Plant 4 Canopy could have contributed to the TCE detected in soil and groundwater in the Plant 4 and Plant 4 Canopy areas. The TCE and PCE detected below Plant 4 may also be related to releases from off site historical activities to the east of Plant 4 (e.g., the former Art Brass and Bob's Launderette properties). The origin of the PCE is unclear. Capital has no record or knowledge of having used PCE for any purpose.

2.0 Introduction

PSC prepared a Remedial Investigation (RI) report as part of its work to clean up its Georgetown facility located at 734 South Lucile Street in Seattle, Washington (PSC 2003). PSC released solvents to the soil and groundwater at this facility. The general flow direction of the groundwater below this facility is toward the Duwamish River. Some of the groundwater containing solvents from the PCS facility on South Lucile Street flows below the Capital site, which is located at 5801 3rd Avenue South, in Seattle, Washington.

The groundwater was reported to contain low concentrations of solvents such as PCE, TCE, and DCE. Ecology is concerned that the solvents and other volatile compounds may volatilize from the groundwater and enter the breathing zone of site workers.

2.1 PURPOSE OF THE REMEDIAL INVESTIGATION

PSC's Georgetown facility released contaminants to soil and groundwater. Consequently, PSC was required to conduct a remedial investigation and risk assessment to assess the effect of its releases on adjacent and nearby properties. The RI that PSC submitted to Ecology documented the presence of tetrachloroethene (PCE), trichloroethene (TCE), other solvents, and solvent degradation products in groundwater upgradient from and downgradient from the Capital site. The concentration of TCE identified by PSC in groundwater near the Capital site was high enough to cause PSC and Ecology to judge that the TCE may be having a significant impact on human health and the environment. In its RI, PSC claims that Capital is potentially a source of contamination (PSC 2003, PSC 2004c, PSC 2004d).

2.2 SUMMARY OF ENVIRONMENTAL INVESTIGATIONS CONDUCTED BY CAPITAL PRIOR TO AUGUST 2004

Over time Capital has increased the scope of its operations at the site (Section 3.1.2). Several environmental investigations were conducted during this time. These investigations are listed in Table 2-1.

During 1991, Capital developed the property on the northwest corner of South Mead Street and 4th Avenue South that it had acquired in 1984. Construction activity included the removal of a heating oil tank from the property. A report summarizing this work was prepared by Dames & Moore (Dames & Moore 1991). The tank and approximately 15 cubic yards of soil were removed from the site and disposed of properly. Soil samples collected from the base of the excavation revealed non-detectable concentrations of total petroleum hydrocarbons (TPHs).

During 1998, Capital developed the property on the northeast corner of 1st Avenue South and South Fidalgo Street. Dames & Moore conducted a Phase 1 site assessment associated with the purchase of this vacant lot (Dames & Moore 1998). They did not uncover evidence of the presence of hazardous materials or conditions on the site.

During 2000, the Washington Department of Labor and Industries prepared a consultation report for Capital associated with the operation of spray painting apparatus in Plant 4 at the

Capital site. The Department determined that none of the permissible exposure limits for the solvents utilized were exceeded.

Capital's Plant 2 was destroyed by fire on January 18, 2004. This facility was rebuilt. At Ecology's request, Capital took the following actions:

- Ensured that volatile chemicals did not enter the breathing zone of site workers in the new Plant 2
- Monitored soils encountered during the construction of the new Plant 2
- Ensured that debris and soil that was excavated and removed from their site did not contain detectable concentrations of volatile contaminants
- Verified that soil excavated from their site and reused as backfill at their site was suitable for that use

The results of this work, performed by Floyd Snider McCarthy Inc. (FSM), are discussed in more detail in Section 4.3 and Appendix C. A summary report was prepared and provided to Ecology on July 6, 2004 (FSM 2004).

2.3 SUMMARY OF KNOWN SPILLS OF SOLVENTS AND OIL PRODUCTS AT CAPITAL

Capital knows of two spills of oil and solvents at its facility (Capital 2003). The first spill occurred around 1989. A small quantity of TCE degreasing solvent was spilled on the concrete at the south end of the area between Plants 3 and 4. The spill occurred during a refill operation at the hot vapor solvent degreasing unit that was in service at the time. A drum turning device was not secured properly. The drum slipped part way and spilled solvent from the spout onto the concrete floor near the degreaser unit. Immediate action was taken to cover the spill stream with absorbent floor sweep material and place a line of absorbent pads around the spill. The spill did not reach the nearest floor drain and catch basin, which was connected to the combined sewer line. The contaminated floor sweep and absorbent pads were placed in a waste containment drum for routine disposal with the spent solvent.

A small diesel spill occurred in the storage yard area of Plant 1 between July 6 – 8, 2001. The accidental puncturing of a 55-gallon diesel fuel drum by a forklift sometime during the second shift operations resulted in the spill. The spill was not noticed until early morning on July 9, 2001, whereupon remedial action was initiated. Foss Environmental Services Corporation pumped out the diesel-contaminated water that was contained in the storm drain catch basins and connecting sewer lines.

3.0 Site Setting

3.1 THE CAPITAL FACILITY

3.1.1 Land Use and Ownership

Capital (UBI Number 578 009 230) is a for profit corporation that was incorporated in 1953. The corporation moved to its present location at 5801 3rd Avenue South in Seattle, Washington in 1965 (Figure 3-1).

The Capital facility occupies the majority of the property bounded by South Mead Street on the north, 1st Avenue South on the west, South Fidalgo Street on the south, and 4th Avenue South on the east. The site is zoned for industrial use, as are adjoining and nearby properties. A zoning map for this portion of the Georgetown area is presented as Figure 3-2.

Capital moved to its current main office location in 1965. Prior to that time the property was primarily residential in character (refer to the aerial photographs for 1936, 1946, 1956, and 1960 contained in Appendix A.3 and the Sanborn maps for 1917, 1929, 1949, and 1967 contained in Appendix A.2). No known releases of hazardous materials were identified on the property prior to the time that it was acquired by Capital. A detailed environmental assessment of this property and adjoining properties is provided in Section 4.1.

Capital normally operates two work shifts per day Monday through Friday with occasional work occurring on Saturday. The facilities, buildings, and storage yards are locked during off hours. The storage yards are fenced and locked when not in use. Appropriate security measures are in place at all times.

3.1.2 Evolution of Capital's Operations

Since occupying the original Plant 2 building in 1965, Capital has acquired additional property, added buildings and equipment, extended yard space, and made improvements upon and adjacent to the site to support expanded operations. These additions and improvements are summarized in Table 3-1.

3.1.3 Current Capital Operations

The property is essentially flat, and is almost entirely paved and/or covered by structures. The current facility complex is comprised of four buildings, some linked by canopies, and two inventory storage yards. The four concrete tilt-up buildings enclose approximately 110,000 square feet of space. A roofed and partially walled canopy connects Plant 3 to Plant 4. A second roofed and partially walled canopy connects Plant 2 to Plant 3. The current facility configuration is shown on Figure 3-3. The year in which each portion of the facility was constructed is also indicated on Figure 3-3 and in Table 3-1.

Capital is a metal fabrication firm that forms, cuts, punches, welds and assembles metal parts. Capital also fabricates and paints metal containers. A description of the firm is provided on its website (www.Capitalind.com). The firm currently employs more than 100 people and operates four primary fabrication facilities:

- Plant 1: metal shearing, sawing, lasering, and welding occurs in this facility
- Plant 2: metal forming, lasering and punching occurs in this facility
- Plant 3: container welding occurs in this facility
- Plant 4: container painting occurs in this facility

3.2 ADJACENT AND NEARBY PROPERTIES

The Capital property is surrounded by commercial and industrial properties. A number of these properties are identified on the aerial photo of the vicinity that is included as Figure 3-4. The current ownership of these properties is identified in Table 3-2. A number of these properties (as a result of current or historic uses) are judged to have the potential to be contributors to the TCE contained in the groundwater flowing below Capital (the TCE plume). These potential contributions are identified and discussed in Section 4.1.

3.3 GEOLOGIC SETTING

The geology in the area surrounding Capital described below was taken from Section 3 of the PSC RI report (PSC 2003). PSC's description was derived from literature reviews and their own field investigations. Their investigations focused on PSC's Georgetown facility, which is located about 1,900-ft northeast of Capital. The PSC RI report describes geologic conditions beneath Capital because the groundwater plume that originates below PSC's Georgetown facility extends beneath Capital.

3.3.1 Overview of Regional Geology[1]

The regional geology consists of three assemblages. From oldest to youngest these are Bedrock, Interbedded Glacial and Nonglacial Sediments, and Duwamish Valley Alluvium. Bedrock is thought to be located between a few hundred to over a thousand feet deep beneath the Duwamish Valley. The Bedrock consists primarily of sedimentary rocks. These rocks are believed to be overlain by permeable, unlithified Interbedded Glacial and Nonglacial sediments.

The Interbedded Glacial and Nonglacial Sediments were deposited on the eroded Bedrock surface. They consist of a variety of fine and coarse-grained sediments that are highly compacted due to the weight of overlying glacial ice. The upper portion of this assemblage consists of glacially overridden silt. The glaciers that deposited these sediments are thought to have carved the topographic trough the Duwamish River later occupied.

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[1] This discussion of the regional geology is taken from Section 3.4 of the PSC RI report.

Duwamish Valley Alluvium was deposited on the Glacial and Nonglacial Sediments. These sediments are believed to be up to 200-ft thick in the study area. Their thickness decreases to the south, east, and west.

Duwamish Valley Alluvium has been subdivided into two units, an older alluvium and a younger alluvium. The older alluvium was deposited on glacially overridden silty sediment. It consists primarily of fine and medium sand. It varies in thickness between 10 and 30-ft and is located at approximately 100-ft below ground surface (bgs) in the middle of the Duwamish valley. Its silt and organic matter content is less than that of the younger alluvium. The older alluvium reportedly grades upward into the younger alluvium.

The younger alluvium consists of clayey silt, organic silt, sandy silt, and silty sand with abundant organic matter (e.g., wood fragments). The younger alluvium varies from about 15 to 20-ft thick in the southern part of the Duwamish basin to 100-ft thick in the northern part, by the mouth of the Duwamish River.

The younger alluvium unit is important because it hosts groundwater in the vicinity of Capital. The abundant organic matter in the younger alluvium creates a reducing chemical environment that is conducive to the reductive chlorination of chlorinated solvents such as PCE, TCE, DCE, vinyl chloride, trichloroethane (TCA), and dichloroethane (DCA). The silt content of the younger alluvium varies and affects groundwater movement (and contaminant transport) in the subsurface soil.

3.3.2 Geology Near Capital Based on PSC's Investigations

The geology discussed in this section is based on PSC's field investigations. These investigations extend from their Georgetown facility downgradient beneath Capital all the way to the Duwamish Waterway. The subsurface samples closest to Capital that PSC used for soil classification and aquifer identification are limited to samples obtained from borings K21 and H14[2] based on information presented on PSC's Figures 3-12a, 9-4a, and 9-5 (PSC 2003). It appears that PSC correlated these observations to their geologic model, which is based on greater sample density in the vicinity of their Georgetown Facility. Their geologic model does not identify a glacially derived geologic unit beneath Capital.

PSC identified five geologic units in their study area. Except for Bedrock, PSC believes the other four units belong to the Duwamish Valley Alluvium (regional geologic) unit described in the literature. From youngest to oldest these geologic units are:

- Shallow Sand and Fill Unit
- Intermediate Sand and Silt Unit
- Silt Unit
- Deep Sand and Silt Unit

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[2] K21 is located on South Mead Street between 2nd Avenue South and 3rd Avenue South. H14 is located at the intersection of South Orcas Street and 5th Avenue South.

Based on PSC's geologic cross-sections, at least the top two units are located beneath Capital, (Figure 3-12a, PSC 2003). The other two units may be present but were not encountered due to the limited depth of PSC's explorations in the Capital vicinity. The following geologic descriptions are taken from Section 3.4 of the PSC RI report.

> *Shallow Sand Unit - The Shallow Sand Unit consists of poorly graded, fine to medium sand with fine gravel. Organic matter (e.g., wood or other fibrous vegetative material) is commonly present, at levels varying from "trace" to "abundant." The thickness of this unit varies approximately from 21 feet (CG-111-I) to 46 feet (F9) at the PSC borings.*
>
> *The upper portion of this unit consists of fill, which was emplaced during the industrial development of the area. The lower portion is composed of Duwamish River deposits (alluvium). In some areas the fill is composed of material that was dredged from the Duwamish River. Consequently the silts and sands of the fill may be difficult to distinguish from the native alluvium (Booth and Herman, 1998).*
>
> *The Shallow Sand Unit grades into the Intermediate Sand and Silt Unit.*
>
> *Intermediate Sand and Silt Unit – The Intermediate Sand and Silt Unit consists of interbedded silty sand and sandy silt lenses, with thicknesses from 0.1 foot to more than one foot. The lenses are discontinuous and cannot be correlated between borings. In contrast to the Shallow Sand Unit, wood debris and other organic material is prevalent at many locations. Shell fragments were encountered in most borings. These sediments are apparently of fluvial and marine origin, possibly deposited in an estuary.*
>
> *At the PSC borings where this unit was penetrated, its thickness varies from approximately 13 feet (CG-101-1) to 68 feet (F9). For some off-site borings (K10, Y26, H14, M29) it is not possible to distinguish the intermediate/shallow contact. Where identifiable the contact dips to the west-southwest, consistent with the overall subsurface topography of the study area.*
>
> *Silt Unit – The Silt Unit consists of silt with zero to five percent clay and, at some locations, 20 to 60 percent very fine sand. Clam shells and shell fragments are commonly present, as are rare wood fragments in "trace" quantities. Worm burrows, mud cracks and occasional fine laminations were reported at some locations (e.g., at CG-102-D, CG-104-D). This material likely was deposited in a calm tidal environment, or in a floodplain as riverine overbank deposits... The Silt Unit is continuous across the facility footprint, where its total thickness varies from approximately 11 feet at CG-106-D to 50 feet at CG-2D. The thickness at CG-2D is somewhat anomalous with a typical thickness near the facility from 14 to 38 feet.*
>
> *Deep Sand and Silt Unit – The Deep Sand and Silt Unit consists of sandy silt with 30 to 40 percent fine sand and interbedded lenses of silty sand, with gravel and cobbles at some locations (e.g., CG-1-D). Wood fragments and clam shells also*

reportedly were present. The sediments that comprise this unit are fluvial and marine deposits. This unit was encountered at all of the PSC "D" series of permanent monitoring wells, where the depth of its upper surface varies approximately from 84 feet bgs (CG-4-D) to over 128.5 feet bgs (CG-2D).

Little is known about the total thickness of the deep sand unit, because few borings fully penetrate it. Based on the depth-to-bedrock maps compiled by Yount (2985, 1991), the thickness of the Deep Sand and Silt Unit probably increases rapidly as one moves from the facility toward the Duwamish River... to a maximum of about 330 to 660 feet bgs near the Duwamish Waterway.

3.4 SITE GEOLOGY

This interpretation of the geology beneath the Capital site is based on information from the following sources:

- Subsurface geology from Section 3.5 and Figure 3-12a of the PSC RI report
- Direct push soil explorations located outside the southwest corner of Plant 2 that were accomplished by ECS during November 2004
- Direct push soil explorations inside Plant 2, Plant 2 Canopy, Plant 4, and Plant 4 Canopy that were accomplished by ECS in April and May 2005

PSC's interpretation of the subsurface geology beneath Capital is based on observations of soil samples collected from exploration K21 (located along South Mead Street between 2nd Avenue South and 3rd Avenue South). These observations apparently were correlated to more detailed observations and interpretations made in the vicinity of PSC's Georgetown facility. PSC's Figure 3-12a shows the inferred contact between the Shallow Sand Unit and the Intermediate Sand and Silt Unit located at a depth of about 50-ft bgs beneath Capital. Therefore, all of the field explorations conducted by Capital to date have been in the Shallow Sand Unit, as defined by PSC. The field observations during the November 2004 and April 2005 field investigations are generally consistent with PSC's description of this unit.

The direct push soil explorations accomplished at Capital in November 2004, April 2005, and May 2005 were focused on soil above the water table. Consequently, most observations were of soil above a depth of about 9-ft bgs. In a few places, however, observations were made of soil down to almost 12-ft bgs. The geological information collected during these soil explorations is illustrated on Figures 3-5 and 3-6 and summarized below.

Fill consisting typically of olive yellow, yellowish olive, light olive brown, and brown, poorly graded fine sand is present beneath the footprints of Plants 2 and 4 and their canopies based on the available information (refer to boring logs in Appendices D.3, D.4, and D.5. Outside the footprint of Plant 2, the Fill consists of gray, light brown, and dark brown, well graded gravelly sand and well graded sandy gravel based on observations at Borings ECS6, ECS7, and ECS8. Fill was observed at the ground surface in unpaved areas outside of Capital's building footprints and beneath the concrete floors inside Capital's buildings (where explored). The Fill generally is 1 to 2-ft thick. In places, lumps of silt were observed in the Fill. These could have been ripped up from the underlying Brown Silt layer and incorporated into the Fill while the Fill was being graded.

Dark Brown Sand with Silt is present at most locations beneath the Plant 2 and Plant 4 buildings and their canopies based on the available information (Appendix D.3, D.4, and D.5). This soil layer was not observed in the borings located outside of the building footprints (refer to Borings ECS6, ECS7, and ECS8 in Appendix D3). The Dark Brown Sand with Silt consists of very dark brown, well-graded fine sand with silt. Trace amounts of gravel (including angular gravel), trace amounts of wood fragments, and lumps of silt and fine roots were observed. The lumps of silt observed in this layer resemble the underlying Brown Silt layer. The water content is sufficient to make the layer moist, but not wet. Where present, this layer is typically about 1-ft thick, but locally is thicker. This soil layer may be imported fill or a pedogenic soil horizon (e.g., a B horizon) that was present before the site was developed, but was disturbed by grading when the site was developed.

Brown Silt is present beneath most of the site based on the available information. This layer was observed at all direct push explorations to date (i.e., up to ECS41) (Appendices D.3, D.4, and D.5). The color of this layer varies and generally appears brown, grayish brown, pinkish brown, and light brownish gray. The color is affected by mottles that generally are strong brown, orange brown, and dark reddish brown. Locally this layer consists of sandy silt with an estimated silt content that is less than 30%. The moisture content varies from moist to wet and its strength varies from soft to very soft. The Brown Silt typically varies from 3 to 4-ft thick. However, the Brown Silt is likely to be thinner or absent where it has been excavated for deep structures such as building footings, machine foundations, or underground utilities. Its bottom contact (with the underlying Very Dark Gray Sand and Silty Sand) is typically 1 to 2-ft above the water table. The Brown Silt is mostly mottled and locally wet, which suggests perched water may locally or seasonally be present.

The Brown Silt is judged to be a native soil layer that was present before the Duwamish River was filled and the site was developed. It probably represents fine-grain, overbank sediment that was deposited during Duwamish River flood events.

The Brown Silt, because it has a finer grain size than the overlying, coarser grain Fill, is expected to have a higher capillary tension force[3] than the Fill. Consequently, a contaminated liquid released onto the ground surface would be expected to spread laterally (i.e., horizontally) more in the Brown Silt than in the overlying Fill. Further, because of its proximity to the water table, the groundwater capillary fringe may extend continuously up through the Dark Gray Sand and Silty Sand into the Brown Silt. If this occurs, it would be possible for contaminants in the Brown Silt to diffuse downward through the groundwater capillary fringe to the water table. Similarly, it would be possible for contaminants in groundwater to diffuse upward through the capillary fringe into the Brown Silt.

Very Dark Gray Sand and Silty Sand consisting of very dark gray, dark gray, and grayish brown, poorly graded fine sand is present beneath all parts of the site based on the available

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[3] Capillary forces are molecular attractive forces between water and soil particles. In the unsaturated zone, water is held in the soil pores under surface tension forces.

information. Locally, the sand is overlain by grayish brown, locally mottled silty fine sand that is up to 2-ft thick. The Very Dark Gray Sand and Silty Sand layer is saturated at depths typically between 7 and 9-ft bgs based on ECS's site investigations. The thickness of this layer is at least 5-ft, based on ECS's limited observations, and is probably about 35-ft based on PSC's predictions. PSC predicts the bottom of this layer is located approximately 50-ft bgs.

3.5 HYDROGEOLOGY

3.5.1 Hydrogeologic Units

The hydrogeologic units described below were discussed in Section 3.6 of the PSC RI report. PSC constructed many permanent groundwater monitoring wells, with some in the vicinity of Capital. PSC has measured groundwater elevations, determined groundwater flow, evaluated tidal influences, and calculated aquifer properties. PSC's work was focused on conditions beneath the Georgetown Facility, which is located approximately 1,900-ft northeast of Capital. Many of the hydrogeology conditions beneath the Georgetown facility are likely to be similar to those beneath Capital. Consequently, PSC's investigations are useful for evaluating conditions beneath Capital.

PSC identified five hydrogeologic units. These units correspond directly with the geologic units described in Section 3.4 of this report. In order of increasing depth, these hydrogeologic units and their corresponding geologic units (in parentheses) are:

- Shallow Aquifer (Shallow Sand Unit including Fill)
- Intermediate Aquifer (Intermediate Sand and Silt Unit)
- Silt Aquitard (Silt Unit)
- Deep Aquifer (Deep Sand and Silt Unit)
- Basement Confining Unit (Bedrock)

The following descriptions are taken from Section 3.6 of the PSC RI report. According to PSC's Figure 3-12a, PSC has only identified the top two hydrologic units beneath Capital. The next lower two units and the Basement Confining Unit, as defined by PSC, are probably present. However, deeper explorations would be needed to confirm this.

> <u>Shallow Aquifer</u> – *The Shallow Aquifer corresponds to the Shallow Sand geologic unit, which included surface fill. The Shallow Aquifer is unconfined, and extends from ground surface to depths of between approximately 21 feet bgs (CG-111-I) and 46 feet bgs (F9) at the PSC borings. This unit is horizontally continuous, having been encountered at all of the borings in the area. The thickness generally increases from the area east of PSC's Georgetown Facility, to the west.*
>
> <u>Intermediate Aquifer</u> – *The Intermediate Aquifer corresponds to the Intermediate Sand and Silt geologic unit. The Intermediate Aquifer is horizontally continuous across the PSC monitoring well network, where its thickness varies approximately from 13 feet (CG-101-I) to 68 feet (F9). This aquifer is bounded above by the Shallow Aquifer, to which it is hydraulically connected… At some*

> *off site borings (K10, H14, Y26, M29) the distinction between the shallow and intermediate aquifers is difficult to determine. Where identifiable, the contact is consistent with the study area subsurface topography, dipping to the west-southwest. The Intermediate Aquifer is semi-confined.*
>
> *At most borings, the intermediate aquifer is bounded below by the top of the Silt Aquitard. At one boring (CG-101-I) the silt aquitard appears to have pinched out as it approaches the valley wall. At this location the Intermediate Aquifer is bounded below by the Silt Aquitard.*
>
> *Silt Aquitard – The Silt Aquitard corresponds to the Silt geologic unit. This unit is continuous across the [PSC] facility footprint and beyond the footprint to the southwest. Where penetrated by the PSC borings, the total thickness of the Silt Aquitard varies approximately from 30 to 112 feet bgs at those PSC borings where it was encountered... The Silt Aquitard hydraulically confines the underlying Deep Aquifer... The available data indicate that the upper surface [of the Silt Aquitard] is highest in the area east of the [PSC] facility footprint and slopes westward.*
>
> *Deep Aquifer – The Deep Aquifer corresponds to the Deep Sand geologic unit. This unit is horizontally continuous throughout the boring network. Its upper surface coincides with the bottom of the Silt Aquitard, where the aquitard is present. Where the aquitard is absent, the upper surface of the Deep Aquifer coincides with the bottom of the intermediate aquifer. At the PSC borings, the depth of the Deep Aquifer's upper surface varies approximately from 84 feet bgs (boring CG-4-D) to over 128 feet (GC-2-D). The units' thickness is greater than 34 feet at boring CG-5-D. Based on the depth-to-bedrock map compiled by Yount et al (1991), the depth to bedrock is expected to increase rapidly with distance as one moves westward from the facility, to about 330 to 660 feet bgs near the Duwamish Waterway.*
>
> *Basement Confining Unit – The Basement Confining Unit corresponds to the bedrock geologic unit. The upper surface of the bedrock may be weathered and fractured. The base of the weathered zone forms a boundary between relatively permeable overlying material (i.e., unconsolidated sediments and weathered bedrock) and the relatively impermeable, underlying, unweathered bedrock. Based on its relatively low permeability, and low recharge in the east upland area, the bedrock is classified as a confining unit.*

All of the groundwater samples collected to date by Capital were obtained from the Shallow Aquifer.

3.5.2 Hydraulic Properties of Hydrogeologic Units

PSC presents comprehensive hydraulic properties (hydraulic conductivity, porosity, storage coefficient) for the hydrologic units described above (Section 3.6.1.2, Volume 1 of 7, PSC 2003). ECS used selected data to calculate the groundwater velocity in the shallow aquifer below Capital as discussed in Section 3.5.7 below.

3.5.3 Groundwater Recharge, Flow, and Discharge in the Vicinity of Capital

Precipitation is the main source of water for the groundwater system. In addition, there are small amounts of water entering the shallow aquifer due to landscape irrigation, leaking pipes, and other sources. Some of the precipitation that falls on the ground surface enters the shallow aquifer. The rest is lost to evaporation, transpiration by plants, runoff to the storm sewer system, etc. According to PSC (Section 3.6.2.3, PSC 2003), the highest rates of recharge occur along the east side of the Duwamish Valley because so much of the central valley is covered by impervious surfaces that route runoff to storm sewers.

Stormwater runoff from streets and paved surfaces on and adjacent to Capital flows into catch basins that are managed by the City of Seattle. According to PSC (Section 3.6.1.2, PSC 2003), underground utility pipes are likely to be above the water table most years. Further, areas where pipelines intersect the water table, if present, are likely to be limited. Therefore, the information provided by PSC suggests there is unlikely to be significant preferential seepage pathways for contaminated groundwater along buried utility lines in the vicinity of Capital.

westerly.

Groundwater in the Shallow Aquifer generally follows the topography. It flows in an easterly? direction, and discharges into the Duwamish Waterway, whose water level is close to sea level elevation. The available groundwater elevation data indicate that groundwater in the shallow, intermediate, and possibly the deep aquifers discharges to the Duwamish Waterway.

PSC plotted groundwater elevations on a street map in the vicinity of Capital. Their map (Figure 3-25, PSC 2003), reproduced in this report as Figure 3-7, shows the average elevations of the water table surface based on measurements made in monitoring wells over a period of one year. Groundwater flow direction is perpendicular to the elevation contours shown on Figure 3-7. In the vicinity of Capital, the average flow direction of groundwater in the upper part of the Shallow Aquifer (i.e., above 15-ft bgs) is about south 60° west. The average flow direction of groundwater in the lower part of the Shallow Aquifer (i.e., 30 to 40-ft bgs) is similar, about south 50° west (Figure 3-26, PSC 2003).

3.5.4 Vertical Groundwater Gradients

Groundwater flow in the Shallow Aquifer beneath Capital appears to be horizontal, with a slight downward component, based on information provided by PSC. Figure 9-4a of the PSC RI report shows potentiometric contours beneath Capital's Plant 2 based on averaged groundwater elevations. Groundwater flow direction is perpendicular to these contours. The one year, averaged potentiometric contour is almost 90° (i.e., almost vertical) in the upper Shallow Aquifer and about 87° to 88° in the lower Shallow Aquifer beneath the northern part of Capital (near South Mead Street). Below the southern part of Capital (near South Fidalgo Street) the contour slopes about 80° in the upper Shallow Aquifer and about 76° in the lower Shallow Aquifer. Since groundwater flow is perpendicular to the piezometric contours, groundwater in the upper Shallow Aquifer is expected to move horizontally and in a slightly downward direction beneath Capital. Groundwater in the lower Shallow Aquifer will also move horizontally, but with a steeper downward component. Similarly, contaminants that are dissolved in this groundwater will be transported horizontally and downward as the groundwater moves beneath Capital.

Groundwater flow in the Shallow Aquifer upgradient from Capital (between South Mead Street and South Orcas Street on 4th Avenue South) appears to be horizontal with a slight downward component in the upper Shallow Aquifer and a slight upward component in the lower Shallow Aquifer (Figure 9-4a, PSC 2003). Consequently, contaminants released into the Shallow Aquifer upgradient from Capital would be expected to migrate mostly within this aquifer toward Capital.

3.5.5 Fluctuations in Groundwater Levels

Groundwater levels in PSC's monitoring wells are characterized by seasonal (i.e., having a one year time period) fluctuations superimposed on less prominent shorter- and longer-period fluctuations. These changes correspond with variations in total monthly precipitation (Section 3.6.2.1, PSC 2003). According to PSC, groundwater levels in all three of the aquifers (i.e., shallow, intermediate, and deep) appear to be at least moderately well correlated with the monthly total precipitation values. Further, the groundwater level fluctuations lag the precipitation by at least a month. This correlation between monthly precipitation and groundwater levels suggests that the seasonal variation in precipitation is the primary cause of the seasonal variation in groundwater levels.

The effect of the shorter-period fluctuations is insufficient to mask the seasonal and longer-term fluctuations. However, PSC was unable to evaluate the shorter-period fluctuations because their hydrographs are based on monthly or quarterly water level measurements.

PSC noted that water level elevations in wells with screens in the upper part of the Shallow Aquifer (i.e., above 15-ft bgs) are strongly correlated to water level elevations in wells with screens in the lower part of the Shallow Aquifer (about 30 to 40-ft bgs). This correlation in hydraulic responses indicates that the upper part of the Shallow Aquifer is hydraulically well connected to the lower part of the Shallow Aquifer. Similarly, PSC found that the Shallow Aquifer is hydraulically well connected to the Intermediate Aquifer. A confining unit does not separate these two aquifers.

The water level elevations in wells with screens in the Intermediate Aquifer are not strongly correlated to those of the Deep Aquifer as compared to the Shallow Aquifer. Because the Silt Aquitard separates the Intermediate and Deep Aquifers, they are not hydraulically well connected, at least in the areas where PSC made their measurements.

PSC performed two tidal monitoring studies to evaluate the effect of tidal fluctuations in the Duwamish Waterway on water levels measured in monitoring wells. One of the wells used in the study is well CG-141-WT, which is located close to Capital (i.e., near the intersection of 1st Avenue South and South Fidalgo Street). Well CG-141-WT has a screen located 4.5 to 14.5-ft bgs, which is in the upper portion of the Shallow Aquifer. PSC found that water level fluctuations in CG-141-WT are not influenced tidally.

Because CG-141-WT is located between Capital and the Duwamish Waterway, it is likely that tidal fluctuations in the Duwamish Waterway do not affect groundwater levels in the Shallow Aquifer beneath Capital. Consequently these tidal fluctuations are not likely to affect contaminant transport in the Shallow Aquifer below Capital.

3.5.6 Shallow Aquifer Beneath Capital

Shallow explorations beneath the Capital facility were conducted using direct push drilling methods. The data collected by ECS consists of soil descriptions from the ground surface to a few feet below the water table and the measured depths to groundwater at the time of drilling. Most of these observations were obtained from beneath the Plant 2 and Plant 4 areas. These observations are summarized on Boring Logs in Appendix D.3, D.4, and D.5.

The depth to groundwater was estimated during the direct push subsurface explorations conducted in November 2004, April 2005, and May 2005. The depth to groundwater estimated (at time of drilling) at Capital varied from approximately:

- 7 to 8-ft bgs at locations west, southwest, and south of Plant 2 Canopy
- 8-ft beneath the floor of Plant 2
- 6.5 to 8.5-ft beneath the floor of Plant 2 Canopy
- 8 to 9.5-ft beneath the floor of Plant 4
- 8-ft beneath the floor of Plant 4 Canopy

3.5.7 Groundwater Velocity of Shallow Aquifer Beneath Capital

ESC used the data presented by PSC to estimate groundwater velocity in the vicinity of Capital. The average linear groundwater velocity is calculated to be about 0.30-ft per day (about 100-ft per year) based on the following:

- The average hydraulic gradient (i) is 0.00164 (measured across Capital on Figure 3-25, PSC 2003)
- The hydraulic conductivity (K) is 90.7 ft/day (converted from 0.032 cm/sec, page 3-18, PSC 2003)
- The effective porosity (n_e) is 0.5 (quasi mid-point value chosen from range of 0.44 to 0.59 given on page 3-19, PSC 2003, and assuming a Darcian pore factor of unity)
- The use of equation $V=Ki/n_e$

Contaminant transport is likely to be slower than the average linear groundwater velocity because the contaminant molecules interact with soil particles. As a result of this interaction, the movement of the contaminant molecules is retarded relative to the movement of the water these molecules are dissolved in.

This calculation of average groundwater velocity is a crude estimate based on aquifer properties that are highly variable and potentially difficult to measure accurately. While this estimate is subject to error, it does provide a basis for understanding that groundwater contamination in the vicinity of Capital moves slowly toward the Duwamish Waterway. For instance, it would take a "packet" of groundwater approximately 14 years to travel the 1,500-ft from the Plant 2 area to the Duwamish River (assuming that the hydraulic conditions along the flow path remain similar to those used in the calculation). Contaminant migration will take longer because the contaminant molecules will interact with the soil particles of the aquifer and be retarded relative to the movement of the surrounding water molecules.

3.5.8 Site Hydrogeology and Effects on Contaminant Migration

The information presented in Sections 3.4 and 3.5 of this report can be used to make predictions on contaminant migration in the Capital vicinity. Contaminants released upgradient (i.e., approximately northeast of Capital) can easily reach the Shallow Aquifer because it is relatively close to the ground surface. The contaminants can then migrate downgradient through the sandy aquifer in a southwesterly direction toward Capital. Releases near or at Capital that reach the Shallow Aquifer will migrate in a southwesterly direction toward the Duwamish Waterway. Contaminants dissolved in groundwater in the upper part of the Shallow Aquifer are likely to migrate horizontally and slightly downward, deeper into the aquifer.

Solvents released onto the ground surface can migrate vertically downward into the Shallow Aquifer. A solvent that is denser than water (like TCE) may migrate vertically downward more than horizontally into the aquifer. For instance, a surface spill of TCE upgradient from Capital could migrate vertically downward and travel with the groundwater that flows below Capital.

The Shallow Aquifer contains abundant natural organic matter. This organic matter creates a chemical environment that is favorable for the reductive dechlorination of compounds such as PCE, TCE, DCE, and vinyl chloride. Consequently, the concentration of these compounds is expected to change along the groundwater flow path as degradation compounds successively form and decompose. This pattern of formation and decomposition can become complicated if there are additional sources of these compounds along the flow path.

3.6 DUWAMISH WATERWAY

The Duwamish Waterway is the closest surface water body to Capital. According to the available hydrologic data, groundwater that flows beneath the site discharges to the Duwamish Waterway.

The Duwamish Waterway is the name given to the lower 4.5 miles of the Duwamish River (PSC 2003). This portion of the river was straightened and dredged for navigation around 1917.

The Duwamish River originates at the confluence of the Green and Black Rivers in Tukwila and discharges, through the Duwamish Waterway, into Elliott Bay, an arm of Puget Sound. A 1909 US Geological Survey map (Figure 3-3, PSC 2003) shows the current Seattle street grid existed in the vicinity of Capital and a meander of the Duwamish was located approximately adjacent to the south side of South Fidalgo and South Mead Streets. It further appears that the street grid was bent around this meander of the Duwamish River. Therefore, development at the location of Capital probably took place on preexisting alluvial floodplain soils and not on fill that was placed in a channel of the Duwamish River. Further, development south of the Capital facility probably took place on fill (probably hydraulically-placed fill) placed in this former channel. This potential difference between soil beneath Capital and beneath areas south of, and downgradient from, Capital may affect groundwater movement and/or groundwater geochemistry.

The Duwamish Waterway is approximately 400 to 450-ft wide in the vicinity of Capital. The bottom elevation of the Waterway varies from approximately –49-ft Mean Lower Low Water (MLLW) at the mouth, to +13-ft at the 16th Avenue South Bridge (Section 3.2, PSC 2003).

A dam on the Green River, seasonal precipitation, and storm event runoff affects discharge in the Duwamish Waterway. The discharge typically varies between 200 to 2,000 cubic feet per second (Section 3.2, PSC 2003).

The Duwamish Waterway is tidally influenced by tides at its mouth at Elliott Bay. Tides that vary between –4.6 and +14.8-ft MLLW have been observed on the Waterway. As a result, tide-induced flow reversals occur in the Waterway as far as 13 miles upstream from the mouth (Section 3.2, PSC 2003). These tidal changes in the Waterway can have an effect on groundwater flow in the vicinity of the Waterway.

King County measured salinity in the Duwamish Waterway in 1999 in an effort to calibrate a hydrodynamic and chemical transport model of the Duwamish Waterway and Elliott Bay. King County found diurnal and semi-diurnal changes in salinity that appear to be tidally induced. At the monitoring stations salinity was observed to increase with depth. Because water density increases with salinity, the data indicate that the Waterway is, on average, stably stratified (Section 3.2, PSC 2003). Density differences between the water in the Waterway and groundwater can affect groundwater flow from the aquifers adjacent to the Duwamish Waterway into the Waterway.

A wide variety of ecological and human receptors are associated with the Duwamish River. The development of the appropriate clean up levels (CULs) for soil and groundwater at the Capital facility will consider factors such as the bioconcentration of contaminants in the tissue of aquatic life in the river, the quantity of aquatic life that is consumed, and other issues related to the ecology of the river.

3.7 ECOLOGICAL SETTING

The Capital facility lies on a low gradient, almost flat, surface that was the former flood plain of the Duwamish River. This surface has been modified by filling and grading. The nearest surface water body is the Duwamish Waterway, which is located approximately 1,100-ft west of the western property boundary of Capital.

The land in the vicinity of Capital is zoned industrial or commercial (Figure 3-2). There is little vegetation at the Capital facility and nearly all of the property is covered by impervious surfaces (buildings, pavement). Some exposed soil exists in the material receiving yard located west of Plant 1 along 1st Avenue South. This yard is used to receive and store raw materials for the production processes at Capital. The receiving yard is less than 1 acre in size.

An ecological evaluation for the Capital site is not necessary based on Ecology criteria for determining that no further ecological evaluation is needed when contaminated soil is covered by buildings or pavement (Washington Administrative Code [WAC] 173-340-7491 [1][b]) or when there is less than 1.5 acres of contiguous undeveloped land on the site or within 500-ft of any areas of the site (WAC 173-340-7491 [1][c][i]).

4.0 Preliminary Site Characterization Activities

4.1 CAPITAL INDUSTRIES SITE EVALUATION

This investigation contained many of the work elements normally contained in a Phase 1 environmental site investigation. The goal of this evaluation was to describe site conditions on the Capital property and on adjoining properties as required by the Model Toxics Control Act (MTCA) [WAC 173-340-350 (7)(b)]. The historical uses of chlorinated solvents at the Capital facility are also summarized in this Section.

4.1.1 Capital Industries Historical Documents

Nearly all of Capital's historical records were destroyed in the fire that occurred in January 2004. The most complete source of historical information identified was the submittal by Capital to the USEPA on January 15, 2003 (Capital 2003). This submittal included a summary of the operational and construction history for Capital. This history was summarized in Table 3-1. Capital's submittal also summarized the use of materials regulated by the USEPA.

Ecology recently requested that Capital respond to a number of questions related to chemical/waste handling practices at Capital, and to existing and expired environmental permits (Ecology 2005). Capital's response to these questions is being provided in a companion document to this RI report.

4.1.2 Available Environmental Records

Environmental Data Resources, Inc. (EDR) conducted a search of available environmental records that met the requirements for a government records search prescribed by ASTM Method E 1507-00 (ASTM 2000). A copy of the report that EDR prepared is included in Appendix A.1. A number of sites within a one-quarter mile radius of Capital were identified. The sites identified by EDR that were judged to have the potential for use of chlorinated solvents are shown in Figure 4-1. The locations of these sites are superimposed on a TCE plume map and shown in Figure 4-1.

The EDR search identified that independent remedial actions were conducted at two sites south (downgradient) of the Capital facility: the Mobile Crane Company (5900 2nd Avenue South) and Sahlberg Equipment (5950 4th Avenue South) properties. Summary reports were submitted to Ecology. Mobile Crane removed an underground storage tank (UST) and soil contaminated with hydrocarbons in 1999 – 2000 (Milbor-Pita & Associates, Inc. 1999). Ecology issued a determination that no further action was needed related to this UST in May 2002 (Ecology 2002). The society of St. Vincent DePaul commissioned an Environmental Assessment (EA) of the Sahlberg property in 1993. The EA identified petroleum contamination in soil on the property and volatile organic contamination in groundwater below the property. Neither PCE nor TCE were reported to be present (Applied Geotechnology, Inc. 1993).

Ecology maintains a file on the Art Brass facility located at 5516 3rd Avenue South. Art Brass is a metal plating business that was formerly located directly east of Capital at both 5810 and 5815

4th Avenue South. Ecology inspections at the present location of this facility (5516 3rd Avenue South) conducted in 1998 identified a history of spills and discharges at the facility (Ecology 1998). These spills and discharges were reported to contain metals. Neither TCE nor DCE were mentioned, although TCE was listed as a waste stream at the facility, and a vapor degreaser is used to prepare metals for plating. In August 1999, cyanide solution from a brass-plating tank was observed to be exiting the rear plating shop and running west toward the storm drain at the intersection of Findlay Street and 3rd Avenue South (Hay 1999).

It is judged to be likely that the historic Art Brass facilities at 5810 and 5815 4th Avenue South used TCE to prepare metal parts for plating as well, since TCE was the degreaser of choice during the 1960s – 1980s. This facility is located upgradient from Capital's Plant 4.

Blaser Die Casting, at 5700 3rd Avenue South, was also identified by EDR as a firm for which there were no governmental records. Blaser has been operating at this address or at nearby addresses since approximately 1973. The current ownership purchased the property from Scougel Rubber Corporation in 1996. This facility is located upstream of Capital's Plant 2 near the location of the origin of the TCE plume associated with PSC temporary Well K19 (Figure 4-1).

4.1.3 Sanborn Fire Insurance Maps and Historical City Directory Listings

EDR provided Sanborn Fire Maps for the Capital vicinity for 1917, 1929, 1949, and 1967 (Appendix A.2). These maps identify the activities underway in buildings to aid firemen who may be called to a location to fight a fire. These maps identified a number of potential historical sources of TCE including:

- The south side of the corner of South Orcas Street and 3rd Avenue South (described as waterproofing – 1929 at 313 South Orcas Street, machine shop – 1949, and aluminum casting – 1967) is located upstream of Capital's Plant 2 at the location of the origin of the TCE plume associated with PSC temporary Well K19.
- Potential sources of contamination were historically located between South Mead and South Fidalgo Streets on 4th Avenue South (Art Brass at 5815 4th Avenue South, and a plastics firm in 1967 at 5807 4th Avenue South).
- Several properties to the east of 4th Avenue South may also have contributed to the contamination below Capital Industries. A machine shop (405 South Fidalgo in 1949), an electroplating facility (406 South Fidalgo in 1967), and an auto body shop (405 South Mead in 1967) were also present on the Sanborn maps.

The locations of these sites are superimposed on a TCE plume map and shown in Figure 4-2.

Polk City Directories for the present location of Blaser (5700 3rd Avenue South) and for any addresses between 5700 – 5900 3rd and 4th Avenue South were searched. Polk City Directories for 1961, 1968, 1973, 1978, 1983, 1988, and 1996 were searched electronically. The directory listings are included in Appendix A.3.

The listings found included:

- The property at 5807 4th Avenue South had listings for J.M. Knisely Engineering (1961, 1968, and 1973) and Pacific Testing Laboratory (1978, 1983, 1988, and 1996).
- The property at 5811 4th Avenue South contained only one listing, for American Repair, in 1983.
- The property at 5815 4th Avenue South had listings for Fastway Printer and Copy Center (1973), Art Brass (1973, 1978, 1983), and Advanced Forklift (1988, 1996). This property is currently occupied by Pacific Food Systems.
- Art Brass is also listed at 5810 4th Avenue South in the 1968 Directory.
- Bob's Launderette is listed at 5812 4th Avenue South in the 1961 Directory. If dry cleaning occurred at this facility, the property is a potential source of PCE to the groundwater in the vicinity.
- The first listing for Blaser Tool & Mold appeared in 1973.

The locations of these properties are superimposed on a TCE plume map and shown on Figure 4-3.

Both the Sanborn fire maps and the historic city directories identified a number of potential sources of PCE and/or TCE contamination at locations upstream from the Capital facility. Once again, these potential source areas were most numerous in the vicinity of South Orcas Street and 3rd Avenue South and along 4th Avenue South between South Mead and South Fidalgo Streets.

4.1.4 Aerial Photographs

Aerial photographs of the area surrounding Capital Industries were obtained for 1936, 1946, 1956, 1960, 1974, 1985, and 2002 (Appendix A.4). These photos reveal the following:

1936 – The area now occupied by Capital was residential. The area south of South Fidalgo Street resembles farmland. One commercial-looking building is present in the current location of Blaser. This building also is seen on the 1929 Sanborn map (where it is described as waterproofing, electric motors).

1946 – Commercial buildings can be seen on the east side of 4th Avenue South between Mead and Fidalgo Streets (described as auto repair, gasoline on the 1949 Sanborn map). A store is present on the southwest corner (probably 5807 4th Avenue South) of South Mead Street and 4th Avenue South. Military barracks are seen south of South Fidalgo Street.

1956 – Barracks are no longer present south of South Fidalgo Street. A restaurant is present on the northwest corner of South Mead Street and 4th Avenue South (5714 4th Avenue South). A commercial building is present at 5811 4th Avenue South.

1960 –Commercial structures are seen south of South Fidalgo Street.

1974 – An industrial facility is now present at 5700 3rd Avenue South. Mobile Crane and Sahlberg are present at their current locations. A commercial building is now present at 5815 4th Avenue South. Development has occurred between South Orcas and South Mead Streets on 4th Avenue South. Capital's Plants 2 and 3 are in place. An unpaved storage area is seen to the west of Capital's Plant 2 along 2nd Avenue South. A commercial development on the north side of South Mead Street between 1st Avenue South and 2nd Avenue South is present. The commercial building north of Plant 2 on South Mead Street is present. Some development within the footprint of what is now Plant 1 has taken place.

1985 – Capital's Plants 1 and 4 are present. Nearly all properties surrounding Capital are developed as businesses. Four houses remain along the south side of South Orcas Street to the west of Blaser. These houses appear to contain commercial enterprises.

2002 – This photograph reflects recent conditions at the site.

4.1.5 Potential Upgradient Sources of PCE and/or TCE in Groundwater

Properties discussed in this section represent potential sources of the chlorinated solvents detected beneath Capital Industries. The locations of these properties are shown on Figures 3-4, 4-1, 4-2, and 4-3. This discussion of potential source properties was prepared prior to the field work summarized in Section 5 and is based on the following assumptions:

- Geology shown in the PSC RI report is representative of the geology in the vicinity of Capital Industries
- Groundwater flow directions shown in the PSC RI report are representative of the groundwater conditions in the vicinity of Capital Industries
- Groundwater contamination shown in the PSC RI report is representative of the contamination present in the vicinity of Capital Industries

Blaser Tool & Mold Property – 5700 3rd Avenue South

The PSC RI report shows a TCE groundwater plume, identified by PSC as the K19 plume, originating from a location adjacent to this property. The K19 plume originates from a location upgradient from Capital.

Pre-Blaser Businesses in the Vicinity of 5700 3rd Avenue South

The Sanborn maps identified structures that were used as a machine shop and for waterproofing, glass crafting, and aluminum casting prior to the presence of Blaser in approximately 1970. These structures are also in the vicinity of the K19 plume.

Properties East of Capital Between South Mead and South Fidalgo Streets

The PSC RI report indicates that the concentration of chlorinated solvents in the groundwater increases as the groundwater flows from 6th Avenue South to Capital. These businesses may have contributed to the solvents in the groundwater:

- Former Art Brass (5815 and 5810 4th Avenue South) properties. These properties are located adjacent to Capital's east property line. A vapor degreaser is part of the process Art Brass likely used to prepare metals for plating.
- Former Coin-Op Dry Cleaner (5700 6th Avenue South). Dry cleaners historically used PCE as part of their cleaning process.
- Former Bob's Launderette (5812 4th Avenue South). This property is located adjacent to Capital's east property line. A candidate property if dry cleaning occurred there.
- Pacific Marine Testing (5807 4th Avenue South), located directly east of Capital's east property line. The nature of this business is not known.
- Former Wear Cote Property, now part of Pacific Foods (5811 4th Avenue South), located directly east of Capital's east property line. The nature of this business is not known.

4.1.6 Historical Uses of Chlorinated Solvents at Capital

Capital moved to its present location at 5801 3rd Avenue South in Seattle, Washington in 1965. Since occupying the original Plant 2 building in 1965, Capital has added buildings, equipment, processes and yard space to support expanded operations. These additions are summarized in Table 3-1.

Since it began operation in Plant 2 in 1965, Capital used solvents to prepare metal surfaces for painting. A "waterfall" type paint station was located in the southwest corner of Plant 2 from approximately 1968 to 1978 (Figure 4-4). Solvents would have been used in this area to prepare metal surfaces for painting during this time. It is not known whether chlorinated solvents were used during this time (nearly all of Capital's historical records were destroyed in the fire that consumed Plant 2 and the Capital offices in January 2004). A chemical and paint storage area was established in the area now know as the Plant 2 Canopy area to service the paint station. This area was used for storage from approximately 1968 to 1978 (Figure 4-4). This area was paved in 1965. Although solvents may have been stored in the Plant 2 Canopy area, there is no information indicating that chlorinated solvents were ever stored there.

Painting operations at Capital shifted to the newly built Plant 4 area in about 1978. Metal parts awaiting painting were staged (and are currently staged) in the southern end of what is now know as the Plant 4 Canopy area. Drums containing chemicals and paint were stored in the Plant 4 Canopy area along the west wall of Plant 4 (Figure 4-4). A paint still was installed in this area in 1985. The Plant 4 Canopy was installed in 1985.

Available records show that TCE was used at Capital in 1984 and 1985. TCE was commonly used as a degreaser during this time period, and it was likely used in the Plant 4 Canopy or Plant 4 areas to prepare metal surfaces for painting prior to 1984.

A degreaser unit was installed in the southwest corner of Plant 4 in approximately 1987. One known solvent used in this degreaser was TCE. There are no records or information indicating that other solvents (e.g., PCE) were used. A heated vapor-producing closed tank system was used to degrease metals. Surface oils and debris were removed from metal surfaces prior to subsequent processes such as painting or welding. The solvent tank was periodically replenished either by hand transfer pump and a small transfer container (pouring) or by using a barrel turner attachment and a fork lift truck to transfer directly into the vapor degreaser tank. There was no spent solvent waste. All solvent eventually was lost to evaporation.

The degreaser operated from about 1987 to 1992. One small spill of TCE is known to have occurred in the Plant 4 Canopy area during this time. This spill is discussed in Section 2.3. No TCE was known to reach the floor drain or catch basins as a result of this spill. The use of TCE was discontinued by Capital in 1992. The Capital staff is unaware of any historic or current use of chlorinated solvents in their facility other than the potential use of these solvents to prepare surfaces for painting as discussed above.

As a result of these practices, three potential source areas for chlorinated solvents in the Capital facility were identified: 1) in the central part of the Plant 2 Canopy area, 2) in the southwest part of Plant 2, and 3) in the area surrounding the place where the degreaser was installed in the southwest corner of Plant 4. However, the only known use of chlorinated solvents was in the Plant 4 and Plant 4 Canopy areas.

4.2 INVESTIGATIONS BY PSC

PSC has prepared a RI report as part of its work to clean up its facility located at 734 South Lucile Street in Seattle, Washington (PSC 2003, PCS 2004a, PSC2004b, PSC 2004c, PSC 2004d). PSC's findings related to the concentration of TCE, DCE, and vinyl chloride in groundwater in the vicinity of Capital are summarized in Section 4.2.1. The implications of these findings to the design of the field work conducted by Capital are summarized in Section 4.2.2.

4.2.1 Summary of PSC's Findings Related to Capital Industries

PCE

PCE is a chemical that degrades in the reducing environment of the aquifers beneath Capital to form TCE. Similarly, TCE can degrade under reducing conditions to form DCE, and DCE can degrade to form vinyl chloride. Therefore, an understanding of concentrations of TCE requires that PCE concentrations also be reviewed.

PSC detected PCE at only one location in the vicinity of Capital. PCE was detected at 2.86 μg/l in a groundwater sample from the upper Shallow Aquifer at Well CG-136-WT, which is located near the intersection of South Mead Street and 3rd Avenue South (i.e., a short distance upgradient from Plant 2). PCE was not detected in groundwater samples from the lower Shallow Aquifer or the Intermediate Aquifer in the vicinity of Capital (Figures 9-18, 9-22, and 9-25, PSC 2003)[4]. PSC's data shows that PCE was released upgradient from Capital's Plant 2 and, as a result of in-situ degradation that occurred in the past, it may have contributed to the TCE, DCE, and vinyl chloride detected in the vicinity of Plant 2.

TCE

PSC identified anomalously high concentrations of TCE while investigating the nature and extent of the contaminant plume downgradient of their Georgetown Facility. In particular, PSC identified increases in TCE concentrations in the Shallow Aquifer in the vicinity of Capital (Ecology 2005; Figure 9-19, PSC 2003). Figure 4-5 of this report reproduces PSC's Figure 9-19.

The area with elevated TCE was identified as the "K19/I22 TCE Source Area" on Figure 25 in Ecology 2005. In plan view, the K19/I22 TCE Source Area is about a city block wide. It extends from the southwest corner of the intersection of South Orcas Street and 4th Avenue South, in a southwesterly direction beneath Capital, to beyond the intersection of South Fidalgo Street and 2nd Avenue South. TCE concentrations in the K19/I22 Source Area increase from a low of 145 µg/l beneath South Mead Street (i.e., just upgradient from Capital's Plant 2) to a high of 666 µg/l beneath South Fidalgo Street (i.e., just downgradient from Capital's Plant 2), which suggests there may a source of TCE in Plant 2.

PSC also prepared cross-sections through the K19/I22 TCE Source Area that show TCE concentrations (Figures 9-4a and 9-5, PSC 2003). These PSC figures are reproduced in this report as Figures 4-6 and 4-7. PSC's cross-section C'-C (Figure 4-6 in this report; Figure 9-4a, PSC 2003) shows that TCE concentrations are higher in groundwater beneath Capital's Plant 2 than in groundwater beneath that part of South Mead Street located on the upgradient side of Plant 2. Therefore, Figure 4-6 (Figure 9-4a, PSC 2003) suggests there may be a source of TCE at Plant 2.

PSC's cross-section D'-D (Figure 4-7 in this report; Figure 9-5, PSC 2003) shows that TCE concentrations are higher in groundwater north of Capital's Plant 2 (at borings K19 and K21) than just to the west of Capital's Plant 2 (at boring K23). In addition, TCE looks like it spreads downgradient from boring K19 and lower into the Shallow Aquifer before reaching Capital's Plant 2. Therefore, Figure 4-7 suggests a source of TCE located upgradient from Plant 2 that has spread beneath Plant 2.

The cross-section that is labeled Figure 19b in Ecology 2005 shows that TCE concentrations in groundwater are higher and extend deeper into the Shallow Aquifer beneath Capital's Plant 2 in comparison to upgradient conditions. Therefore, cross section Figure 19b suggests that there may be a source at Plant 2. However, ECS judges cross-section Figure 19b to be a less accurate representation than PSC's two cross sections C'-C and D'-D (Figures 4-7 and 4-8), which represent the same area. PSC represents conditions below Capital with two almost

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[4] PSC did not sample groundwater from the Deep Aquifer in the vicinity of Capital.

parallel cross sections located about 120-ft apart (i.e., C'-C and D'-D). In contrast, cross section Figure 19b represents conditions below Capital with one cross section by projecting data longer distances[5]. In particular, by using data from Well K21, which is located 120-ft north of the cross section, the plume size diminishes upgradient of Capital and expands below Capital. In comparison, cross section D'-D, which uses data from K21 and much shorter projections, shows a continuously expanding and sinking plume emanating from a source upgradient from Capital.

PSC depicts the distribution of TCE in plan view in the upper part of the Shallow Aquifer (referred to as the water table interval), the lower part of the Shallow Aquifer (typically 30 to 40-ft bgs at Capital), and in the Intermediate Aquifer (greater than 50-ft bgs at Capital) in the vicinity of Capital (Figures 9-19, 9-23, and 9-27, PSC 2003). These maps show an area of high TCE concentrations (up to 386 µg/l at Well CG-137) in the upper Shallow Aquifer beneath Capital's Plant 2. Beneath Plant 2, from the upper to the lower Shallow Aquifer, TCE decreases in concentration and in the area impacted (e.g., 377 µg/l down to 2.83 µg/l at J23). Beneath Plant 2, TCE was non-detect in the sample taken from the Intermediate Aquifer (<1 µg/l at J23). These maps also show high TCE concentrations (up to 1,120 µg/l at boring K19) in the upper part of the Shallow Aquifer less than one block upgradient from Capital. The TCE concentrations at this location decrease to non-detect in the lower part of the Shallow Aquifer (<1 µg/l at K19) and in the Intermediate Aquifer. The general impression created by the PSC data is an area where two TCE contaminant plumes, one from upgradient of Plant 2 and the second from under Plant 2, are commingled near Capital.

DCE

PSC detected DCE in water samples from wells both upgradient and downgradient from Capital (Figures 9-20, 9-24, and 9-28, PSC 2003). From the upper Shallow Aquifer, DCE was detected at concentrations up to 993 µg/l (at boring K19) upgradient from Capital. DCE concentrations decrease beneath South Mead Street (just north of Capital) to 75.4 µg/l at CG-136-WT. Downgradient from Capital's Plant 2, DCE was detected at concentrations up to 425 µg/l (at boring I-22). These data suggest the DCE concentrations increase beneath Plant 2 in the upper Shallow Aquifer as groundwater flows below the facility.

From the lower Shallow Aquifer, DCE was detected at concentrations up to 47.3 µg/l (at boring K19 beneath 3rd Avenue South) and up to 107 µg/l (at boring I17 beneath 4th Avenue South), both upgradient from Capital. Downgradient from Capital's Plant 2, DCE was detected at concentrations up to 133 µg/l (at boring I22). These data also suggest that the DCE concentration increases beneath Plant 2 in the lower Shallow Aquifer.

PSC did not detect DCE in samples from the Intermediate Aquifer in the vicinity of Capital.

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[5] The maximum projection distances on PSC's cross sections are about 70-ft to the south and 50-ft to the north for section C'-C and about 10-ft to the south and 10-ft to the north for section D'-D. PSC used all subsurface data within these projection distances. In contrast, on cross section Figure 19b (which is located in the same planes as C'-C) the maximum projection distances are about 100-ft to the south and 140-ft to the north. Figure 19b does not use all information within these projection distances (e.g., K23 is not shown).

The concentrations of DCE and TCE generally correlate in samples from the upper Shallow Aquifer, the lower Shallow Aquifer, and the Intermediate Aquifer. Higher concentrations of DCE were found in locations where higher concentrations of TCE were also present. This apparent correlation supports the idea that the DCE formed from the reductive dechlorination of TCE.

Vinyl Chloride

PSC detected vinyl chloride in water samples from wells both upgradient and downgradient from Capital (Figures 9-21, 9-25, and 9-29, PSC 2003). From the upper Shallow Aquifer, vinyl chloride was detected at concentrations up to 66.4 μg/l (at boring K19) upgradient of Capital. Downgradient from Capital's Plant 2, vinyl chloride was detected at concentrations as low as 2.92 μg/l (at Well CG-137). These data suggest vinyl chloride concentrations decrease beneath Plant 2 in the upper Shallow Aquifer.

Vinyl chloride is widespread in the lower Shallow Aquifer according to PSC's Figure 9-25. Vinyl chloride was detected at 63.2 μg/l at Well CG-136-40 beneath South Mead Street (just upgradient from Plant 2). Groundwater in the lower Shallow Aquifer downgradient from Plant 2 has similar concentrations (58.2 μg/l at boring J23). In contrast, groundwater in the lower Shallow Aquifer downgradient from the Materials Receiving Yard has higher concentrations (245 μg/l at Well CG-141-40). Similarly, groundwater in the lower Shallow Aquifer downgradient from the Plant 2 Canopy area has higher concentrations (597 μg/l at boring K23).

Vinyl chloride was also widespread in the Intermediate Aquifer. A sample with a concentration that is relatively high was collected at a location downgradient from Plant 2 (642 μg/l at boring J23). Because vinyl chloride forms from the breakdown of PCE, DCE, and TCE, and vinyl chloride itself decomposes (to a non-toxic compound, ethene), its concentration is strongly affected by the decomposition rates of these compounds. The decomposition rates are related to microbial processes and may vary widely. Consequently, vinyl chloride concentrations may correlate more with subsurface microbial conditions than with proximity to a source area.

4.2.2 Implications of PCS's RI Results to ECS's Field Investigations

The data collected by PSC demonstrates that TCE and its degradation products are present in groundwater beneath Capital Industries. In particular, the data suggest there may have been a release of TCE in Plant 2 that reached the water table and contaminated the Shallow Aquifer. However, this interpretation is just one of at least four conclusions that can be reached using the data collected by PSC. . These four conclusions are:

- The TCE detected downgradient from Capital's Plant 2 came from releases of TCE (and potentially PCE) from inside Capital's Plant 2. The TCE reached and contaminated the Shallow Aquifer beneath and downgradient from Plant 2. This is PSC's interpretation.
- The TCE detected downgradient from Capital's Plant 2 came from releases of TCE (and potentially PCE) that occurred upgradient from Plant 2. These releases contaminated the Shallow Aquifer upgradient and downgradient from Plant 2. Further, a "slug" (i.e., a relatively large release that occurred over a relatively short time period) of dissolved TCE contamination was released from a source upgradient

from Plant 2. Contamination from this slug has migrated with groundwater in the lower part of the Shallow Aquifer to below Plant 2. Detection of the higher concentration slug downgradient from Plant 2, relative to upgradient concentrations, creates the appearance of a release from Plant 2.

- The TCE detected downgradient from Capital's Plant 2 came from releases of TCE (and potentially PCE) onto the ground outside of Plant 2, but near the southwest corner of Plant 2. This TCE contaminated the Shallow Aquifer. Detection of TCE in groundwater at this location creates the appearance of a release from Plant 2 that impacted groundwater beneath Plant 2.
- Some combination of the events described above contaminated the Shallow Aquifer with TCE. Consequently, there are commingled plumes in the Shallow Aquifer.

The data collected by PSC is not sufficient to identify which interpretation best explains the presence of TCE in groundwater samples collected by PSC near Capital. Interpreting the PSC data for DCE and vinyl chloride is potentially even more complicated. DCE forms by the in-situ degradation of TCE. Vinyl chloride forms similarly by the degradation of DCE. Consequently, the presence of DCE and vinyl chloride depend not only on the source locations for TCE, but also on local environmental conditions that affect the microbes that facilitate these degradation reactions.

A field investigation program was designed to collect information that could be used to assess the validity of each of the four interpretations listed above. This field investigation program is summarized in Section 5 of this report.

4.3 RECONSTRUCTION OF PLANT 2 AT CAPITAL INDUSTRIES

Capital's Plant 2 was destroyed by fire in January 2004. In March 2004, Ecology expressed concern about the possibility of unacceptable health risks to Capital's workers in Plant 2 due to vapor intrusion from below the building (Ecology 2004). Capital collected soil vapor from below the pad of Plant 2, and modeled the concentration of TCE and other contaminants that could potentially impact workers in the rebuilt Plant 2. This work is summarized in Section 4.3.1 and in Appendix B.

Capital also monitored potentially contaminated soils and groundwater that could have been encountered during the reconstruction effort. This work is summarized in Section 4.3.2 and in Appendix B.

4.3.1 Potential for the Migration of Volatile Compounds from Soil Gas to the Breathing Spaces of Site Workers

Soil vapor samples were collected from 12 locations below the slab of the old Plant 2 on April 19, 2004. These locations are identified on Figure 4-8. An on-site laboratory analyzed most samples. Other samples were collected in Summa canisters and sent to an off site laboratory for analysis. The approach to sampling is provided in Appendix B.

The results reported by the on-site laboratory are summarized in Table 4-1. Vapor samples were collected from locations throughout the Plant 2 footprint. Two samples (VP-1, VP-2) were collected in the northeast portion of the Plant 2 footprint in the area where the offices of the new Plant 2 were to be located. These two samples did not contain PCE, TCE, DCE, vinyl chloride, or BTEX at concentrations greater than on-site laboratory detection limits. None of the 12 samples collected from within the footprint of Plant 2 contained benzene or vinyl chloride at concentrations greater than the detection limits (Table 4-1). TCE was detected in two of the 12 samples collected (VP-7, VP-11). These samples were collected from locations in the western portion of the Plant 2 footprint. PCE was detected in 10 of the 12 samples analyzed (all samples except VP-1 and VP-2). This was an unexpected result, as Capital reports that PCE was never used during the operation of its facility, and PCE concentrations reported by PSC to be present in the groundwater below the Capital facility were low (PSC 2003).

The analytical results from the Summa canisters and from the on-site laboratory were judged to be in general agreement. In some instances, higher concentrations of some constituents were detected in the Summa canisters, while in other instances the on-site laboratory reported higher concentrations than were detected in the Summa canisters. A full description of these results is contained in Appendix B.

A mathematical model was used to evaluate the potential for the compounds present in the soil gas to accumulate in the breathing spaces of future office and shop area workers in the new Plant 2. The model was based on the Johnson & Ettinger (J&E) Model (Environmental Quality Management 2000) and Excel spreadsheets provided by the USEPA for the J&E model (USEPA 2002).

The predicted PCE, TCE, DCE, vinyl chloride, and BTEX concentrations in the office and shop areas of the new Plant 2 are summarized in Table 4-2. The Model Toxics Control Act (MTCA) Method B cleanup level (CUL) for each constituent is also included in Table 4-2. When the predicted concentration is divided by the MTCA Method B CUL for the constituent, a safety factor is calculated. The lowest safety factor calculated using the conservative 95 percent upper confidence limit of the mean value of the measured concentrations in soil gas, in the shop area of the new Plant 2 is 16 (for PCE). The lowest safety factor calculated using the 95 percent upper confidence limit in the office area of the new Plant 2 is 20 (for PCE).

Thus, the predicted concentration of the volatile constituents evaluated in the breathing spaces of future shop and office workers is significantly less than MTCA Method B CULs. Based on these results, Capital determined that volatile solvents and BTEX in the groundwater will not impact the air in the new Plant 2.

The original pad below Plant 2 was in place for approximately 39 years. The soil vapor collected from below the pad could have been accumulating throughout that time period. TCE was found at only two locations in the western area of Plant 2 at relatively low concentrations (36, 60 µg/m3). Thus, no clear pattern of soils potentially contaminated with TCE was identified.

4.3.2 Monitoring Soil and Groundwater During the Reconstruction of Plant 2

Capital began rebuilding Plant 2 in the beginning of May 2004. The existing cement slab was removed. A storage vault to contain rain runoff from the roof, footings to support the walls and ceiling of the new facility, and utility trenches were installed in the northeast corner of Plant 2. The installation of these features involved the excavation of soils.

A Soil and Groundwater Monitoring Plan (SGWMP) was prepared as part of the effort by Capital to properly characterize and manage potentially contaminated soil and groundwater that could have been encountered during construction. The SGWMP is provided in Appendix B of this report. The SGWMP described acceptable soil management practices to be followed during trenching, excavation, and grading at the site, soil stockpile management, transportation and appropriate disposal of soil determined to be impacted by volatile contaminants, transportation and appropriate disposal of non-impacted soil, and soil reuse criteria.

A key element of the approach to soil monitoring was the use of a photoionization detector (PID) to screen excavated soils for the presence of volatile substances. A three-foot length of rebar was used to create a vapor pathway in the soils that were tested. The tip of the PID was placed from 4 to 6-in into the pathway created by the rebar. Soils were also placed in a plastic bag. The tip of the PID was also placed in the bag. The bag was sealed and allowed to sit for approximately five minutes. The readings obtained at five minutes were recorded.

The PID was calibrated regularly with both a gas of known composition (isobutylene at 100 parts per million by volume [ppmv]), and by chemically analyzing soil samples that adhered to the slab rubble that was exported from the site. A total of six soil samples were obtained from soil that the PID identified as having background concentrations (a PID reading of 0.1 ppmv) of volatile compounds. PCE, TCE, DCE, vinyl chloride, and BTEX were not detected in any of these soil samples. Sampling and analysis procedures are discussed in Appendix B.

The SGWMP called for the placement of excavated soil that exhibits a PID reading greater than 5 ppmv in a suspect soil stockpile. An environmental consultant was at the site each day that pad removal or soil excavation work was conducted. There were more than 500 PID readings obtained as soil was excavated at the site. A total of approximately 19 cubic yards of suspect soil was encountered during excavation activities (refer to Appendix B for details). This soil exhibited initial PID readings greater than 5 ppmv. On May 21, 2004, some soil that was excavated to create a footing in the southeast corner of the site caused a momentary reading of 1.7 ppmv on the PID. This reading rapidly fell to background levels. This soil was used as backfill on the site. All of the other soils excavated during construction work at the site exhibited background (< or = to 0.1 ppmv) PID readings.

Three samples of the soil from each of the two suspect soil stockpiles were collected and analyzed for PCE, TCE, DCE, vinyl chloride, and BTEX. These constituents were not detected in the soil samples. The soil in both suspect soil stockpiles was judged to be clean. This soil was used as backfill on the site, or disposed of at an offsite facility. Again, no clear pattern of soil contaminated with chlorinated solvents was identified.

The SGWMP also addressed acceptable groundwater management practices. However, groundwater was not encountered during the earthwork that was conducted at the site.

4.4 IDENTIFICATION OF DATA GAPS

Preliminary site characterization activities are discussed in Sections 4.1 through 4.3. This data was assessed to identify gaps in our understanding of the nature and extent of contamination in the Capital vicinity. These data gaps are discussed below.

The field investigations discussed in Section 5 were designed to fill these data gaps and determine whether or not Capital is a significant contributor to the contamination found in groundwater below its facility.

4.4.1 Potential Upgradient Sources of Contamination

The most likely upgradient sources of TCE to the groundwater in the vicinity of Capital are judged to be the Blaser Tool and Mold property, pre-Blaser firms (machine shop, aluminum casting, and others) located in the area of 5700 3rd Avenue South, and the historic businesses that were located along 4th Avenue South between South Mead and South Fidalgo Streets (former Art Brass, Pacific Marine Testing, former Wear Cote, and former Bob's Launderette).

Significant environmental information related to these firms was not found. Direct soil analysis data was not available. The groundwater data available was provided by PSC. Additional groundwater data collected around the perimeter of the entire Capital facility, particularly at locations downgradient from these sources but still upgradient from Capital would help to fill in this groundwater data gap and clarify the issue of whether the TCE plume below Capital is due to upgradient sources, Capital's operations, or due to both upgradient sources and Capital's operations.

4.4.2 Data Gaps – Groundwater

PSC's groundwater investigations were adequate to identify a potential non-PSC TCE source in the vicinity of Capital, but insufficient to evaluate the multiple, closely spaced potential TCE sources that were identified in Section 4.1. Therefore, more closely spaced groundwater samples are needed to better delineate groundwater impacts, particularly along the north boundary of Capital between 2nd Avenue South and 3rd Avenue South, and along Capital's eastern boundary in the vicinity of the former Art Brass, former Bob's Launderette, and Pacific Marine Testing locations.

The number of PSC's groundwater investigation locations was insufficient for comparing downgradient contaminant concentrations to upgradient contaminant concentrations for all locations around the perimeter of Capital's facilities. Conditions upgradient from Capital are important for evaluating potential upgradient impacts to groundwater beneath and downgradient from Capital. Therefore, groundwater samples that surround Capital's facilities are needed.

Additional groundwater samples from within the Capital facility would directly contribute to an understanding of the nature and extent of groundwater under the Capital facility. These samples would be particularly useful if they were obtained in locations where historical uses of chlorinated solvents at Capital could have taken place.

4.4.3 Data Gaps – Soil

Based on the information reviewed, PSC did not describe or analyze soil samples collected from above the water table in the vicinity of Capital for the volatile organic compounds (VOCs) of concern. PSC collected some soil samples below the water table for characterizing the aquifer material. Soil samples collected directly above the well and/or boring locations where PSC detected elevated TCE concentrations would clarify whether these concentrations were due to upstream activities (e.g., operations at Capital) or from a more local spill of solvents directly above the well or boring.

Soil conditions above the water table are important for detecting where releases occurred and where residual concentrations remain. Residual contaminant concentrations in soil can be secondary sources that impact groundwater or soil vapor. Therefore, soil or soil vapor samples collected from above the water table are needed to evaluate potential historical areas where Capital used or may have used chlorinated solvents and for understanding contaminant migration above the water table. In addition, knowledge of soil conditions above the water table is useful for developing preliminary plans for soil and/or groundwater remediation, if needed.

5.0 Field Investigations and Findings

The information summarized in Section 3 and discussed in Sections 4.1 – 4.3 was assessed to identify gaps in our understanding of the nature and extent of contamination in the Capital vicinity. These data gaps are identified in Section 4.4. The field investigations discussed in this Section collected the additional information needed to fill these data gaps and determine whether or not Capital is a significant contributor to the TCE contamination found below its facility.

5.1 OVERALL OBJECTIVES OF THE FIELD INVESTIGATIONS

The overall objective of the field investigations was to identify the nature and extent of TCE and its degradation products in the vicinity of and below Capital's facility and to determine whether or not Capital was a significant contributor to the TCE contamination found in groundwater below its facility.

5.2 IDENTIFICATION OF POTENTIAL CONTAMINANTS OF CONCERN AND TARGET LEVELS

The field investigations focused on TCE and its degradation products, which are the PCOCs that Ecology identified as significant at the Capital site (Ecology 2004, 2005). These PCOCs were among the chemicals of concern (COCs) that PSC discussed in Addendum IV to their RI report (PSC 2004d).

PSC developed what they called 'Final RI Cleanup Levels" in Addendum IV to their RI report. According to PSC *"Final RI Cleanup Levels are identified in the RI to focus the efforts of the feasibility study* [FS] *on areas of the facility* [i.e. the PSC facility] *and the RI Study Area where a remedy may be required to protect human health and the environment. Final RI Cleanup Levels are risk-based levels that provide an estimate of the concentrations to which exposures must be controlled to protect human health and the environment. Final RI Cleanup Levels are used to identify the COCs which will be further evaluated in the FS."*

The process that PSC used to develop the Final RI Cleanup Levels is discussed in revised Section 12 of their RI report and will not be repeated here (PSC 2004d). Some of the considerations that PSC used to develop the Final RI Cleanup Levels for their site are not directly applicable to the Capital site. As a result, the CULs that are ultimately established for the Capital site may differ from the Final RI Cleanup Levels developed by PSC.

The Final RI Cleanup Levels established by PSC were used as target values for the chemicals of interest at Capital. These target values were used to assess the relative concentrations of the PCOCs detected in the groundwater and soils during the field investigations that were conducted. The target values that were used for this investigation are summarized in Table 5-1.

5.3 GROUNDWATER INVESTIGATIONS

Capital completed three groundwater investigations. An initial Geoprobe groundwater investigation was conducted in November 2004. As a follow-up to this investigation, a Gore Sorber soil vapor investigation was performed in February 2005 and Geoprobe soil and groundwater investigations were performed in April 2005 and May 2005.

5.3.1 The November 2004 Geoprobe Investigation

The specific objectives of the November 2004 investigation were to:

- Conduct a screening-level evaluation of solvent (PCE, TCE, DCE, and vinyl chloride) concentrations in groundwater at locations upgradient and downgradient of the Capital facility.
- Estimate depth to groundwater around the Capital facility.
- Characterize groundwater solvent concentrations in four depth intervals between 9 and 37-ft bgs.
- Characterize soil above the water table outside and near the southwest corner of Plant 2. This is a location where PSC identified elevated levels of solvents in groundwater. Soil was collected and analyzed to assess whether the solvent concentrations measured in groundwater were caused by solvent releases to the ground surface outside of the south and west sides of Capital's Plant 2 and Plant 2 Canopy buildings.

The Work Plan that was prepared to guide this investigation is included in Appendix D.1. The Work Plan includes a discussion of the approach to sampling and analysis that was implemented by ECS. A discussion of several key elements of this approach is presented below.

5.3.1.1 Number and Location of Groundwater Samples

A total of 27 Geoprobe locations were sampled. The locations were dispersed around the perimeter of the Capital facility as shown on Figure 3-5. The sample location density was greatest upgradient, downgradient, and to the west of Capital's Plant 2 because Plant 2 was identified by PSC and Ecology as an area where a release of TCE may have contributed to what PSC called the K-19 plume. The PSC K19 plume originates upgradient of Plant 2 (Figure 4-5). The reasoning used to establish each sample location is summarized in Table 5-2.

Groundwater was collected at four depths at most of the 27 Geoprobe locations: 9 to 13-ft bgs, 15 to 19-ft bgs, 21 to 25-ft bgs, and 33 to 37-ft bgs. At three locations, the maximum depth sampled was 21 to 25-ft.

A maximum depth of 37-ft was chosen based on the data collected by PSC (PSC 2003). The PSC data, some of which is included on Figure 4-6, clearly shows that most of the PCE, TCE, and DCE detected in groundwater near Capital is at or above this depth. Vinyl chloride was detected in significant concentrations above and below 37-ft. However, vinyl chloride is a degradation product whose presence is not directly useful for identifying source areas. Consequently, vinyl chloride concentrations were not characterized in the lower Shallow Aquifer and Intermediate Aquifer (e.g. at depths greater than 37 feet).

The four intervals sampled allowed for characterization of 55% of the top 29-ft of the Shallow Aquifer at each Geoprobe location[6]. This was judged to provide a sufficient level of detail to (a) characterize the overall water quality of the top 29-ft of the Shallow Aquifer in the vicinity of Capital; (b) identify concentration hot spots in the vicinity of Capital; and (c) identify potential source area targets for follow-up soil investigations.

5.3.1.2 Sample Collection and Analysis Method

Geoprobe direct-push sampling technology was used to collect groundwater and soil samples. The Geoprobe casing was pushed to the desired depth to collect a groundwater sample. A rod was inserted to hold the temporary well screen in place, and the casing was retracted to expose the well screen to the aquifer. An unused ¼-in plastic tube was inserted to the approximate middle of the screen and groundwater was purged and sampled using a peristaltic pump.

Soil samples were collected by pushing a 4-ft long by 2-in diameter plastic lined core tube into the ground. Soil samples were collected in the following manner. The first core was pushed to 3-ft, removed, subsampled, and logged. The second core was pushed to 6-ft and removed. Then the 4 to 6-ft interval was located, subsampled, and logged. The third core was pushed to 9-ft and removed. The 6 to 9-ft interval was located, subsampled, and logged.

The November 2004 groundwater and soil samples were analyzed by EPA Method 8260A. This was consistent with the objective of conducting a screening-level evaluation of solvent (PCE, TCE, DCE, and vinyl chloride) concentrations in groundwater at locations upgradient and downgradient of the Capital facility. The results of this investigation were used to guide subsequent Phases of the field investigations.

EPA Method 8260A is adequate for a screening level evaluation. The laboratory reporting limits for PCE, TCE, DCE, and vinyl chloride using this method were 2 μg/l for groundwater and 10 μg/kg for soil. These values are above the groundwater target values for PCE (0.2 μg/l), TCE (0.4 μg/l), and vinyl chloride (1.28 μg/l) for the upper water column. They are also above the target values for soil in the upper 15-ft for PCE (1.87 μg/kg), TCE (0.62 μg/kg), and vinyl chloride (1.2 μg/kg). These reporting limits do not exceed the target values for cis- and trans-DCE in groundwater and soil.

These reporting limits were judged to be appropriate since the analytical results obtained are not used to prove that the concentrations measured were below applicable target levels. The reporting limits were judged to be sufficiently low to allow a screening-level assessment of the

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[6] 55% was calculated assuming the water table was 8-ft bgs and four depths were sampled. Samples were taken from 16-ft (vertically) of the aquifer because each of the four sample intervals was 4-ft long (i.e., the length of the temporary well screen). After adding the unsampled intervals, the top 29-ft of the aquifer was investigated since the bottom of the lowest sample interval was 37-ft.

distribution of solvents at locations upgradient and downgradient of Capital facilities, and to determine whether or not a localized source of PCOCs is present at locations near to wells and borings that PSC identified as having elevated levels of TCE in groundwater.

The results of the November 2004 Geoprobe investigation were used to:

- Identify potential future groundwater sample locations
- Provide evidence of upgradient contributors from along the entire northern property boundary of Capital to the solvents in groundwater below Capital
- Identify potential solvent hot spots in groundwater or soil below Capital (if any)
- Determine whether there is solvent contamination located in vadose zone soil[7] that overlays the sample locations where PSC reported elevated concentrations of solvents in groundwater.

The sampling methods and analytical procedures utilized were judged to be appropriate for these uses. Laboratory quality control procedures are documented in Appendix C.1. Sample collection and analysis procedures are documented in Appendix D.1.

5.3.2 April 2005 Geoprobe Investigation

Groundwater samples were collected a second time during the April 2005 Geoprobe investigation. The samples were collected just below the water table (about 9 to 13-ft bgs) at locations judged to be appropriate given the objectives of the investigation. This objective was to identify potential areas below Capital where elevated levels of PCOCs may be present. The reasoning used to establish each location that was selected for groundwater sampling is summarized in Table 5-2. The groundwater collection and analysis procedures employed were very similar to those discussed in Section 5.3.1.2 above. The April 2005 investigation is discussed in more detail in Sections 5.5 and 5.6. The Work plan for the April 2005 investigation is provided in Appendix D.1.

Core recoveries were sufficient in November 2004 so the method was changed only slightly for subsequent soil sampling in April and May 2005. The core tubes were pushed to 4-ft rather than 3-ft. Therefore, soil samples were collected in the following manner. The first core was pushed to 4-ft, removed, subsampled, and logged. The second core was pushed to 8-ft, removed, the 4 to 8-ft interval was located, subsampled, and logged. The third core, where used, was pushed to 12-ft, removed, the 8 to 12-ft interval was located, subsampled, and logged. A third core was used if the second core did not reach the water table.

5.3.3 May 2005 Geoprobe Investigation

Groundwater samples were collected a third time during the May 2005 Geoprobe investigation. The samples were collected just below the water table at locations along the east property line

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[7] Soil not saturated with groundwater that is located between the water table and the ground surface is in the vadose zone.

of Plant 4. The objective was to identify potential areas east and upgradient of Capital that may be contributing PCE, TCE, and DCE to groundwater flowing beneath Capital. The reasoning used to establish each groundwater sample location is summarized in Table 5-2. The groundwater collection and analysis procedures employed were very similar to those discussed in Section 5.3.1.2 above. The May 2005 investigation is discussed in more detail in Sections 5.5 and 5.6. The Work plan for the May 2005 investigation is provided in Appendix D.1.

5.4 NATURE AND EXTENT OF GROUNDWATER CONTAMINATION

The data from the groundwater investigations discussed in Section 5.3 is summarized in this Section. This data was evaluated in an effort to understand the nature and extent of groundwater contamination in the vicinity of and below the Capital facility. In order to evaluate the potential significance of the detected concentration of each PCOC, the concentration is compared to the target level for the PCOC that was established in Section 5.2.

The concentrations of PCE, TCE, DCE, and vinyl chloride that were detected during the November 2004 investigation are listed on Figure 5-1a and Figure 5-1b. The laboratory reports associated with these analyses are contained in Appendix C.1. The laboratory data reported was judged to be suitable for its intended use. The boring logs associated with these investigations are contained in Appendix D.3, D.4 and D.5.

5.4.1 Chlorinated Ethenes

The PCE, TCE, DCE, and vinyl chloride concentrations detected during the November 2004 Geoprobe investigation are summarized on Figure 5-1. Groundwater concentrations detected during the November 2004 investigation, together with the additional groundwater concentrations provided by the April and May 2005 Geoprobe investigations, were contoured for each of the groundwater depths that were evaluated (9 to 13-ft bgs, 15 to 19-ft bgs, 21 to 25-ft bgs and 33 to 37-ft bgs). These contours are presented as Figures 5-2 through 5-5.

PCE

PCE is currently not a widespread contaminant beneath Capital (Figure 5-2). No PCE was detected in the groundwater below Plant 2 or the Plant 2 Canopy although PSC detected low concentrations upgradient from Plant 2 (2.86 µg/l at CG-136-WT). This outcome is consistent with PSC's earlier findings.

Low concentrations of PCE (up to 70 µg/l at ECS28) are present in the upper Shallow Aquifer beneath Plant 4. PCE was detected up to 23 µg/l in groundwater beneath the property line located on the east side of Plant 4. PCE concentrations decrease with groundwater depth but may still exceed the target level of 0.2 µg/l at 19-ft bgs in Plant 4. The extent of PCE that exceeds the target level is limited to the Plant 4 and Plant 4 Canopy areas and potentially to property located east of Plant 4.

PCE is not stable in the reducing environment in the aquifers beneath Capital. The available data shows PCE concentrations decreasing with depth and decreasing with distance from Plant 4. Further, the decrease is accompanied by the presence of degradation products.

Therefore, it is reasonable to conclude that PCE, while present beneath Plant 4 above target levels, is unlikely to exceed target values in the lower Shallow Aquifer and that PCE will not persist in the Shallow Aquifer for the amount of time it is likely to take groundwater below Plant 4 to reach the Duwamish River (15 – 20 years, refer to Section 3.5.7).

PCE is not known to have been used at Capital. PCE may have been used at one of the businesses located adjacent to the east side of Plant 4 of Capital (e.g., the former Art Brass and Bob's Launderette properties). Groundwater samples collected along the east property line contained up to 23 μg/l PCE (Figure 5-2). This data indicates solvent releases may have occurred east of Capital between Plant 4 and 4th Avenue South and contributed to PCE in groundwater beneath Plant 4.

TCE

TCE exceeds the target level of 0.404 μg/l in the Shallow Aquifer beneath Plant 2 and beneath Plant 4 (Figures 5.3a – 5.3d). The highest concentrations were detected beneath the Plant 2 Canopy (up to 630 μg/l at ECS36 in the 9 to 13-ft depth interval); downgradient from the southwest corner of Plant 2 (up to 360 μg/l at ECS6 in the 15 to 19-ft depth interval and 180 μg/l in the 33 to 37-ft interval); and beneath Plant 4 (up to 45 μg/l at ECS28 in the 9 to 13-ft bgs depth interval). TCE was not detected beneath most of Plant 3, most of Plant 1, and the Material Receiving Yards west of Plant 1. The presence of TCE beneath Plant 2 is consistent with findings presented by PSC (PSC 2003).

Plant 2 Canopy and Plant 2 West

The high TCE concentrations detected beneath the Plant 2 Canopy (e.g., the orange area on Figure 5-3a) are continuous with high concentrations from a TCE source located upgradient from Capital. This concentration pattern could have at least two explanations. One possible explanation is that TCE from sources located upgradient from Plant 2 migrated beneath the Canopy. The variable TCE concentrations observed along this flow path may be caused by variable release amounts from an upgradient source (or sources) through time and/or variable decomposition rates. A second explanation could have been that the TCE detected was the result of commingled releases that came from within the Plant 2 Canopy area and from an upgradient source.

To resolve these possible explanations, soil gas was sampled in February 2005 and soil between the floor slab and the water table in the Plant 2 Canopy area was sampled and tested in April 2005 (Section 5.6). No TCE was detected in these samples (Section 5.6.2). Since soil located between the Plant 2 floor slab and the water table did not contain TCE, the data supports the upgradient source explanation. Therefore, a property upgradient from Capital is likely the source of TCE found in the groundwater below Capital's Plant 2 Canopy area.

The high TCE concentrations detected beneath the southwest corner of Plant 2 (e.g., the orange area near ECS6 on Figure 5-3b and the yellow area near ECS6 and ECS7 on Figure 5-3d) is continuous with the high concentrations located upgradient from Capital. However, the concentrations beneath the southwest corner of Plant 2 are significantly higher in the 33 to 37-ft bgs depth interval (180 μg/l at ECS6 beneath the southwest corner versus non-detect at ECS21 and ECS22 along South Mead Street). This pattern could have at least three explanations. One explanation could have been that the TCE from a source located upgradient from Plant 2 migrated beneath the Plant 2 Canopy. TCE concentrations are variable along this flow path due to variable release amounts including a "slug" release, variable decomposition rates, and other causes. PSC's data supports the idea of an upgradient source. For example, Figure 4-7 (taken from Figure 9-5 in PSC, 2003) shows groundwater flow (which is perpendicular to the potentiometric contours) and contaminant migration moving from a source upgradient from Capital downward beneath Plant 2.

A second possible explanation could have been that the TCE observed is the result of commingled releases that came from the Plant 2 Canopy area and from the upgradient source. To evaluate these two explanations, soil gas was sampled and soil was collected from between the floor slab and the water table in the southwest corner of Plant 2 and the Plant 2 Canopy areas. No TCE was detected in these samples (Section 5.6.2).

A third possible explanation could have been that the TCE observed is the result of commingled releases, the first upgradient from Plant 2 and the second downgradient of the southwest corner of Plant 2, but close enough to have affected soil and groundwater at the locations sampled. To evaluate this possible explanation, soil between the ground surface and the water table, located outside of the Plant 2 and Plant 2 Canopy buildings, was sampled and tested. TCE was not detected in these soil samples (Section 5.6).

Since vadose zone soil samples from beneath the Plant 2 Canopy and the southwest part of Plant 2 were found not to contain TCE, it is likely that a property upgradient from Capital is the source of the TCE in the groundwater beneath Capital's Plant 2 and Plant 2 Canopy.

Plant 4 Area

The TCE concentrations detected beneath and downgradient of Plant 4 (the yellow areas near ECS2 and ECS3 on Figures 5-3a and 5-3b) could have at least three explanations. The TCE may be related to a source in Plant 4, a source east of Plant 4, or both. A source east of Plant 4 would have to be located between 4th Avenue South and Capital's property line (e.g., the former Art Brass and Bob's Launderette properties) since TCE was not detected along 4th Avenue South at ECS27. Soil gas and soil were tested below Plant 4 and the Plant 4 Canopy to evaluate whether or not a source exists within Plant 4 (Section 5.6). To evaluate the upgradient TCE source, groundwater was tested along Capital's east property line in May 2005.

TCE was detected in soil above and below the Brown Silt beneath Plant 4 (up to 140 μg/Kg at ECS 30). The detection of TCE in multiple locations in vadose zone soil beneath Plant 4 indicates contaminated soil beneath Plant 4 is likely to be contributing TCE to groundwater beneath Plant 4 (e.g., 20 μg/l at ECS30). However, TCE was also detected in shallow groundwater beneath the east property line (e.g., 18 μg/l at ECS38, Figure 5-3a). This detection at the upgradient property line suggests an upgradient source may also be contributing TCE to groundwater beneath Plant 4.

TCE is not stable in the reducing environment that is present in the aquifers beneath Capital. The available data shows TCE concentrations decreasing with groundwater depth as well as the presence of TCE degradation products. Therefore, it is reasonable to conclude the TCE, while present above target values, is unlikely to persist in the Shallow Aquifer for the estimated 15 – 20 years that it takes groundwater below Capital to reach the Duwamish River (Section 3.5.7).

DCE

DCE is a degradation product of TCE. However, DCE also can degrade into vinyl chloride. DCE's concentration, therefore, depends on the presence of TCE and the balance between these two competing degradation rates. Because aquifer conditions vary, the balance between the degradation rates varies as well.

DCE's distribution in groundwater is partially related to nearby or upgradient TCE sources (Figures 5-4a through 5-4d). For example, in the 9 to 13-ft depth interval, DCE is highest beneath Plant 2 and Plant 4 in the same general locations where TCE concentrations are elevated and in locations downgradient from where TCE concentrations are elevated. A similar pattern is observed in the 33 to 37-ft depth interval in samples from ECS6 and ECS7 (i.e., near the southwest corner of Plant 2). This pattern suggests some DCE is forming from nearby TCE.

Some DCE is flowing below Capital from sources located upgradient from Capital (e.g., ECS15 to ECS17, ECS19, and ECS20 in the 21 to 25-ft depth interval). These upgradient sources appear to be responsible for some of the DCE detected downgradient from Capital. For example, there is not any credible evidence that the DCE detected at depth (ECS11 and ECS12 in the 21 to 25-ft depth interval) downgradient from Plant 1 is related to releases from Plant 1. Figures 5-4a through 5-4d show total DCE, which is the sum of the two isomers *cis*-1,2-DCE and *trans*-1,2-DCE. The *cis* isomer is most abundant in groundwater beneath Capital. The target value for *cis*-1,2-DCE is 72.7 μg/l and the target value for *trans*-1,2-DCE is 65.3 μg/l. In the 9 to 13-ft and 15 to 19-ft sample intervals, DCE exceeds target values at locations where TCE exceeds target values. However, in deeper sample intervals, DCE exceeds at some locations where TCE does not.

In summary, some of the DCE detected downgradient from Capital is likely coming from upgradient sources. DCE also is forming from TCE as it degrades below Capital. The DCE present downgradient from the Plant 2 Canopy (9 to 13-ft) and the southwest corner of Plant 2 (15 to 19-ft and 33 to 37-ft) is likely due to the combination of the DCE contributed by upgradient sources and the DCE created by the degradation of TCE as the TCE flows below Capital.

Vinyl Chloride

Vinyl chloride is a degradation product of DCE (and its precursors). Like DCE, its concentration is partially related to nearby and upgradient DCE sources (Figures 5-5a to 5-5d). In the shallow sample interval (9 to 13-ft depth interval), vinyl chloride was detected at ECS36 (1.8J μg/l) beneath Plant 2 Canopy where TCE and DCE were detected along the ECS20 to ECS9 and ECS9 to ECS10 groundwater flow paths. This was the only location beneath Plant 2 and Plant 2 Canopy where vinyl chloride was detected in the shallow sample interval. In the 15 to 19-ft depth intervals, higher amounts of vinyl chloride were detected and appear related to upgradient DCE sources. In the deeper sample intervals, vinyl chloride is widespread beneath Capital and appears related to upgradient sources (ECS15 to ECS17, ECS19, and ECS20). The highest vinyl chloride concentrations detected are beneath Plant 1 and the Materials Receiving Yard (e.g., up to 780 µg/l at ECS14 in the 33 to 37-ft depth interval). There is no credible evidence for PCE or TCE sources in these areas based upon groundwater analyses (Figure 5-5d) or documented past Capital operating practices.

The target value for vinyl chloride is 1.28 µg/l in groundwater above 20-ft bgs and 2.04 µg/l for groundwater below 20 ft-bgs. In the 9 to 13-ft depth interval, a small area beneath Plant 2 and the Plant 2 Canopy may exceed this target level. The areas that exceed the target value for vinyl chloride increase with depth to the 33 to 37-ft interval, where essentially the entire aquifer upgradient from and beneath Capital exceeds this CUL.

5.4.2 Other Compounds

Several compounds were detected in groundwater in addition to the compounds listed on Figure 5-1. These compounds are listed in Table 5-3, and include benzene, chloroethane, and 1,1,1 trichloroethane. None of these compounds was wide spread or detected in groundwater at concentrations above target values.

5.5 SOIL INVESTIGATIONS

There have been four soil investigations at Capital and all have characterized soil conditions above the water table (i.e., vadose zone soil). A limited number of soil samples were collected and analyzed during the November 2004 Geoprobe investigation (Sections 5.3 and 5.4). As a follow-up to this investigation, a Gore Sorber soil gas investigation was performed in February 2005. The Gore Sorber soil gas results were used to select the locations of additional Geoprobe soil samples. These samples were collected during the April and May 2005 Geoprobe investigations. The specific objectives and sampling and analysis approach used during each of these soil investigations is discussed below.

5.5.1 Description of November 2004 Geoprobe Soil Investigation

One specific objective of the November 2004 investigation was to characterize soil above the water table a short distance outside of the southwest corner of Plant 2 and outside of the west side of the Plant 2 Canopy. It was in this general location that PSC identified elevated levels of solvents in groundwater. Soil samples were collected above the water table to assess whether the TCE that PSC detected was the result of a source of contamination located above the wells (i.e., outside of Capital's buildings). Soil samples were collected and analyzed from two or more different depth intervals at locations ECS6 through ECS9 (Figure 3-5).

The Work Plan that was prepared to guide this investigation is included in Appendix D.1. The Work Plan includes a discussion of the approach to sampling and analysis that was implemented by ECS. The sampling and analytical methods are described in Section 5.3.

The results of this soil investigation are summarized in Section 5.6.2. No chlorinated solvent compounds were detected in these soil samples.

5.5.2 Description of February 2005 Gore Sorber Soil Gas Investigation

Gore Sorbers are patented passive soil gas sampling devices that have been used at a wide variety of facilities to identify the location of areas that contain elevated concentrations of compounds of interest in soil gas. The elevated soil gas concentrations are often associated with contaminant hot spots in soil and groundwater. The technology has been assessed by the USEPA (USEPA 1998).

The Gore Sorber investigation was designed to evaluate chlorinated solvent (PCE, TCE, DCE, and vinyl chloride) concentrations in soil gas. The goal was to identify soil that is located above the water table that is potentially contaminated with chlorinated solvents that were previously detected in groundwater. Soil in the identified areas was subsequently sampled using Geoprobe direct push methods.

The Gore Sorber modules were placed in soil over and around groundwater that contains elevated TCE. The goal was to identify areas of contaminated soil (i.e., possible release locations) associated with three areas of TCE-elevated groundwater that were identified during the November 2004 Geoprobe investigation. The three areas are situated (a) between sample locations ECS9 and ECS20 (Plant 2 Canopy area); (b) upgradient from sample location ECS6 (western portion of Plant 2 area); and (c) upgradient from sample location ECS2 (Plant 4 area).

Thirty of these devices were placed in the three areas that were judged to be locations of potential prior sources of TCE contamination. Each Gore Sorber was placed at least 5-ft from a footing or deep machine foundation and in a floor area not occupied by equipment. The Gore Sorbers were placed in the soil below the floor pads in the Plant 2 Canopy, the western portion of Plant 2, and the Plant 4 areas of the Capital facility. They were set about 2 to 3-ft bgs, left in place for 2 weeks, and removed in March 2005. The Gore Sorber sample locations are identified on Figure 3-5. The selection criteria utilized for each location is listed in Table 5-2. The work plan that guided this work, the sampling approach utilized to install and remove the Gore Sorbers, and the methods used to analyze the soil vapors adsorbed by the Gore Sorber modules is included as Appendix D.2. The boring logs for this investigation are contained in Appendix D.3.

The Gore Sorber modules were analyzed by Gore using a modified EPA Method 8260/8270. The volatile contaminants collected by the modules were thermally desorbed from the module. The desorbed gases were passed through a gas chromatograph and mass selective detectors. Gore uses an analytical QA approach that is equivalent to EPA Level 2 QA procedures (i.e., appropriate for screening level results). The analytical results were expressed in micrograms of each chemical that were adsorbed to each sample device, rather than a concentration.

The Gore Sorbers adsorbed any VOCs present in soil gas during the 2-week monitoring period, then they were retrieved and sent to Gore for analysis. The results obtained were used to identify targets for the subsequent April 2005 Geoprobe investigation. Soil and groundwater samples were then collected at each target location using Geoprobe direct push methods.

5.5.3 Description of April 2005 Geoprobe Investigation

The April 2005 Geoprobe investigation was designed to evaluate the presence (or absence) of solvent-contaminated soil located above the water table in selected areas of interest within the Capital facility. The Gore Sorbers did not detect any significant hot spot areas in the vadose zone soil beneath the Plant 2 or Plant 2 Canopy areas (Section 5.6). Consequently, the Geoprobe soil samples below Plant 2 and the Plant 2 Canopy were collected at five locations judged to have the highest potential for contamination, based on the Gore Sorber and groundwater results and the review of historical practices at Capital.

The Gore Sorbers identified an area beneath Plant 4 and the Plant 4 Canopy that was likely to contain VOC concentrations above target levels. Consequently, Geoprobe soil samples were taken at five locations in the Plant 4 and Plant 4 Canopy area.

Soil samples were collected at locations ECS28 through ECS32 in the Plant 4 area and at locations ECS33 through ECS37 in the Plant 2 and Plant 2 Canopy areas (Figure 3-5). The specific criterion used to select each location is listed in Table 5-2.

The Work Plan that was prepared to guide this investigation is included in Appendix D.1. The Work Plan includes a discussion of the approach to sampling and analysis that was implemented by ECS. Soil samples were collected using methods described in Section 5.3. The boring logs for each sample location are contained in Appendix D.4.

The soil subsamples for chemical analysis were collected in accordance with USEPA Method 5035[8]. The analytical methods selected for the analysis of the soil samples was USEPA Method 8260 and 8260B. The reporting limits for PCE, TCE, DCE, and vinyl chloride that were established by C.C.I. Laboratories, Inc. (CCI) for Method 8260 were 5 μg/kg for soil. This reporting limit is above the target value for the upper 15-ft of soil for PCE (1.87 μg/kg), TCE (0.62 μg/kg), and vinyl chloride (1.2 μg/kg). CCI was selected to analyze the soil samples collected below the Plant 4 areas since it was anticipated that these samples would exhibit TCE concentrations above 5 μg/kg. The CCI laboratory report is included as Appendix C.3. The results of these analyzes are discussed in Section 5.6.

Analytical Resources Inc. (ARI) analyzed the soil samples collected from below Plant 2 and the Plant 2 Canopy. ARI used EPA Method 8260B to achieve reporting limits of 0.8 to 1.3 μg/kg (depending on the size of the soil sample available), with method detection limits of 0.4 μg/kg (for PCE, TCE, and vinyl chloride). These lower detection limits were used since it was anticipated that the concentration of contaminants in soil below Plant 2 and the Plant 2 Canopy

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[8] EPA Method 5035 requires pushing a capsule into the soil to obtain a sample. The capsule is capped and sent to the laboratory for analysis. At the laboratory, the soil is uncapped and ejected from the capsule into a vial for weighing and extraction. After ejection, the vial is capped and the soil does not come into contact with the atmosphere again. This contrasts with the most commonly used older method whereby a spoon is used to transfer the soil sample into a jar. The jar is capped and sent to the laboratory where the soil is removed with a spoon, placed in a vial for weighing and extraction. Using the old method, the soil is exposed more to the atmosphere because it is transferred twice by spoon.

would be below target levels. The ARI laboratory report is included in Appendix C.4. The results of these analyzes are discussed in Section 5.6.

5.5.4 Description of May 2005 Geoprobe Investigation

The May 2005 Geoprobe investigation was a follow up to the April 2005 Geoprobe investigation. The April 2005 Geoprobe investigation revealed that vadose zone soil beneath Plant 4 contains PCE and TCE, both of which were detected in groundwater beneath Plant 4. The May 2005 investigation sought to identify the eastern boundary of this soil contamination.

Soil samples were collected at locations ECS38 through ECS41 in the Plant 4 area (Figure 3-5). The criteria used to select each location are listed in Table 5-2.

The Work Plan prepared to guide this investigation is included in Appendix D.1. The Work Plan includes a discussion of the approach to sampling and analysis that was implemented by ECS. Soil samples were collected using methods described in Section 5.3. The boring logs for each sample location are contained in Appendix D.4.

The east property line was inaccessible so angled explorations, using direct push (Geoprobe) methods, were used. The methods were the same as used before except the core tubes were oriented due east at an angle of 60° below the horizontal. The drilling location was inside Plant 4 within about 4.2-ft of the property line.

The soil subsamples for chemical analysis were collected in accordance with USEPA Method 5035. The analytical methods selected for the analysis of the soil samples were USEPA Methods 8260 and 8260B. The reporting limits for PCE, TCE, DCE, and vinyl chloride that were established by C.C.I. Laboratories, Inc. (CCI) for Method 8260 were 5 μg/kg for soil. This reporting limit is above the target value for the upper 15-ft of soil for PCE (1.87 μg/kg), TCE (0.62 μg/kg), and vinyl chloride (1.2 μg/kg). CCI was selected to analyze the soil samples collected below the Plant 4 areas since it was anticipated that these samples would exhibit TCE concentrations above 5 μg/kg. The CCI laboratory report is included as Appendix C.5. The results of these analyzes are discussed in Section 5.6.

5.6 NATURE AND EXTENT OF SOIL CONTAMINATION

5.6.1 Gore Sorber Soil Gas Results

The reasons for selecting each Gore Sorber location are summarized in Table 5-2. The Gore Sorber laboratory results are summarized on Table 5-4. The Gore laboratory report is included in Appendix C.2.

Plant 2 Canopy Area

The purpose of sampling soil gas beneath the Plant 2 Canopy area was to locate contaminated soil that is potentially contributing TCE to groundwater. However, TCE was not detected in soil gas beneath the Plant 2 Canopy. PCE and TCA were detected in relatively low amounts. That is, soil vapor amounts detected beneath Plant 2 Canopy are low (by about two orders of magnitude) relative to amounts detected beneath Plant 4 even though groundwater TCE concentrations beneath Plant 2 Canopy are much higher (by about one order of magnitude) than the concentrations detected in groundwater below Plant 4.

The soil gas analyses for PCE and TCA were contoured by Gore (Figures 5-6a and 5-6b). The highest PCE was detected at location GS 68. The second highest detection was at GS 64. Since PCE degrades to form TCE, follow-up soil testing was accomplished in these areas (ECS36 and ECS34). In addition, soil was tested at GS 71. GS 71 appears to be upgradient from the higher TCE concentrations in groundwater detected at ECS6 at 9 to 13-ft bgs. Soil samples were collected at GS 71 (ECS37) to obtain soil over the northern portion of the groundwater TCE plume.

The quantity of TCA adsorbed was highest at location GS 67. TCA is not a precursor to TCE. However, soil samples were collected at a location near GS 67 (i.e., ECS35).

Plant 2 West

The purpose of sampling soil gas in the southwest Plant 2 area was to locate TCE-contaminated soil that is potentially impacting groundwater. Groundwater contaminated with TCE to depths of 37-ft bgs was detected at this location. However, TCE was not detected in soil gas beneath the southwestern part of Plant 2. PCE and TCA were detected in relatively low amounts.

The purpose of sampling soil gas in the northwest Plant 2 area was to locate TCE contaminated soil that is potentially impacting groundwater. Groundwater contaminated with TCE to 13-ft bgs was detected along the flow line between ECS20 and ECS9 (mostly beneath Plant 2 Canopy). However, TCE was not detected in soil gas beneath the northwestern part of Plant 2. PCE was detected in relatively low amounts.

The soil gas analyses for PCE and TCA were contoured by Gore (Figures 5-6a and 5-6b). The highest PCE was detected at location GS 90. Follow-up soil samples were collected at location GS 81 (located approximately 19-ft east of GS 90 (because groundwater TCE concentrations are higher at ECS6 than at ECS7). TCA was not evaluated further because it does not degrade to form TCE and is not present in groundwater above target levels beneath Plant 2.

Plant 4 Area

The purpose of sampling soil gas in the Plant 4 area was to locate contaminated soil that is potentially adding TCE to groundwater. Groundwater contamination was detected in this area as a result of the November 2004 Geoprobe investigation. Relatively high quantities of PCE and TCE (compared to the results obtained in the Plant 2 area) were detected in soil gas in this area.

The soil gas analyses for PCE and TCE were contoured by Gore (Figures 5-7a and 5-7b). The highest concentration of PCE was detected at location GS 57 and the second highest concentration was detected nearby at GS 56. Lower amounts were also detected in the Plant 4 Canopy area.

The highest TCE quantity was detected at location GS 55 and the second highest quantity was detected nearby at GS 57. Lower amounts were detected in the Plant 4 Canopy area. Follow-up soil samples were collected in both the Plant 4 (ECS28 through ECS31) and Plant 4 Canopy (ECS32) areas because of the relatively high amounts of TCE detected in soil gas and because TCE is elevated in groundwater in this area.

5.6.2 November 2004, April 2005, and May 2005 Geoprobe Soil Sample Test Results

Geoprobe soil samples were collected at locations ECS6 through ECS9 in November 2004, at locations ECS28 through ECS37 in April 2005 and at locations ECS38 through ECS41 in May 2005. This data is summarized on Figures 5-8 and 5-9 and in Table 5-4. At least two depth intervals were sampled and analyzed at each location. A sample was generally collected from at or near the top of the Brown Silt and at or near the bottom of the Brown Silt. The Brown Silt layer is illustrated on Figure 3-6. These intervals were sampled because contaminants released onto the ground surface would be expected to spread laterally and sorb readily to the Brown Silt more than to the overlying and underlying soils, which have coarser textures. This sampling method is more likely to detect contamination than sampling at the same depth interval at each location without consideration of the geology. During the May 2005 investigation, other soil layers in addition to the Brown Silt were sampled and analyzed. The laboratory reports for the soil data are located in Appendices C.1, C.3, C.4 and C.5. Boring logs that describe soil conditions and sample intervals are located in Appendices D.3, D.4, and D.5.

Plant 2 Canopy

Samples collected in November 2004 at locations ECS8 and ECS9 outside of the Plant 2 Canopy building (Figure 5-8) did not detect any chlorinated ethenes in soil above the water table. This means that the TCE detected in groundwater at these locations, as well as in PSC's wells GC-137-WT and CG-137-40, probably did not come from releases onto the ground surface outside of the Canopy building.

The only chlorinated ethene detected in vadose zone soil beneath the Plant 2 Canopy area was PCE (Figure 5-8). PCE was detected at very low concentrations at location ECS35 (2.5 μg/kg at the top of the Brown Silt; not detected at the bottom of the Brown Silt) and ECS34 (estimated 0.5 μg/kg at the bottom of the Brown Silt, not detected at the top). PCE was not detected at the other two exploration locations. The target level for PCE is 1.87 μg/kg.

PCE is a PCOC at this location because it can degrade to form TCE, which is present in groundwater in this area. The PCE concentrations detected in soil are low, so low they are near or below many laboratories' reporting limits (typically 2 to10 μg/kg). Moreover, PCE was detected in only 2 of the 8 soil samples collected beneath the Plant 2 Canopy and it was only detected in very low amounts in soil gas.

No TCE was detected in the soils below the Plant 2 Canopy. Therefore, the data indicates that the TCE in groundwater beneath the canopy is caused by sources upgradient from Capital and not from PCE or TCE releases by Capital in the Plant 2 Canopy area.

No other chlorinated solvents were detected in soil from this area (Appendix C.4).

Southwest Corner of Plant 2

Samples collected in November 2004 at locations ECS6 and ECS7 outside of the Plant 2 Canopy building (Figure 5-8) did not detect any chlorinated ethenes in soil above the water table. This means that the TCE detected in groundwater at these same locations, as well as in PSC's earlier explorations, probably did not come from releases onto the ground surface outside of the Plant 2 building.

PCE and TCE were not detected in the samples collected at location ECS33 inside Plant 2 (Figure 5-8). Nor was significant PCE or TCE detected in this area by the Gore investigation. TCE detected in groundwater at this location is likely to have originated from a source or sources upgradient from Capital and then subsequently migrated beneath Plant 2, and not from TCE releases by Capital in the Plant 2 area.

No other chlorinated solvents were detected in soil from this area (Appendix C.4).

Plant 4 Area

PCE and TCE were detected in vadose zone soil beneath Plant 4 including soil along the property line (ECS38 through ECS41). TCE was detected beneath the Plant 4 Canopy area. These chemicals were detected in samples collected near the top and bottom of the Brown Silt layer. They were also detected in the sandy Fill located just beneath the concrete floor slab at locations ECS39 and ECS40 (Figure 5-9). Target levels were exceeded for PCE, TCE, and DCE in many of the samples analyzed. This data is consistent with the results of the Gore Survey, which earlier detected the same compounds in this area. Other VOCs were not detected.

This data indicates that the Brown Silt layer, and potentially the overlying Fill, located beneath approximately the southern third of the footprint of Plant 4 are contaminated with PCE, TCE, and DCE in concentrations that exceed target levels. Limited sampling indicates the Brown Silt beneath potentially the southern third of the Plant 4 Canopy is contaminated with TCE in concentrations that exceed target levels. Because these same chemicals have been detected in groundwater and the bottom of Brown Silt is located near the water table (e.g., one foot), it is likely that the contaminated soil beneath Plant 4 and Plant 4 Canopy is contributing these chemicals to the underlying groundwater.

Activities associated with preparing metal surface for painting prior to the time that the degreaser was installed in approximately 1987 occurred in the southern portion of the Plant 4 Canopy area. These activities could have caused the TCE contamination in this area.

The origin of the PCE is not clear. The PCE may have been used in the historical activities which took place in Plant 4, it may be related to releases from off site historical activities to the east of Plant 4 (e.g., the former Art Brass and Bob's Launderette), or it may have come from multiple sources. Capital has no record or knowledge of having used PCE for any purpose.

The detection of PCE in groundwater at Plant 4's east property line suggests there may have been upgradient releases. Therefore, the available data suggests PCE may have come from both Capital and an upgradient source.

5.7 CONCLUSIONS – SOIL AND GROUNWATER CONTAMINATION

TCE was detected in groundwater beneath the southwestern portion of Plant 2 and beneath the Plant 2 Canopy. The relatively high concentrations in these areas are continuous with an off site and upgradient source.

DCE and vinyl chloride are also present in groundwater beneath Capital. There is no evidence these chemicals were ever used at Capital. The data indicate that some DCE and vinyl chloride are coming from upgradient sources while the rest is forming from the degradation of TCE, and potentially from PCE, in the Plant 4 area.

Geoprobe soil samples were collected in November 2004. These samples were collected at locations ECS6 through ECS9 outside of the southwest walls of Plant 2 and the Plant 2 Canopy. No chlorinated ethenes were detected in soil above the water table at these locations. This means that the TCE detected in the groundwater by PSC and by Capital in these areas did not come from releases onto the ground surface at these locations.

In February 2005, thirty Gore Sorbers were installed in three areas that were judged to be locations where historical Capital practices may have released chlorinated solvents and where TCE concentrations were the highest in groundwater. TCE was not detected in the soil vapor adsorbed by the Gore Sorbers installed in soil below Plant 2 or the Plant 2 Canopy. Very low quantities of PCE and TCA were detected.

TCE and PCE were detected in the soil vapor adsorbed by the Gore Sorbers installed in soil below approximately the southern third of Plant 4 and the Plant 4 Canopy.

The results of the Gore Sorber samples were used to identify the five locations each within Plant 2 and the Plant 2 Canopy, and within Plant 4 and the Plant 4 Canopy that were judged to contain the highest concentrations of chlorinated ethenes. Geoprobe soil samples were obtained at these locations during April 2005.

PCE was detected (at 2.5 μg/kg) at one location on top of a silt layer below the Plant 2 Canopy. PCE was not detected below the silt layer at this location. No PCE was detected in groundwater below the Plant 2 or Plant 2 Canopy areas. No TCE was detected in the soil below the Plant 2 or Plant 2 Canopy areas.

These direct soil analytical results, together with the Gore Sorber results obtained during February 2005 and the continuous nature of the TCE groundwater plume, indicate that the TCE in groundwater beneath Plant 2 and the Plant 2 Canopy is likely caused by sources upgradient from Capital and not from TCE releases by Capital in these areas.

PCE and TCE were detected in the vadose zone soil at concentrations exceeding target levels beneath the southern third of Plant 4 and the Plant 4 Canopy during Geoprobe sampling in April and May 2005. TCE and PCE were also found in groundwater collected from the eastern boundary of Capital in May 2005.

The direct soil analytical results, together with the Gore Sorber results obtained during February 2005 and the May 2005 groundwater testing along the eastern boundary of Capital, indicate that activities associated with Capital's historic use of Plant 4 and the Plant 4 Canopy could have contributed to the TCE detected in soil and groundwater in the Plant 4 and Plant 4 Canopy areas. The TCE and PCE detected below Plant 4 may also be related to releases from off site historical activities to the east of Plant 4 (e.g., the former Art Brass and Bob's Launderette properties). The origin of the PCE is not clear. Capital has no record or knowledge of having used PCE for any purpose.

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Draft Remedial Investigation Report

Capital Industries Site,
Seattle, Washington

Tables

JUNE 2005

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Table 2-1
Summary of Prior Environmental Investigations at Capital

Date	Document Title	Reference
October 30, 1991	UST Independent Cleanup Action, Former Knight's Restaurant, Seattle, Washington	Dames & Moore 1991
October 13, 1998	Phase 1 Environmental Site Assessment, Vacant Lot Located at 5280 1st Avenue South, Seattle, Washington	Dames & Moore 1998
February 23, 2000	Consultation No. 501574916	Washington L&I 2000
July 6, 2004	Soil Vapor and Construction Management Report	FSM 2004

Table 3-1
Evolution of Operations at Capital

Date	Description of Expansion of Operations
1965	Original main building (concrete tilt-up) is constructed and occupied to include operations and office space. This building is now identified as Plant 2.
1973	Container manufacturing building (concrete tilt-up) is constructed and occupied east of 3rd Avenue South, across from the original structure. This building is now identified as Plant 3. The street between the two buildings, 3rd Avenue South, is vacated by the City of Seattle.
1978	Installation of a heavy 30-foot press requires pilings and a special foundation be constructed in Plant 2 (Main building).
1978	Paint building known as Plant 4 (concrete tilt-up) is constructed adjacent to Plant 3 on the east side.
1980	Shear building known as Plant 1 (concrete tilt-up) is constructed adjacent to Plant 2 (Main building), west across 2nd Avenue South.
1981	Installation of a second 30-foot press in the yard outside of Plant 2 on the west side of the building under a temporary awning.
1982 (approximately)	The underground fuel tank (500 gallon capacity) located outside Plant 2 on the southwest corner is drained and capped.
1983	A roof canopy is built over the outside 30-foot press on the west side of Plant 2.
1985	A roof canopy is built linking Plant 3 and Plant 4 on the south end of the area between the two buildings.
1985	The Ellez property, west of Plant 1 to 1st Avenue South, is acquired. A house and a tavern are demolished and removed soon thereafter. This area is now the Plant 1 material receiving and storage yard.

Table 3-1
Evolution of Operations at Capital

1991	The Kirkham property, on the corner of Mead Street and 4th Avenue South, acquired in 1984, is developed. Construction activity includes the removal of the Knight's Diner rail car and a heating oil tank from the site. Dames & Moore oversees an underground storage tank removal and site cleanup. A new product inventory yard for Plant 3 Container operations is constructed on the site.
1992	The original paint booths in Plant 4 are upgraded with new filter systems, ducting, doors, and an extension of one booth enclosure.
1993-1994	The west canopy of Plant 2 is completed to the north side of the canopy section constructed in 1983.
1993	Installation of the 5-stage aqueous wash line in Plant 3 near the south wall, including floor sealing and construction of a concrete spill containment berm area around the equipment.
1994	The canopy between Plant 2 and Plant 3 is extended to the north.
1995	Installation of the Finn-Power CNC machine in Plant 2.
1997	The paint booth air make-up furnace is replaced in Plant 2.
1998	The Chinn property, on the corner of 1st Avenue South and Fidalgo Street, is acquired. Dames & Moore performs a Phase I Site Assessment.
1998	Installation of the Bystronics 4020 CNC laser machine in the northeast corner of Plant 1.
2001	Installation of the Bystronics 4025 CNC laser machine on a reinforced concrete pad outside the west wall of Plant 2 under the canopy north of the outside 30-foot press.
2002	Removal of the 5-stage wash line system in Plant 3.
2004	Plant 2 destroyed by fire.
2004	Plant 2 is rebuilt.

Table 3-2
Properties Adjacent and Nearby to Capital

Property Name	Property Address	Property Owner	Owner Address
Allied Security	5901 4th Avenue S, Seattle, WA 98108	Gull Industries, Inc.	PO Box 24687, Seattle, WA 98124
Art Brass Plating, Inc.	5516 3rd Avenue S, Seattle, WA 98108	Evan D. and Carmen Alstrom	11456 12th Avenue SW, Seattle, WA 98146
Blaser Tool & Mold Co.	5700 3rd Avenue S, Seattle, WA 98108	Orcas Foley LLC	5700 3rd Avenue S, Seattle, WA 98108
Chico's Burritos	5801 4th Avenue S, Seattle, WA 98108	Kang Tagay	4457 140th Avenue SE, Bellevue, WA 98006
Kettle's Corner (formerly Bob's Launderette)	5800 4th Avenue S, Seattle, WA 98108	Kettle's Corner, Inc.	5800 4th Avenue S, Seattle, WA 98108
Mead Building	202 S Mead Street, Seattle, WA 98108	Mead Street Building, C/O Phillips Real Estate Services	312 Fairview Avenue N, Seattle, WA 98109
Mobile Crane Co.	5900 2nd Avenue S, Seattle, WA 98108	Wallace Enterprises	PO Box 3767, Seattle, WA 98124
Olympic Medical	5900 1st Avenue S, Seattle, WA 98108	Michigan Properties	5301 2nd Avenue S, Seattle, WA 98108
Otter Moon Motor Works	5706 2nd Avenue S, Seattle, WA 98108	Blue Steel LLC	4203 3rd Avenue NE, Seattle, WA 98105
Pacific Food Systems (formerly Art Brass)	5815 4th Avenue S, Seattle, WA 98108	Pacific Food Systems, Inc.	1120 NW 51st Street, Seattle, WA 98107
Mendi's Restaurant	5807 4th Avenue S, Seattle, WA 98108	Kang Tagay	4457 140th Avenue SE, Bellevue, WA 98006

Table 4-1
Soil Vapor Results Below Plant 2

Sample Number	**VP-1**	**VP-2**	**VP-3**	**VP-4**	**VP-5**	**VP-6**	**VP-7**	**VP-8**	**VP-9**	**VP-10**	**VP-11**	**VP-12**	**Average**
Compound													
Benzene	4.9	5	5	5	5	5	5	5	5	5	5	5	5
Toluene	5.7	6	6	**180**	**498**	6	6	6	6	6	**38**	6	64
Ethyl Benzene	6.6	7	7	**530**	**1236**	**146**	7	7	7	7	7	7	164
Total Xylenes	6.6	7	7	**1059**	**5739**	7	7	7	**181**	7	**119**	7	596
Cis-12DCE	6.0	6	6	**76**	6	6	6	6	6	6	6	6	12
Trans-12DE	6.03	6	6	**442**	6	6	6	6	6	6	6	6	42
TCE	8.19	8	8	8	8	8	**60**	8	8	8	**36**	8	15
PCE	10.3	10	**83**	**614**	**35**	**248**	**145**	**117**	**214**	**179**	**172**	**165**	166
VC	52.0	52	52	52	52	52	52	52	52	52	52	52	52

Notes:

Units in µg/m3.

Bold numbers = results above MDL.

Table 4-2
Calculated Soil Vapor Concentrations Within Plant 2

	BUILDING						OFFICE					
		INDOOR CONC			SAFETY FACTOR			INDOOR CONC			SAFETY FACTOR	
	AIR EXCH	FR UCLC	SC UCLC	CUL	FR UCLC	SC UCLC	AIR EXCH	FR UCLC	SC UCLC	CUL	FR UCLC	SC UCLC
PCE		268.0	2438.0	0.417				268.0	2438.0	0.417		
	1.00	**0.0029**	**0.0265**		**144**	**16**	4.50	**0.0023**	**0.0211**		**181**	**20**
TCE		25.0	10.0	0.022				25.0	10.0	0.022		
	1.00	**0.0003**	**0.0001**		**73**	**220**	4.50	**0.0002**	**0.0001**		**110**	**220**
cis-DCE		25.0	5.0	0.05				25.0	5.0	0.05		
	1.00	**0.0003**	**0.0001**		**167**	**500**	4.50	**0.0002**	**0.0000**		**250**	**INFIN**
trans-DCE		122.0	5.0	0.05				122.0	5.0	0.05		
	1.00	**0.0013**	**0.0001**		**38**	**500**	4.50	**0.0011**	**0.0000**		**45**	**INFIN**
VC		52.0	3.0	0.28				52.0	3.0	0.28		
	1.00	**0.0006**	**0.0000**		**467**	**INFIN**	4.50	**0.0004**	**0.0000**		**700**	**INFIN**
T		157.0	94.0	183				157.0	94.0	183		
	1.00	**0.0017**	**0.0010**		**107,647**	**183,000**	4.50	**0.0014**	**0.0008**		**130,714**	**228,750**
EB		399.0	160.0	4570				399.0	160.0	4570		
	1.00	**0.0043**	**0.0017**		**1,062,791**	**2,688,235**	4.50	**0.0034**	**0.0014**		**1,344,118**	**3,264,286**
X		1644.0	813.0	320				1644.0	813.0	320		
	1.00	**0.0179**	**0.0088**		**17,877**	**36,364**	4.50	**0.0142**	**0.0070**		**22,535**	**45,714**

FR UCLC = FIELD RESULTS UPPER CONFIDENCE LIMIT SOIL VAPOR CONCENTRATION (ug/m3)
SC UCLC = SUMMA CANISTER RESULTS UPPER CONFIDENCE LIMIT SOIL VAPOR CONCENTRATION (ug/m3)
AIR EXCH = AIR EXCHANGE RATE (1/hr)
CUL = MCTA METHOD B CLEANUP ACTION LIMIT (ug/m3)

Table 5-1
Target Values for Groundwater and Soil at Capital

Chemical	Groundwater Target Values (μg/l)		Soil Target Values (μg/kg)	
	Target < 20-ft bgs	Target > 20-ft bgs	Target < 15-ft bgs	Target > 15-ft bgs
PCE	0.202	0.202	1.87	1.87
TCE	0.404	0.788	0.624	3.54
1,1 DCE	3.2	3.2	17.5	25.6
Cis-1,2 DCE	72.7	165	9.93	408
Trans-1,2 DCE	65.3	1690	9.69	418
1,1 DCA	47	47	144	266
1,2 DCA	12.9	30.6	6.02	64.1
Vinyl Chloride	1.28	2.04	1.2	9.31

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
ECS1	ECS1-GW-13	16Nov04	GW	9 to 13	Downgradient of former Art Brass and Bob's Launderette sites.
	ECS1-GW-19	16Nov04	GW	15 to 19	
	ECS1-GW-25	16Nov04	GW	21 to 25	
	ECS1-GW-37	16Nov04	GW	33 to 37	
ECS2	ECS2-GW-13	16Nov04	GW	9 to 13	Downgradient of former Plant 4 degreaser, former Art Brass, and former Wear Cote sites.
	ECS2-GW-19	16Nov04	GW	15 to 19	
	ECS2-GW-25	16Nov04	GW	21 to 25	
	ECS2-GW-37	16Nov04	GW	33 to 37	
ECS3	ECS3-GW-13	16Nov04	GW	9 to 13	Downgradient of Plant 4 Canopy paints and solvents handling, former Wear Cote, and former Pacific Testing Lab sites.
	ECS3-GW-19	16Nov04	GW	15 to 19	
	ECS3-GW-25	16Nov04	GW	21 to 25	
	ECS3-GW-37	16Nov04	GW	33 to 37	
ECS4	ECS4-GW-13	16Nov04	GW	9 to 13	Downgradient of Plant 3 (no solvent use identified).
	ECS4-GW-19	16Nov04	GW	15 to 19	
	ECS4-GW-25	16Nov04	GW	21 to 25	
	ECS4-GW-37	16Nov04	GW	33 to 37	
ECS5	ECS5-GW-13	15Nov04	GW	9 to 13	Downgradient of Plant 3 Canopy and Plant 3 (no solvent use identified). East of TCE plume identified by PSC at I-22.
	ECS5-GW-19	15Nov04	GW	15 to 19	
	ECS5-GW-25	15Nov04	GW	21 to 25	

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
ECS6	ECS6-S-3.0	15Nov04	Soil	3.0 to 3.5	To eliminate solvent source in exterior soil near TCE plume identified by PSC at J-23.
	ECS6-S-6.0	15Nov04	Soil	6.0 to 6.5	
	ECS6-GW-13	15Nov04	GW	9 to 13	Downgradient of former paint booth in Plant 2. Near TCE plume identified by PSC at J-23.
	ECS6-GW-19	15Nov04	GW	15 to 19	
	ECS6-GW-25	15Nov04	GW	21 to 25	
	ECS6-GW-37	15Nov04	GW	33 to 37	
ECS7	ECS7-S-3.0	15Nov04	Soil	3.0 to 3.5	To eliminate solvent source in exterior soil near TCE plume identified by PSC at J-23.
	ECS7-S-7.0	15Nov04	Soil	7.0 to 7.5	
	ECS7-GW-13	15Nov04	GW	9 to 13	Downgradient of former paint booth in Plant 2. Near TCE plume identified by PSC at J-23.
	ECS7-GW-19	15Nov04	GW	15 to 19	
	ECS7-GW-25	15Nov04	GW	21 to 25	
	ECS7-GW-37	15Nov04	GW	33 to 37	
ECS8	ECS8-S-4.5	15Nov04	Soil	4.5-5.0	To eliminate solvent source in exterior soil near TCE plume identified by PSC at CG-137 WT.
	ECS8-S-6.7	15Nov04	Soil	6.7-7.2	
	ECS8-GW-13	15Nov04	GW	9 to 13	Downgradient of Plant 2 Canopy former paint storage. Near TCE plume identified by PSC CG-137 WT.
	ECS8-GW-19	15Nov04	GW	15 to 19	
	ECS8-GW-25	15Nov04	GW	21 to 25	
	ECS8-GW-37	15Nov04	GW	33 to 37	

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
ECS9	ECS9-S-0.0	15Nov04	Soil	0.0 to 2.0	To eliminate solvent source in exterior soil near TCE plume identified by PSC at K-23.
	ECS9-S-2.0	15Nov04	Soil	2.0 to 4.0	
	ECS9-S-6.0	15Nov04	Soil	6.0 to 7,0	
	ECS9-GW-13	15Nov04	GW	9 to 13	Downgradient of Plant 2 Canopy former paint storage area. Near TCE plume identified by PSC K-23.
	ECS9-GW-19	15Nov04	GW	15 to 19	
	ECS9-GW-25	15Nov04	GW	21 to 25	
	ECS9-GW-37	15Nov04	GW	33 to 37	
ECS10	ECS10-GW-13	17Nov04	GW	9 to 13	Downgradient of Plant 2 Canopy former paint storage area. Near TCE plume identified by PSC at CG-137 WT.
	ECS10-GW-19	17Nov04	GW	15 to 19	
	ECS10-GW-25	17Nov04	GW	21 to 25	
	ECS10-GW-37	17Nov04	GW	33 to 37	
ECS11	ECS11-GW-13	17Nov04	GW	9 to 13	Downgradient of Plant 1 (no solvent use identified).
	ECS11-GW-19	17Nov04	GW	15 to 19	
	ECS11-GW-25	17Nov04	GW	21 to 25	
	ECS11-GW-37	17Nov04	GW	33 to 37	
ECS12	ECS12-GW-13	17Nov04	GW	9 to 13	Downgradient of Plant 1 (no solvent use identified).
	ECS12-GW-19	17Nov04	GW	15 to 19	
	ECS12-GW-25	17Nov04	GW	21 to 25	
	ECS12-GW-37	17Nov04	GW	33 to 37	

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
ECS13	ECS13-GW-13	17Nov04	GW	9 to 13	Downgradient of Miscellaneous Storage Yard and Material Receiving Yard (no solvent use identified).
	ECS13-GW-19	17Nov04	GW	15 to 19	
	ECS13-GW-25	17Nov04	GW	21 to 25	
	ECS13-GW-37	17Nov04	GW	33 to 37	
ECS14	ECS14-GW-13	18Nov04	GW	9 to 13	Downgradient of Material Receiving Yard (no solvent use identified).
	ECS14-GW-19	18Nov04	GW	15 to 19	
	ECS14-GW-25	18Nov04	GW	21 to 25	
	ECS14-GW-37	18Nov04	GW	33 to 37	
ECS15	ECS15-GW-13	18Nov04	GW	9 to 13	Upgradient of Miscellaneous Storage Yard and Material Receiving Yard (no solvent use identified). Downgradient of former Continental Industries and Borg Evans Chain sites.
	ECS15-GW-19	18Nov04	GW	15 to 19	
	ECS15-GW-25	18Nov04	GW	21 to 25	
ECS16	ECS16-GW-37	18Nov04	GW	33 to 37	Upgradient of Plant 1 (no solvent use identified). Downgradient of former Continental Industries and Borg Evans Chain sites.
	ECS16-GW-13	17Nov04	GW	9 to 13	
	ECS16-GW-19	17Nov04	GW	15 to 19	
	ECS16-GW-25	17Nov04	GW	21 to 25	
	ECS16-GW-37	17Nov04	GW	33 to 37	

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
ECS17	ECS17-GW-9	17Nov04	GW	5 to 9	Upgradient of Plant 1 (no solvent use identified). Downgradient of former Continental Industries and Borg Evans Chain sites.
	ECS17-GW-19	17Nov04	GW	15 to 19	
	ECS17-GW-25	17Nov04	GW	21 to 25	
	ECS17-GW-37	17Nov04	GW	33 to 37	
ECS18	ECS18-GW-13	15Nov04	GW	9 to 13	Downgradient of PSC's K-19 and K-21 temporary wells.
	ECS18-GW-19	15Nov04	GW	15 to 19	
	ECS18-GW-25	15Nov04	GW	21 to 25	
	ECS18-GW-37	15Nov04	GW	33 to 37	
ECS19	ECS19-GW-13	15Nov04	GW	9 to 13	Downgradient of Blaser. Upgradient of Plant 2 Canopy.
	ECS19-GW-19	15Nov04	GW	15 to 19	
	ECS19-GW-25	15Nov04	GW	21 to 25	
ECS20	ECS20-GW-13	15Nov04	GW	9 to 13	Downgradient of Blaser. Upgradient of Plant 2 former paint booth and Canopy. Near TCE plume identified by PSC at K-21.
	ECS20-GW-19	15Nov04	GW	15 to 19	
	ECS20-GW-25	15Nov04	GW	21 to 25	
ECS21	ECS21-GW-13	16Nov04	GW	9 to 13	Downgradient of Blaser. Upgradient of Plant 2 former paint booth and Canopy. Near TCE plume identified by PSC at K-21.
	ECS21-GW-19	16Nov04	GW	15 to 19	
	ECS21-GW-25	16Nov04	GW	21 to 25	

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
ECS22	ECS22-GW-37	16Nov04	GW	33 to 37	Downgradient of Blaser. Upgradient of Plant 2. Near TCE plume identified by PSC at J-30.
	ECS22-GW-13	16Nov04	GW	9 to 13	
	ECS22-GW-19	16Nov04	GW	15 to 19	
	ECS22-GW-25	16Nov04	GW	21 to 25	
	ECS22-GW-37	16Nov04	GW	33 to 37	
ECS23	ECS23-GW-13	16Nov04	GW	9 to 13	Upgradient of Plant 3 and Canopy (no solvent use identified). Near TCE plume identified by PSC at CG-136 WT.
	ECS23-GW-19	16Nov04	GW	15 to 19	
	ECS23-GW-25	16Nov04	GW	21 to 25	
	ECS23-GW-37	16Nov04	GW	33 to 37	
ECS24	ECS24-GW-9	16Nov04	GW	5 to 9	Upgradient of Plant 3 (no solvent use identified).
	ECS24-GW-19	16Nov04	GW	15 to 19	
	ECS24-GW-25	16Nov04	GW	21 to 25	
	ECS24-GW-37	16Nov04	GW	33 to 37	
ECS25	ECS25-GW-13	17Nov04	GW	9 to 13	Upgradient of Plant 4 Canopy paint and solvent handling.
	ECS25-GW-19	17Nov04	GW	15 to 19	
	ECS25-GW-25	17Nov04	GW	21 to 25	
	ECS25-GW-37	17Nov04	GW	33 to 37	

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
ECS26	ECS26-GW-13	17Nov04	GW	9 to 13	Upgradient of Plant 4 and Canopy paint and solvent handling, and former Pacific Testing Lab and Ware Cote sites.
	ECS26-GW-19	17Nov04	GW	15 to 19	
	ECS26-GW-25	17Nov04	GW	21 to 25	
	ECS26-GW-37	17Nov04	GW	33 to 37	
ECS27	ECS27-GW-13	18Nov04	GW	9 to 13	Upgradient of Plant 4 and Canopy where paints and solvents were handled. Upgradient of former Art Brass site. Downgradient of former Bob's Launderette site.
	ECS27-GW-19	18Nov04	GW	15 to 19	
	ECS27-GW-25	18Nov04	GW	21 to 25	
	ECS27-GW-37	18Nov04	GW	33 to 37	
ECS28	ECS28-S-2.6	3Apr05	Soil	3.1	Locate soil source of PCE, TCE, and DCE detected in soil vapor at GS56.
	ECS28-S-6.0	3Apr05	Soil	6.5	
	ECS28-GW-13	3Apr05	GW	9.5 to 13.5	Locate upgradient source of PCE, TCE, and DCE detected in soil vapor at GS56.
ECS29	ECS29-S-3.1	3Apr05	Soil	3.6	Locate soil source of PCE and TCE detected in soil vapor at GS57.
	ECS29-S-5.0	3Apr05	Soil	5.5	
ECS30	ECS30-S-2.9	3Apr05	Soil	3.4	Locate soil source of PCE, TCE, and DCE detected in soil vapor at GS55.
	ECS30-S-6.5	3Apr05	Soil	7.0	
	ECS30-GW-13	3Apr05	GW	9.5 to 13.5	Locate upgradient source of PCE, TCE, and DCE detected in soil vapor at GS55.
ECS31	ECS31-S-3.6	3Apr05	Soil	4.1	Locate solvent in soil beneath former degreaser (near GS54).
	ECS31-S-6.2	3Apr05	Soil	6.7	

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
ECS32	ECS32-S-2.1	3Apr05	Soil	3.0	Locate soil source of TCE and DCE detected in vapor at GS61.
	ECS32-S-4.5	3Apr05	Soil	5.4	
	ECS32-GW-13	3Apr05	GW	9.9 to 13.9	Locate upgradient source of TCE and DCE detected in vapor at GS61.
ECS33	ECS33-S-3.2	3Apr05	Soil	3.2	Document absence of soil source of solvents at GS81. Former Paint Booth location.
	ECS33-S-6.9	3Apr05	Soil	6.9	
	ECS33-GW-13.6	3Apr05	GW	9.6 to 13.6	To identify upgradient source of TCE previously detected at ECS6.
ECS34	ECS34-S-3.4	3Apr05	Soil	3.4	Document absence of soil source of solvents at GS68. Near Former Paint Booth.
	ECS34-S-6.9	3Apr05	Soil	6.9	
ECS35	ECS35-S-3.8	3Apr05	Soil	3.8	Document absence of soil source of solvents at GS67.
	ECS35-S-6.5	3Apr05	Soil	6.5	
ECS36	ECS36-S-3.8	3Apr05	Soil	3.8	Document absence of soil source of solvents at GS64.
	ECS36-S-6.7	3Apr05	Soil	6.7	
	ECS36-GW-13.5	3Apr05	GW	9.5 to 13.5	Locate upgradient source of TCE previously detected at ECS9.
ECS37	ECS37-S-1.5	3Apr05	Soil	1.5	Document absence of soil source of solvents at GS71.
	ECS37-S-4.2	3Apr05	Soil	4.2	
	ECS37-GW-13.5	3Apr05	GW	9.5 to 13.5	Locate upgradient source of TCE previously detected at ECS9.
ECS38	ECS38-S-4.2	22May05	Soil	3.6	Define extent of contaminants identified in April 2005.
	ECS38-S-6.4	22May05	Soil	5.6	
	ECS38-GW-13.0	22May05	GW	8.7 to 11.3	Locate upgradient and off-site source of TCE previously detected.

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
ECS39	ECS39-S-0.7	22May05	Soil	0.7	Define extent of contaminants identified in April 2005.
	ECS39-S-2.2	22May05	Soil	1.9	
	ECS39-S-6.7	22May05	Soil	5.8	
	ECS39-S-9.5	22May05	Soil	8.3	
	ECS39-GW-13.0	22May05	GW	8.7 to 11.3	Locate upgradient and off-site source of TCE previously detected.
ECS40	ECS40-S-0.6	22May05	Soil	0.6	Define extent of contaminants identified in April 2005.
	ECS40-S-2.4	22May05	Soil	2.1	
	ECS40-S-7.3	22May05	Soil	6.3	
	ECS40-GW-13.0	22May05	GW	8.7 to 11.3	Locate upgradient and off-site source of TCE previously detected.
ECS41	ECS41-S-0.6	22May05	Soil	0.6	Define extent of contaminants identified in April 2005.
	ECS41-S-2.5	22May05	Soil	2.2	
	ECS41-S-6.8	22May05	Soil	5.9	
	ECS41-GW-13.0	22May05	GW	8.7 to 11.3	Locate upgradient and off-site source of TCE previously detected.
GS54	468754	20Feb05 to 3Mar05	SG	3.0	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3. Former vapor degreaser located near here.
GS55	468755	20Feb05 to 3Mar05	SG	1.8	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3. Former vapor degreaser located near here.
GS56	468756	20Feb05 to 3Mar05	SG	3.0	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3. Former vapor degreaser located near here.
GS57	468757	20Feb05 to 3Mar05	SG	2.0	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3. Former vapor degreaser located near here.

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
GS58	468758	20Feb05 to 3Mar05	SG	1.5	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3. Catch basin was located near here.
GS59	468759	20Feb05 to 3Mar05	SG	1.5	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3. Former vapor degreaser located near here.
GS60	468760	20Feb05 to 3Mar05	SG	1.5	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3. Former vapor degreaser located near here.
GS61	468761	20Feb05 to 3Mar05	SG	1.5	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3. Catch basin was located near here.
GS62	468762	20Feb05 to 3Mar05	SG	1.5	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3.
GS63	468763	20Feb05 to 3Mar05	SG	1.5	To find contaminated soil that may be impacting groundwater at locations ECS1, ECS2 and ECS3.
GS64	468764	20Feb05 to 3Mar05	SG	3.0	To find contaminated soil that may be impacting groundwater at location ECS9.
GS65	468765	20Feb05 to 3Mar05	SG	2.5	To find contaminated soil that may be impacting groundwater at location ECS9.
GS66	468766	20Feb05 to 3Mar05	SG	2.7	To find contaminated soil that may be impacting groundwater at location ECS6 and ECS9.
GS67	468767	20Feb05 to 3Mar05	SG	2.6	To find contaminated soil that may be impacting groundwater at location ECS6 and ECS9.
GS68	468768	20Feb05 to 3Mar05	SG	3.0	To find contaminated soil that may be impacting groundwater at location ECS6 and ECS9.
GS69	468769	20Feb05 to 3Mar05	SG	3.0	To find contaminated soil that may be impacting groundwater at location ECS6 and ECS9.

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
GS70	468770	20Feb05 to 3Mar05	SG	2.7	To find contaminated soil that may be impacting groundwater at location ECS9.
GS71	468771	20Feb05 to 3Mar05	SG	3.0	To find contaminated soil that may be impacting groundwater at location ECS9.
GS72	468772	20Feb05 to 3Mar05	SG	2.8	To find contaminated soil that may be impacting groundwater at location ECS9.
GS73	468773	20Feb05 to 3Mar05	SG	2.7	To find contaminated soil that may be impacting groundwater at location ECS9.
GS74	468774	20Feb05 to 3Mar05	SG	2.7	To find contaminated soil that may be impacting groundwater at location ECS6 and ECS9.
GS75	468775	20Feb05 to 3Mar05	SG	2.7	To find contaminated soil that may be impacting groundwater at location ECS6 and ECS9.
GS76	468776	20Feb05 to 3Mar05	SG	3.0	To find contaminated soil that may be impacting groundwater at location ECS6 and ECS9.
GS77	468777	20Feb05 to 3Mar05	SG	2.7	To find contaminated soil that may be impacting groundwater at location ECS6.
GS78	468778	20Feb05 to 3Mar05	SG	2.9	To find contaminated soil that may be impacting groundwater at location ECS6.
GS79	468779	20Feb05 to 3Mar05	SG	2.7	To find contaminated soil that may be impacting groundwater at location ECS6.
GS80	468780	20Feb05 to 3Mar05	SG	2.9	To find contaminated soil that may be impacting groundwater at location ECS6. A paint booth was located near here.
GS81	468781	20Feb05 to 3Mar05	SG	2.0	To find contaminated soil that may be impacting groundwater at location ECS6. A paint booth was located near here.

Table 5-2
Selection Criteria for Groundwater, Gore Sorber, and Soil Sample Locations

Sample Location	Sample Identifier	Date Sampled	Sample Matrix	Depth (ft bgs)	Reason Sample Was Collected at Specified Location
GS90	468790	20Feb05 to 3Mar05	SG	2.7	To find contaminated soil that may be impacting groundwater at location ECS6. A paint booth was located near here.
GS91	468791	20Feb05 to 3Mar05	SG	2.7	To find contaminated soil that may be impacting groundwater at location ECS6.

Notes:

GW = Groundwater

SG = Soil Gas

The 22May05 Geoprobes were advanced at an angle of 60° below horizontal due east such that the water samples were collected at Capital's east property line.

Table 5-3
Target Values for Groundwater - Other Compounds

Chemical	Groundwater Target Values (μg/l)		Number of Locations Where Detected	Maximum Value Detected (μg/l)
	Target < 20-ft bgs	Target > 20-ft bgs		
Benzene	9.6	11.7	9	3 at ECS20
Chloroethane	461	461	3	7 at ECS15
1,1,1 Trichloroethane	11	11	1	0.7J at ECS15

Notes:

J is an estimated value, below reporting limit.

Table 5-4
Gore Sorber Laboratory Results

Location ID	Comment	PCE	TCE	cis+trans-1,2-DCE	trans-1,2-DCE	cis-1,2-DCE	VC	1,1-DCE	1,1,1-TCA	1,1,2-TCA	1,1,1,2-TetCA	CHCl3
GS54	Plant 4	90.46	148.35	2.23	0.30	1.93	ND	BDL	BDL	0.43	ND	0.06
GS55	Plant 4	214.28	371.36	57.13	4.32	52.81	ND	BDL	BDL	0.23	0.11	0.09
GS56	Plant 4	303.77	228.25	30.56	2.29	28.27	ND	ND	BDL	ND	0.06	0.09
GS57	Plant 4	321.81	362.95	10.01	1.51	8.51	ND	ND	BDL	0.25	0.16	0.09
GS58	Pl 4 Canopy	0.18	25.63	0.35	0.07	0.28	ND	ND	0.11	ND	ND	0.03
GS59	Pl 4 Canopy	BDL	1.11	ND	ND	ND	ND	ND	ND	ND	ND	ND
GS60	Pl 4 Canopy	0.52	2.57	ND	ND	ND	ND	ND	BDL	ND	ND	BDL
GS61	Pl 4 Canopy	0.19	80.57	8.26	0.61	7.65	ND	ND	0.16	ND	ND	0.21
GS62	Pl 4 Canopy	0.36	1.09	ND	ND	ND	ND	ND	BDL	ND	ND	ND
GS63	Pl 4 Canopy	0.16	0.09	ND	ND	ND	ND	ND	ND	ND	ND	ND
GS64	Pl 2 Canopy	1.23	BDL	ND	ND	ND	ND	ND	BDL	ND	ND	ND
GS65	Pl 2 Canopy	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GS66	Pl 2 Canopy	0.98	ND	ND	ND	ND	ND	ND	0.15	ND	ND	ND
GS67	Pl 2 Canopy	0.81	BDL	ND	ND	ND	ND	ND	0.63	ND	ND	ND
GS68	Pl 2 Canopy	2.20	ND	ND	ND	ND	ND	ND	0.31	ND	ND	ND
GS69	Pl 2 Canopy	0.33	ND	ND	ND	ND	ND	ND	0.07	ND	ND	ND
GS70	Pl 2 Canopy	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GS71	Pl 2 Canopy	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GS72	Pl 2 Canopy	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GS73	Plant 2	0.10	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND
GS74	Plant 2	0.23	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND
GS75	Plant 2	0.10	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND
GS76	Plant 2	0.08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GS77	Plant 2	BDL	ND	ND	ND	ND	ND	ND	0.14	ND	ND	ND
GS78	Plant 2	0.03	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND
GS79	Plant 2	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GS80	Plant 2	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GS81	Plant 2	0.07	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND
GS90	Plant 2	1.08	ND	ND	ND	ND	ND	ND	0.12	ND	ND	ND
GS91	Plant 2	0.06	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND
Detection Limit		**0.03**	**0.02**	NA	**0.02**	**0.03**	**0.41**	**0.04**	**0.04**	**0.02**	**0.03**	**0.03**

Notes:
Mass adsorbed in µg.
CHCH3 = chloroform.
TCA = trichloroethane.
TetCA = tetrachloroethane.
ND = not detected.

Table 5-5
Summary of Geoprobe Soil Results

November 2004 Geoprobe Investigation - Analyses by CCI

	ECS6-S-3.0	ECS6-S-6.0	ECS7-S-3.0	ECS7-S-7.0	ECS8-S-4.5	ECS8-S-6.7	ECS9-S-0.0	ECS9-S-2.0	ECS9-S-6.0
VINYL CHLORIDE	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U
1,1-DICHLOROETHENE	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U
TRANS-1,2-DICHLOROETHENE	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U
1,1-DICHLOROETHANE	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U
CIS-1,2-DICHLOROETHENE	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U
1,1,1-TRICHLOROETHANE	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U
1,2-DICHLOROETHANE	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U
TRICHLOROETHENE	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U
TETRACHLOROETHYLENE	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U	<10U

April 2005 Geoprobe Investigation - Analyses by CCI

	ECS28-S-2.6	ECS28-S-6.0	ECS29-S-3.1	ECS29-S-5.0	ECS30-S-2.9	ECS30-S-6.5	ECS31-S-3.6	ECS31-S-6.2	ECS32-S-2.1	ECS32-S-4.5
VINYL CHLORIDE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
1,1-DICHLOROETHENE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
TRANS-1,2-DICHLOROETHENE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
1,1-DICHLOROETHANE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
CIS-1,2-DICHLOROETHENE	3.7J	5	<5U	1.7J	6	17	<5U	<5U	4.6J	4.8J
1,1,1-TRICHLOROETHANE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
1,2-DICHLOROETHANE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
TRICHLOROETHENE	27	13	7	17	140	46	15	1.8J	37	45
TETRACHLOROETHYLENE	34	37	2.8J	12	16	17	7	1.5J	<5U	<5U

April 2005 Geoprobe Investigation - Analyses by ARI

	ECS33-S-3.2	ECS33-S-6.9	ECS34-S-3.4	ECS34-S-6.9	ECS35-S-3.8	ECS35-S-6.5	ECS36-S-3.8	ECS36-S-6.7	ECS37-S-1.5	ECS37-S-4.2
VINYL CHLORIDE	<0.6UJ	<0.6UJ	<0.5UJ	<0.4UJ	<0.4UJ	<0.4UJ	<0.5UJ	<0.4UJ	<0.4UJ	<0.6UJ
1,1-DICHLOROETHENE	<1.3U	<1.2U	<1.1U	<0.9U	<0.9U	<0.9U	<1.0U	<0.9U	<0.8U	<1.2U
TRANS-1,2-DICHLOROETHENE	<1.3U	<1.2U	<1.1U	<0.9U	<0.9U	<0.9U	<1.0U	<0.9U	<0.8U	<1.2U
1,1-DICHLOROETHANE	<1.3U	<1.2U	<1.1U	<0.9U	<0.9U	<0.9U	<1.0U	<0.9U	<0.8U	<1.2U
CIS-1,2-DICHLOROETHENE	<1.3U	<1.2U	<1.1U	<0.9U	<0.9U	<0.9U	<1.0U	<0.9U	<0.8U	<1.2U
1,1,1-TRICHLOROETHANE	<1.3U	<1.2U	<1.1U	<0.9U	<0.9U	<0.9U	<1.0U	<0.9U	<0.8U	<1.2U
1,2-DICHLOROETHANE	<1.3U	<1.2U	<1.1U	<0.9U	<0.9U	<0.9U	<1.0U	<0.9U	<0.8U	<1.2U
TRICHLOROETHENE	<0.6UJ	<0.6UJ	<0.5UJ	<0.9U	<0.4UJ	<0.4UJ	<0.5UJ	<0.4UJ	<0.4UJ	<0.6UJ
TETRACHLOROETHYLENE	<0.6UJ	<0.6UJ	<0.5UJ	<0.5J	2.5	<0.4UJ	<0.5UJ	<0.4UJ	<0.4UJ	<0.6UJ

Table 5-5
Summary of Geoprobe Soil Results

May 2005 Geoprobe Investigation - Analyses by CCI

	ECS38-S-4.2	ECS38-S-6.4	ECS39-S-0.7	ECS39-S-2.2	ECS39-S-6.7	ECS39-S-9.5	ECS40-S-0.6	ECS40-S-2.4	ECS40-S-7.3	ECS41-S-0.6	ECS41-S-2.5	ECS41-S-6.8
VINYL CHLORIDE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
1,1-DICHLOROETHENE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
TRANS-1,2-DICHLOROETHENE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
1,1-DICHLOROETHANE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
CIS-1,2-DICHLOROETHENE	2.9J	2.2J	17	38	23	3.7J	<5U	29	10	<5U	<5U	2J
1,1,1-TRICHLOROETHANE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
1,2-DICHLOROETHANE	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U	<5U
TRICHLOROETHENE	6	4.1J	15	13	2.4J	<5U	4.4J	15	9	<5U	1.5J	1.4J
TETRACHLOROETHYLENE	14	38	6	9	2.4J	<5U	1.5J	9	4.5J	<5U	<5U	<5U

Notes:

Concentrations in µg/kg.

U = not detected at reported detection level.

J = an estimated concentration below the reporting limit.

The number after the S in the sample ID is the approximate depth in feet to the top of the sample interval. Refer to the boring log for more information.

All except May 2005 Geoprobe borings were vertically oriented.

The May 2005 Geoprobes were oriented due east, 60-degrees below horizontal. Multiply depth by 0.87 to get true depth bgs.

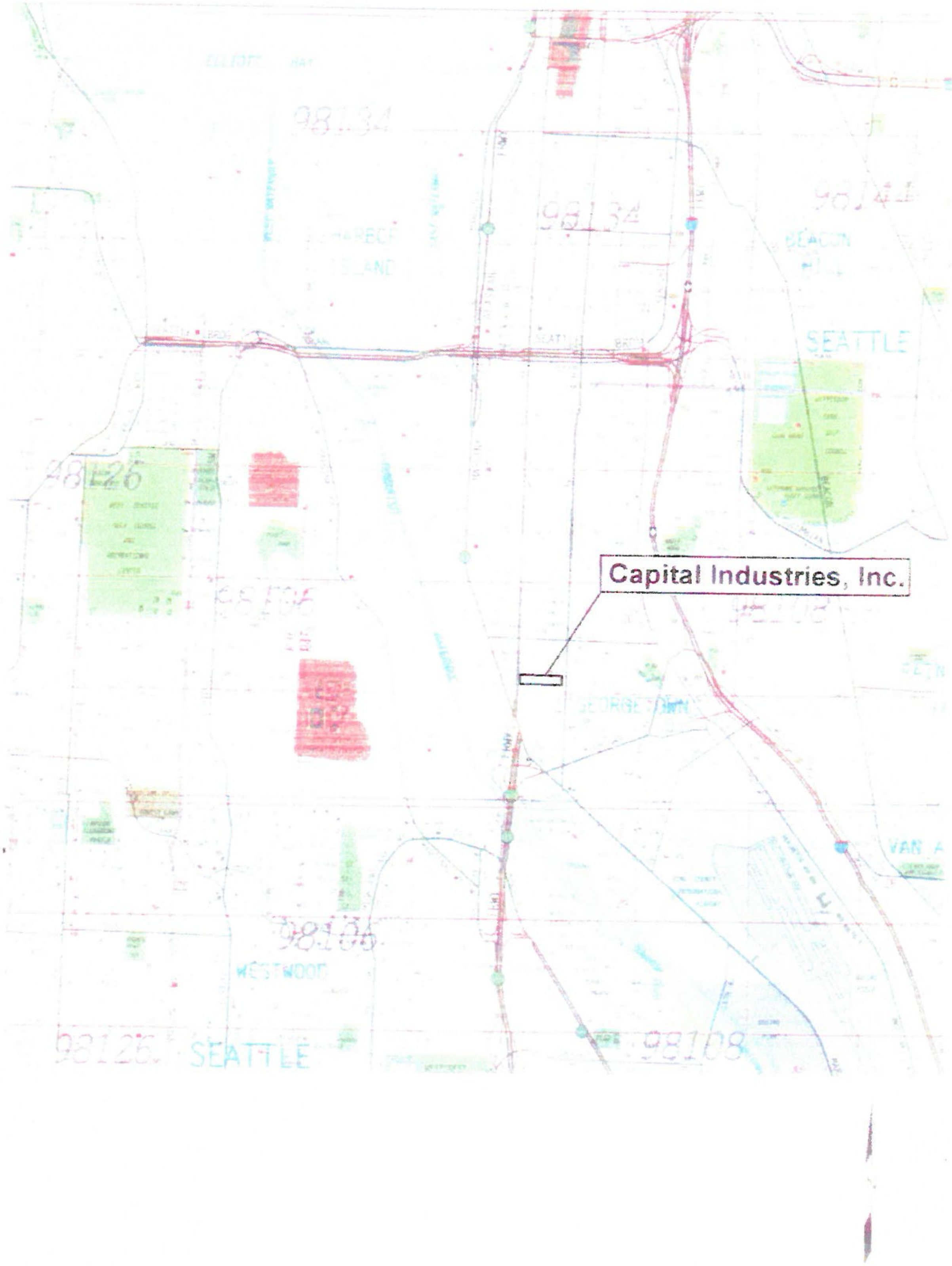
Draft Remedial Investigation Report

Capital Industries Site,
Seattle, Washington

Figures

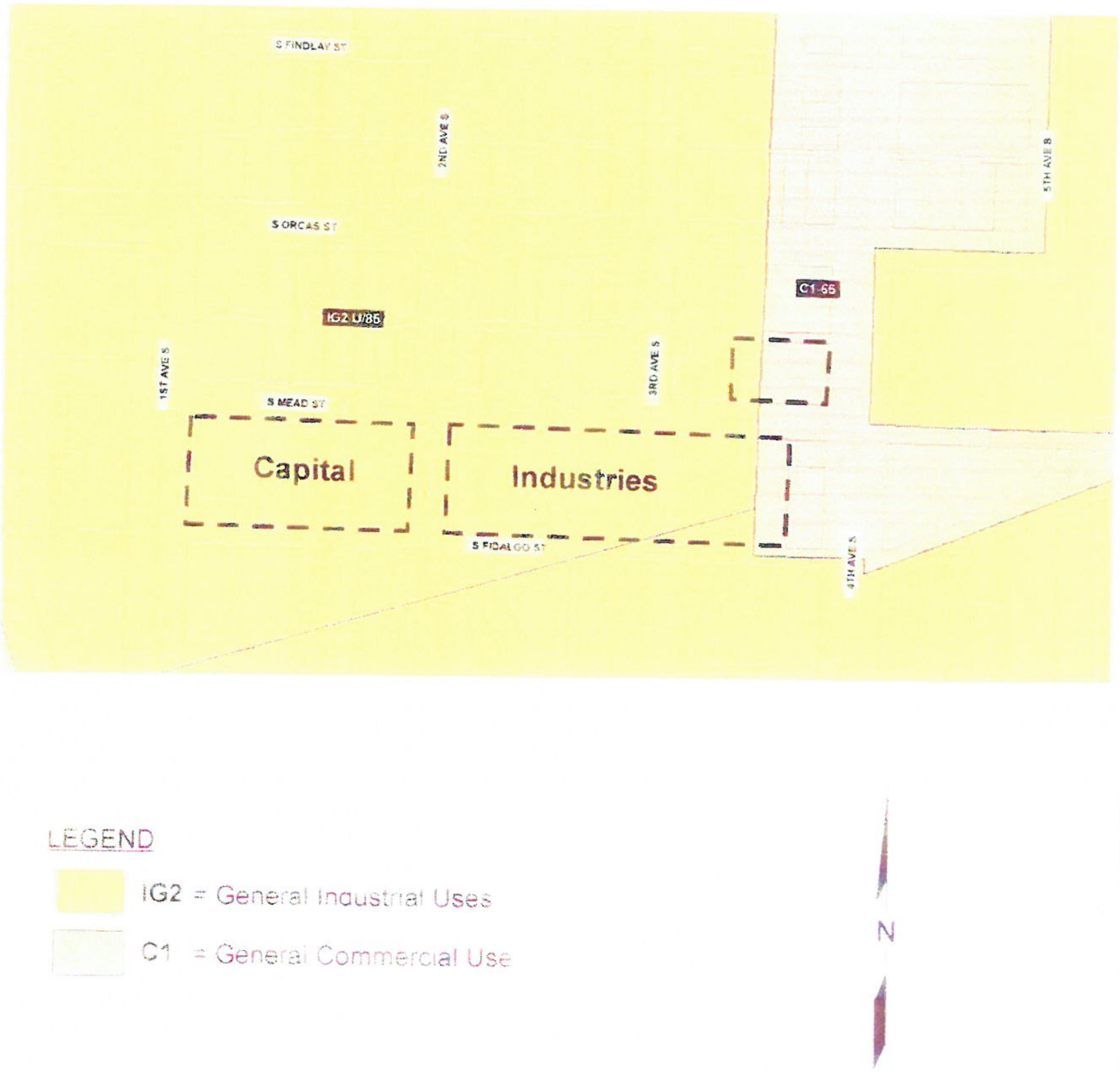
JUNE 2005

DRAFT



NOT TO SCALE

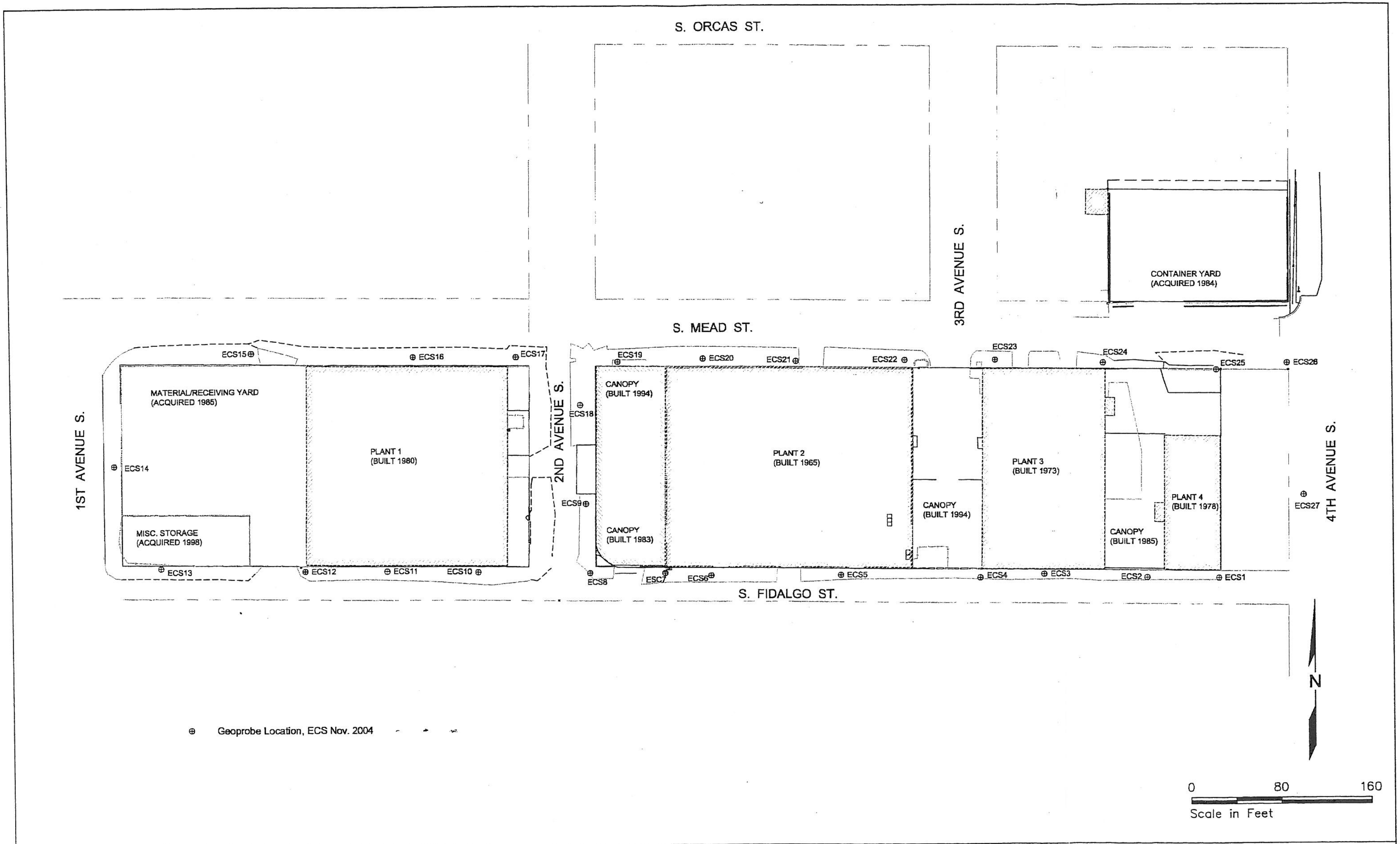
Environmental Consulting Services, Inc.	Capital Industries Seattle, Washington	Figure 3-1 Facility Location Map



Environmental
Consulting
Services, Inc.

Capital Industries
Seattle, Washington

Figure 3-2
City of Seattle Land Use Zoning
in the Capital Vicinity



Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 3-3
Capital Industries 1965-2005

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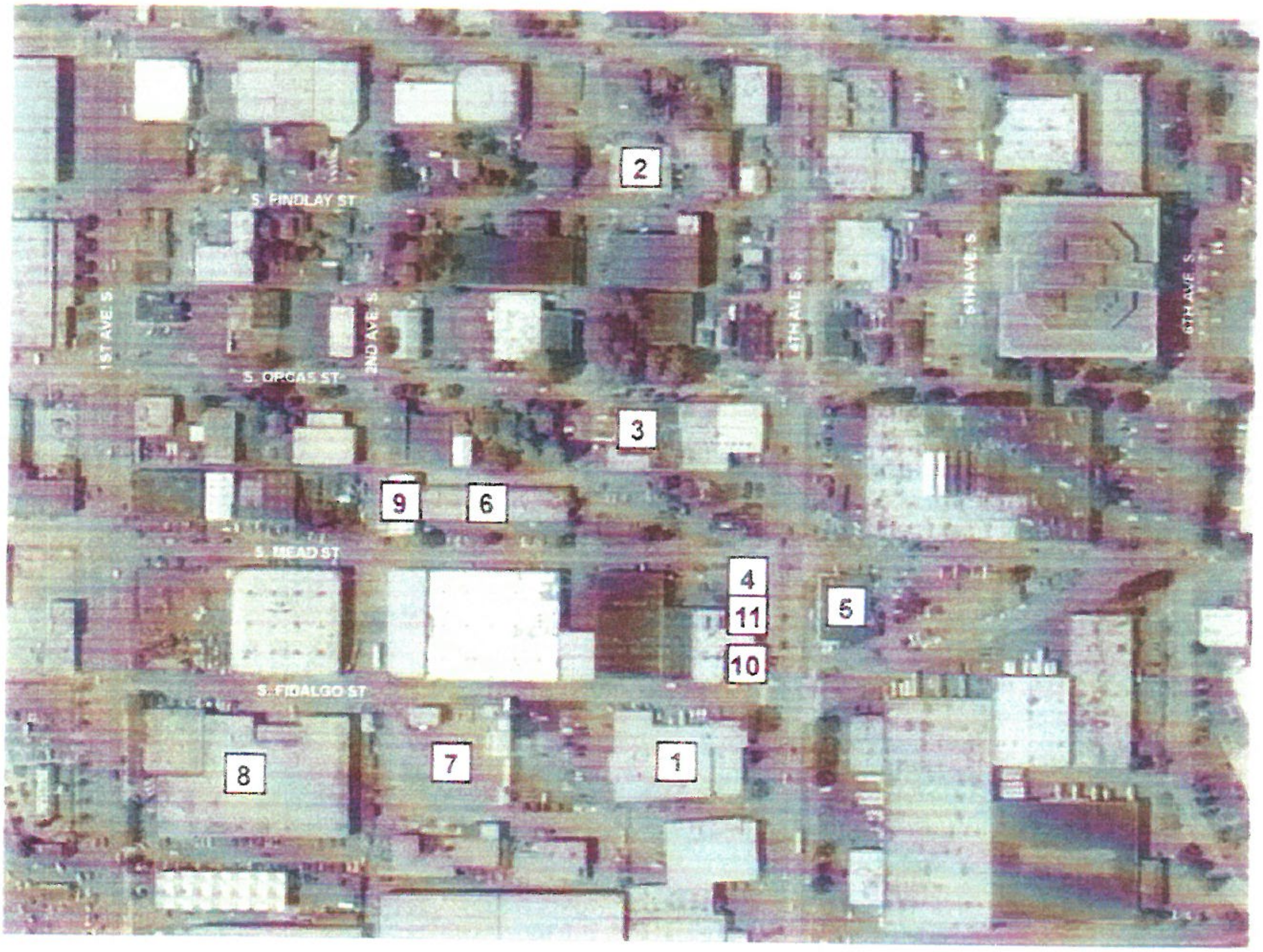

LEGEND

1	Allied Security
2	Art Brass Plating Inc
3	Blaser Tool & Mold Co
4	Chico's Burritos
5	Kettle's Corner (Former Bob's Launderette)
6	Mead Building
7	Mobile Crane Co
8	Olympic Medical
9	Otter Moon Motor Works
10	Pacific Food Systems (Former Art Brass
11	Mendi's Restaurant (formerly Pacific Marine Testing Lab)

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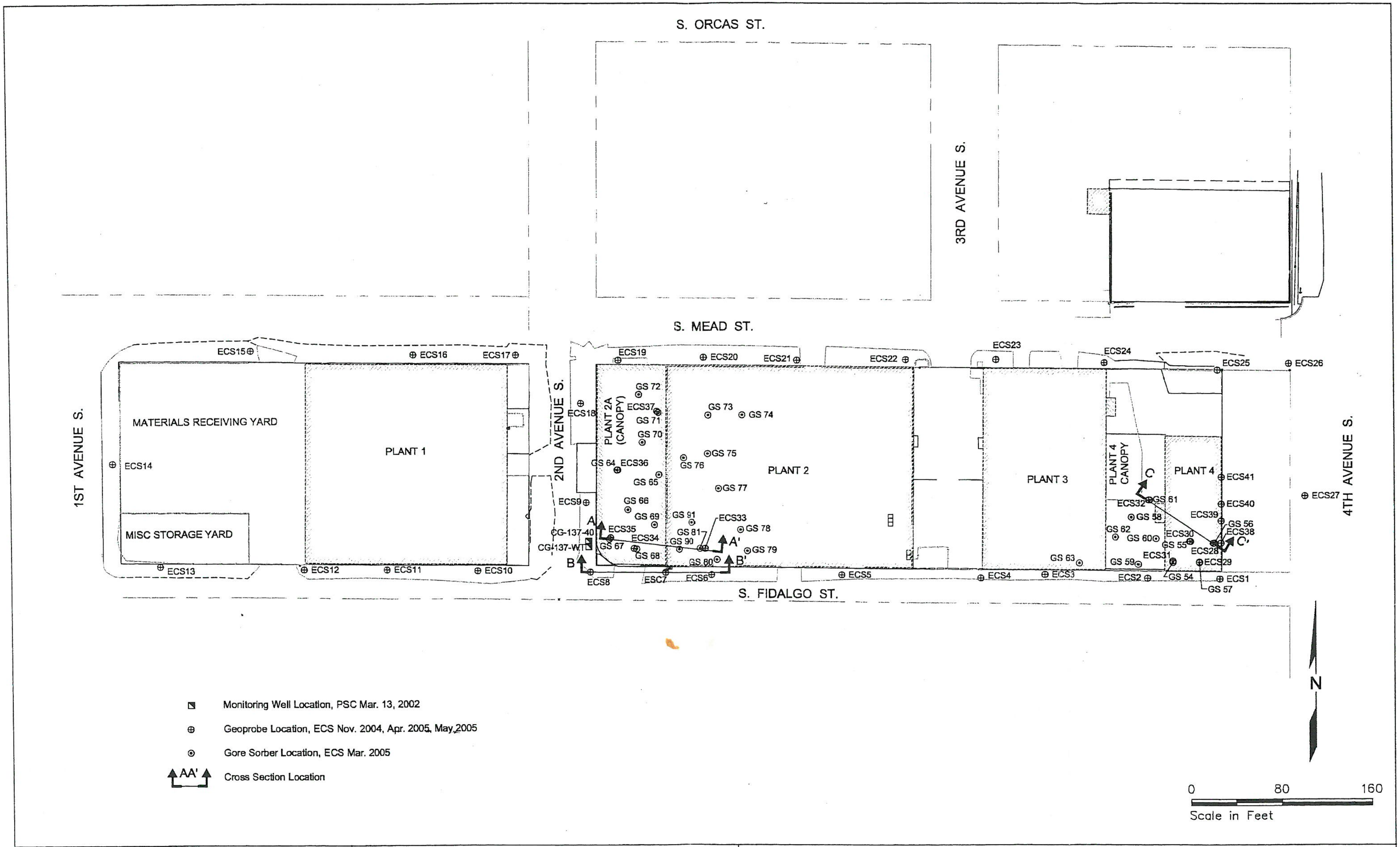
Capital Industries
Seattle, Washington

Figure 3-4
Adjacent and Nearby Properties



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Consulting
Services, Inc.**

Capital Industries
Seattle, Washington

Figure 3-5
Site Map Showing Subsurface Exploration
and Cross Section Locations

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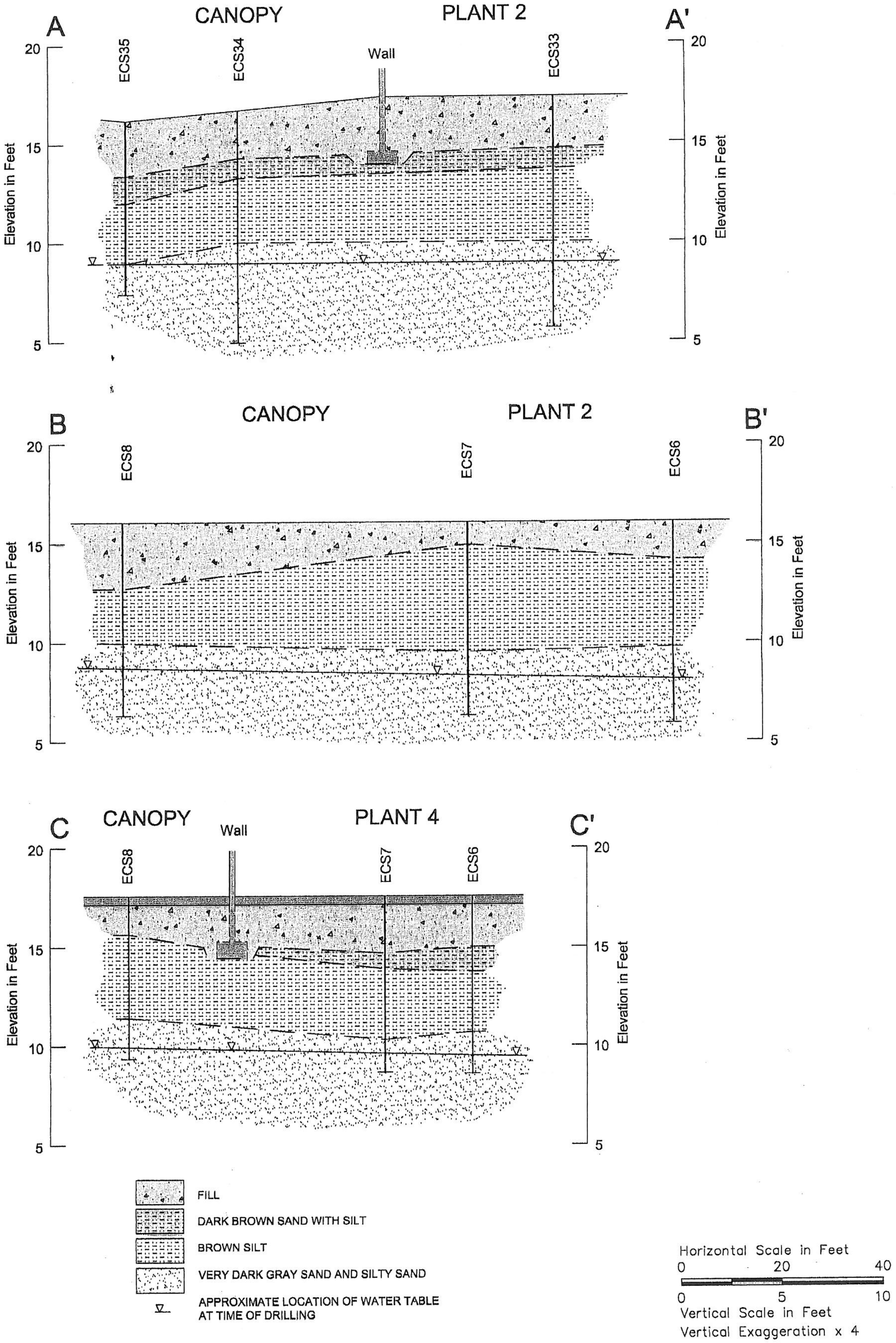

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Seattle, Washington

Figure 3-6
Geologic Cross Sections
A-A', B-B', and C-C'

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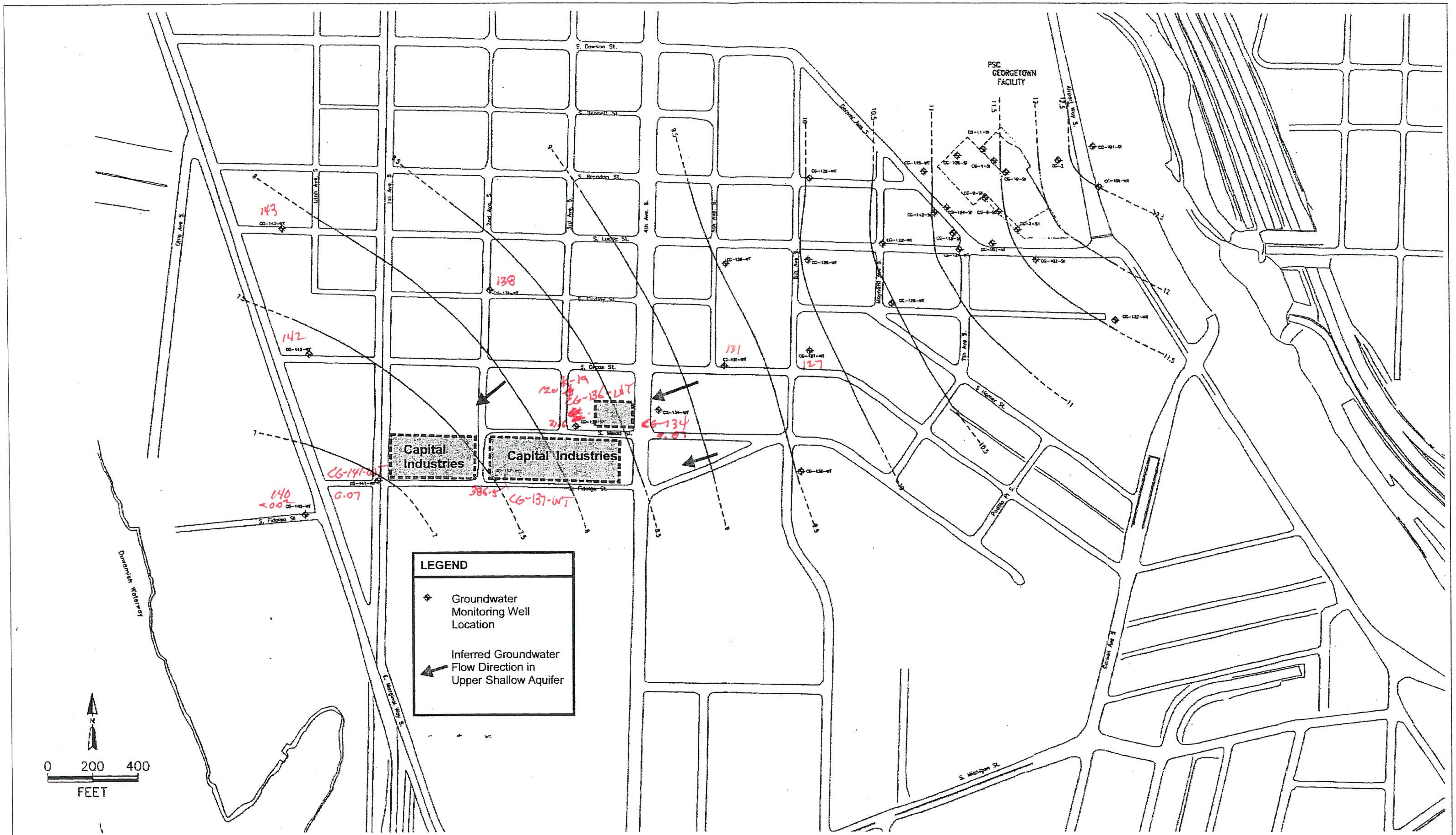
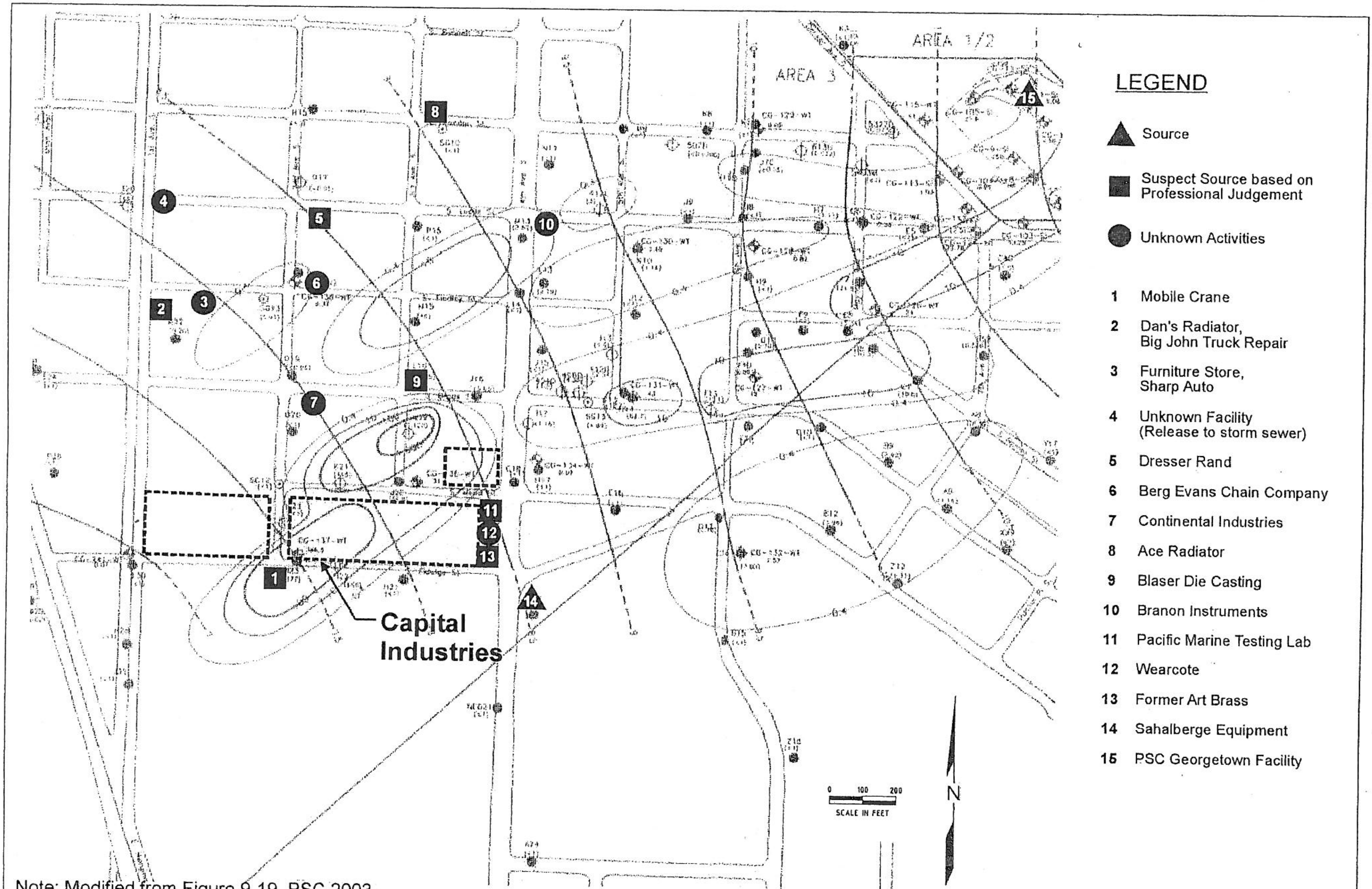


Note: Modified from Figure 3-25, PSC 2003.

Environmental Consulting Services, Inc.	Capital Industries Seattle, Washington	Figure 3-7 Groundwater Elevation in Capital's Vicinity

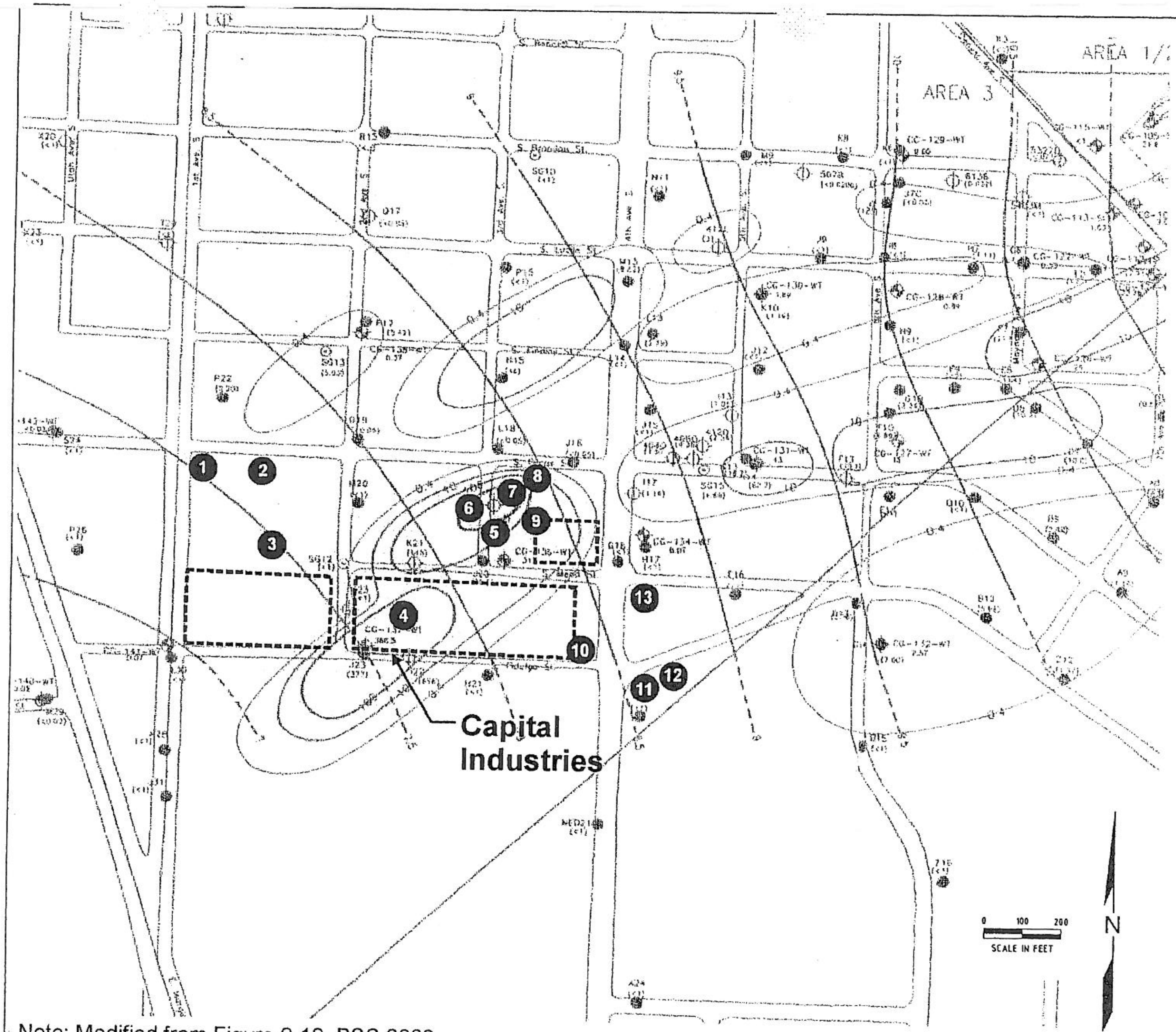
G:\project\Clients\mccarthy\capital\core\Figure 3-7



Note: Modified from Figure 9-19, PSC 2003.

Environmental Consulting Services, Inc.	Capital Industries Seattle, Washington	Figure 4-1 Location of Potential Sources of Upgradient Chlorinated Solvents—Review of Government Documents

G:\project\Clients\mccarthy\capital\corel\Figure 4-1



LEGEND

●	Approximate Historical Location with Map Date
1	5700 1st Ave. S. Equipment Repair 1967
2	115 S.Orcas St. Machine Shop 1967
3	122 S. Mead St. Tool Warehouse 1967
4	Metal Fabrication 1967
5	304 S. Mead St. Glass Crafting 1967
6	Address Unknown Machine Shop 1949
7	5700 3rd Ave S. Machine Shop 1967 Present Location of Blaser
8	313 S. Orcas St. Water Proofing 1929
9	5700 3rd Ave. S. Aluminum Casting 1967
10	5815 4th Ave. S Used Machine 1967 Former Art Brass
11	405 S. Fidalgo St. Machine Shop 1949
12	406 S. Fidalgo St. Electro Plating 1967
13	405 S. Mead St. Auto Body Shop 1967

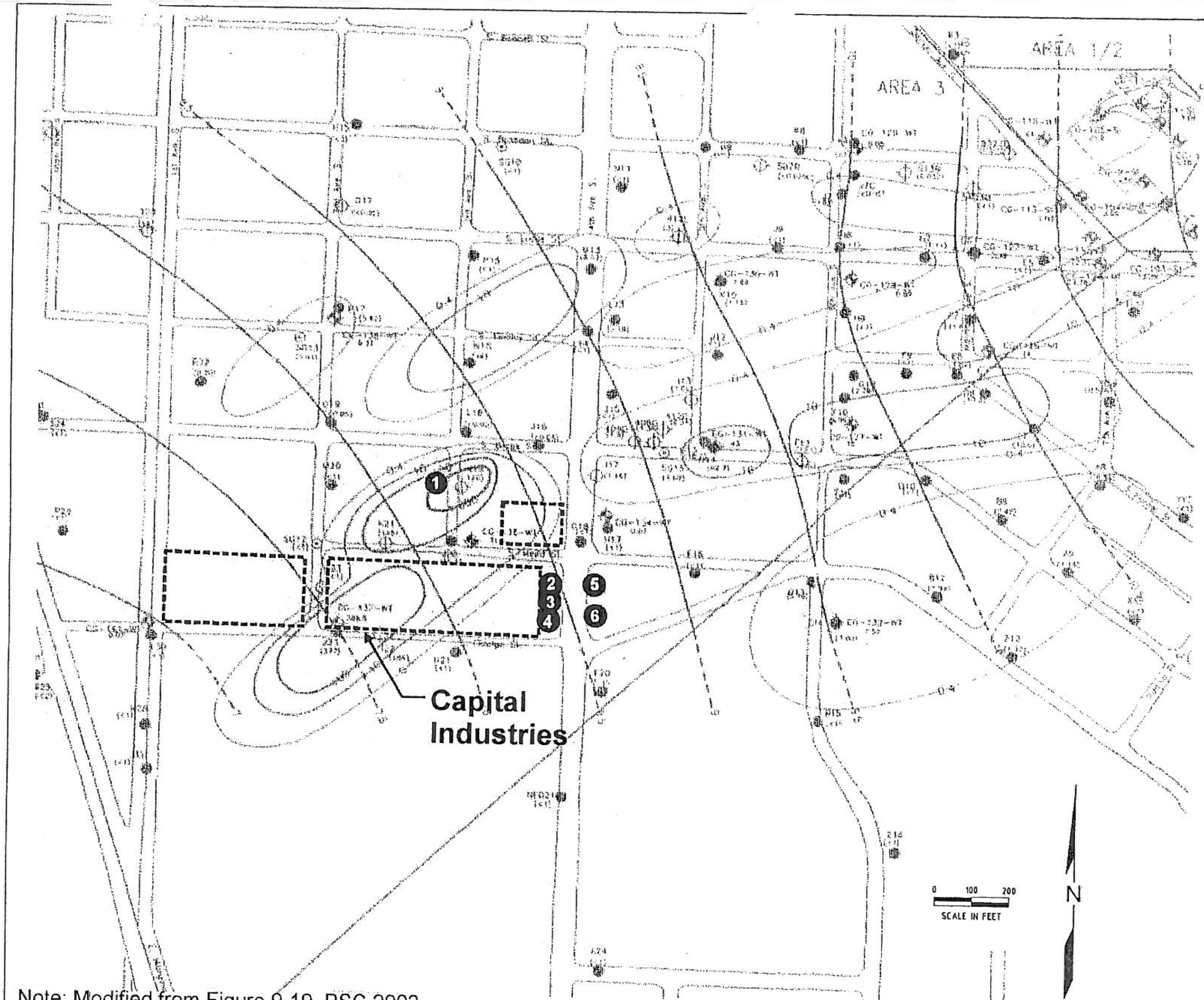
Note: Modified from Figure 9-19, PSC 2003.

Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 4-2
Location of Potential Sources of Upgradient Chlorinated Solvents—Review of Sanborn Fire Maps

G:\project\Clients\mccarthy\capital\corel\Figure 4-1



LEGEND

1 5707 Residence
1961, 1968, 1973

2 5807
JM Knisely Engineering
1961, 1968, 1973

Pacific Marine Testing
(Laboratory)
1978, 1988, 1996

3 5811
American Repair
(Tool Repair)
1983

4 5815
Advance Fork Lift
1988, 1996

Art Brass
1973, 1978, 1983

Fastway Printer &
Copy Center
1973

5 5810
Art Brass
1968

6 5812
Bob's Launderette
1961

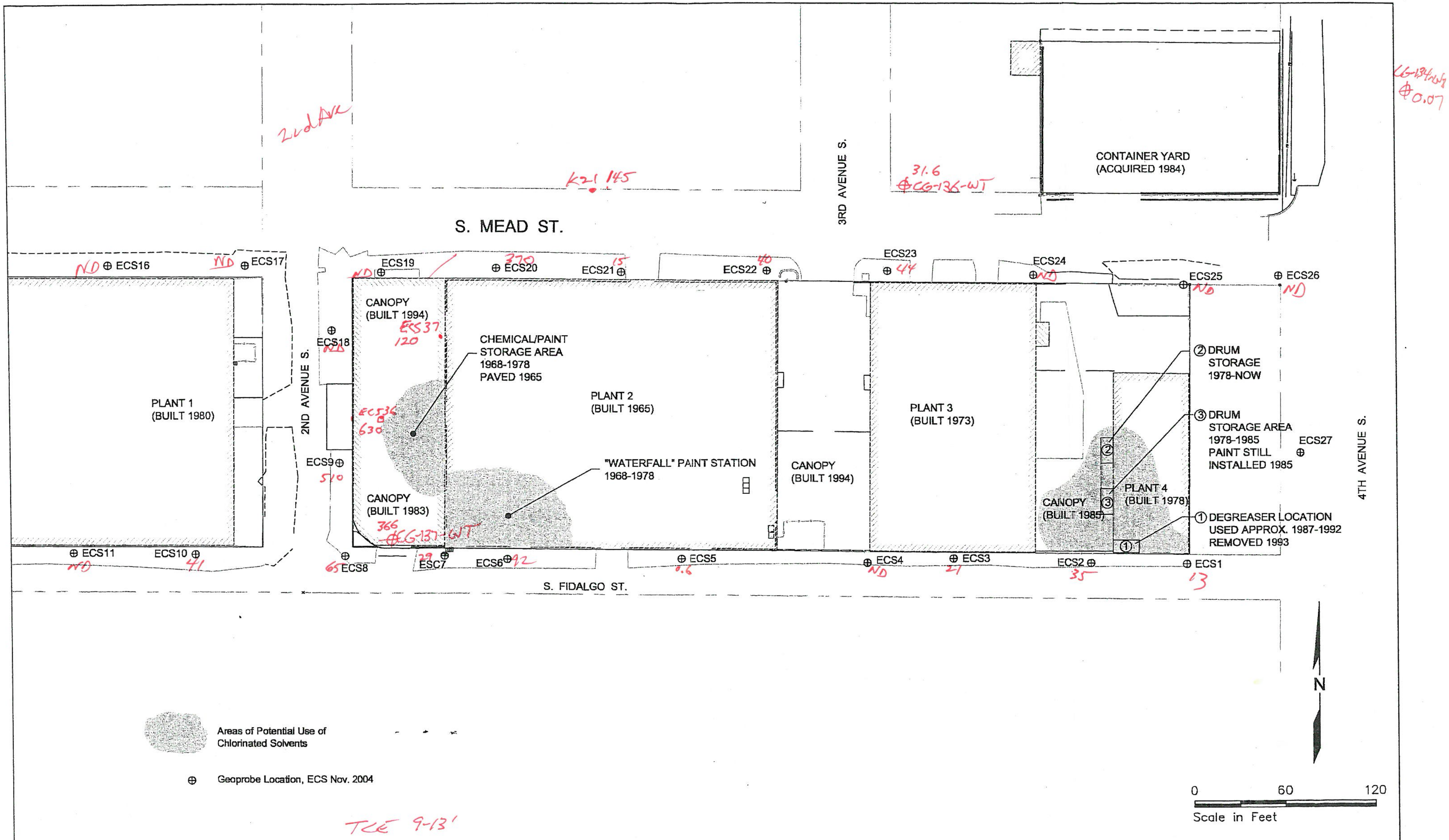
Note: Modified from Figure 9-19, PSC 2003.

Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 4-3
Location of Potential Sources of
Upgradient Chlorinated Solvents—
Review of Historical City Directories

G:\project\Clients\mccarthy\capital\corel\Figure 4-3



Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 4-4
Locations of Potential Historical Uses of
Chlorinated Solvents at Capital

DWG NAME: G:\project\clients\mccarthy\capital\c_indu024 (HistLoca 4-4).dwg
DATE: 06/01/05 09:09am

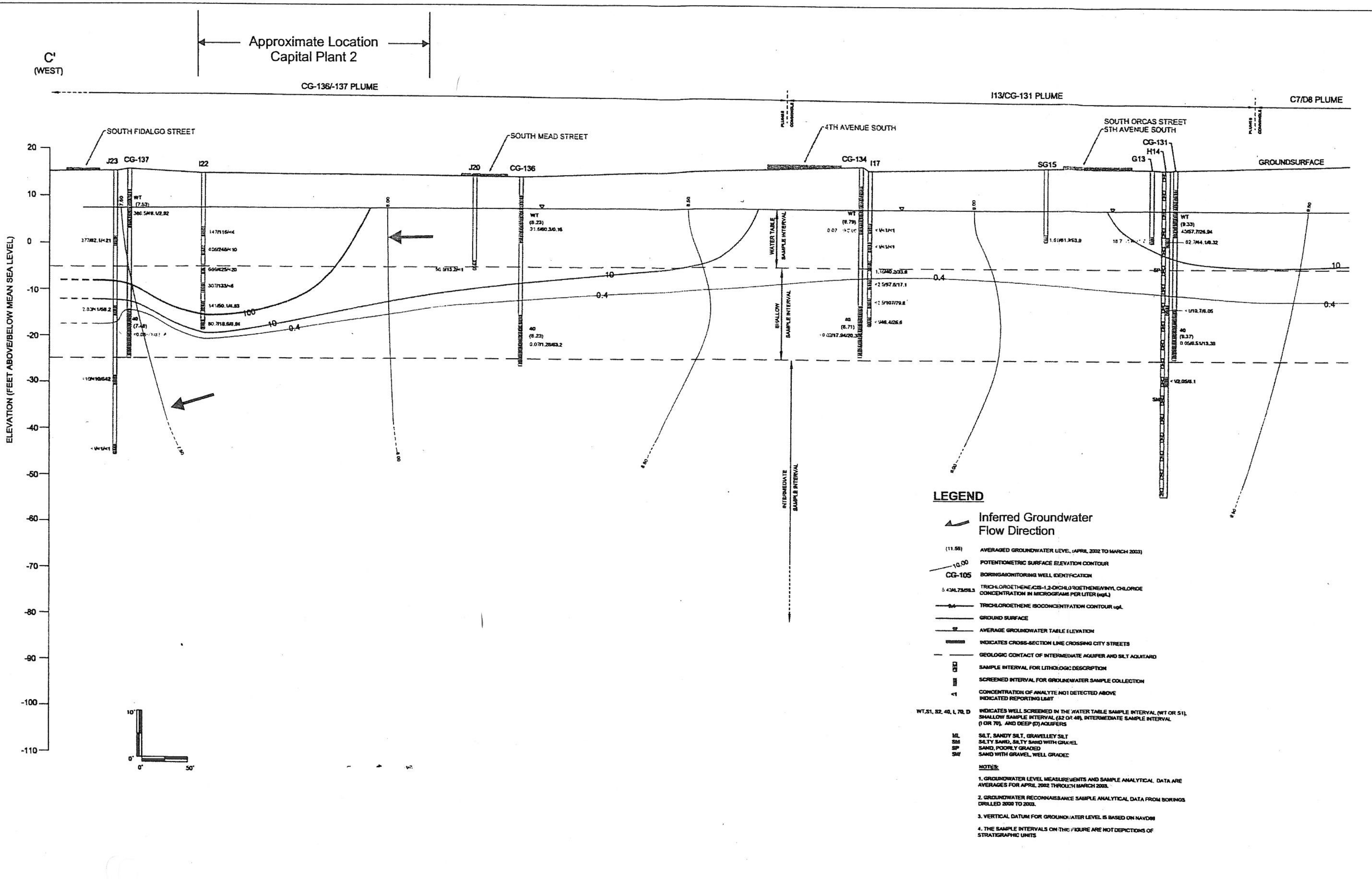
Note: Modified from Figure 9-19, PSC 2003.

Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 4-5
TCE Plume Map—Water Table Elevation

G:\project\Clients\mccarthy\capital\core\Figure 4-5



NOTES:

1. GROUNDWATER LEVEL MEASUREMENTS AND SAMPLE ANALYTICAL DATA ARE AVERAGES FOR APRIL 2002 THROUGH MARCH 2003.

2. GROUNDWATER RECONNAISSANCE SAMPLE ANALYTICAL DATA FROM BORINGS DRILLED 2000 TO 2003.

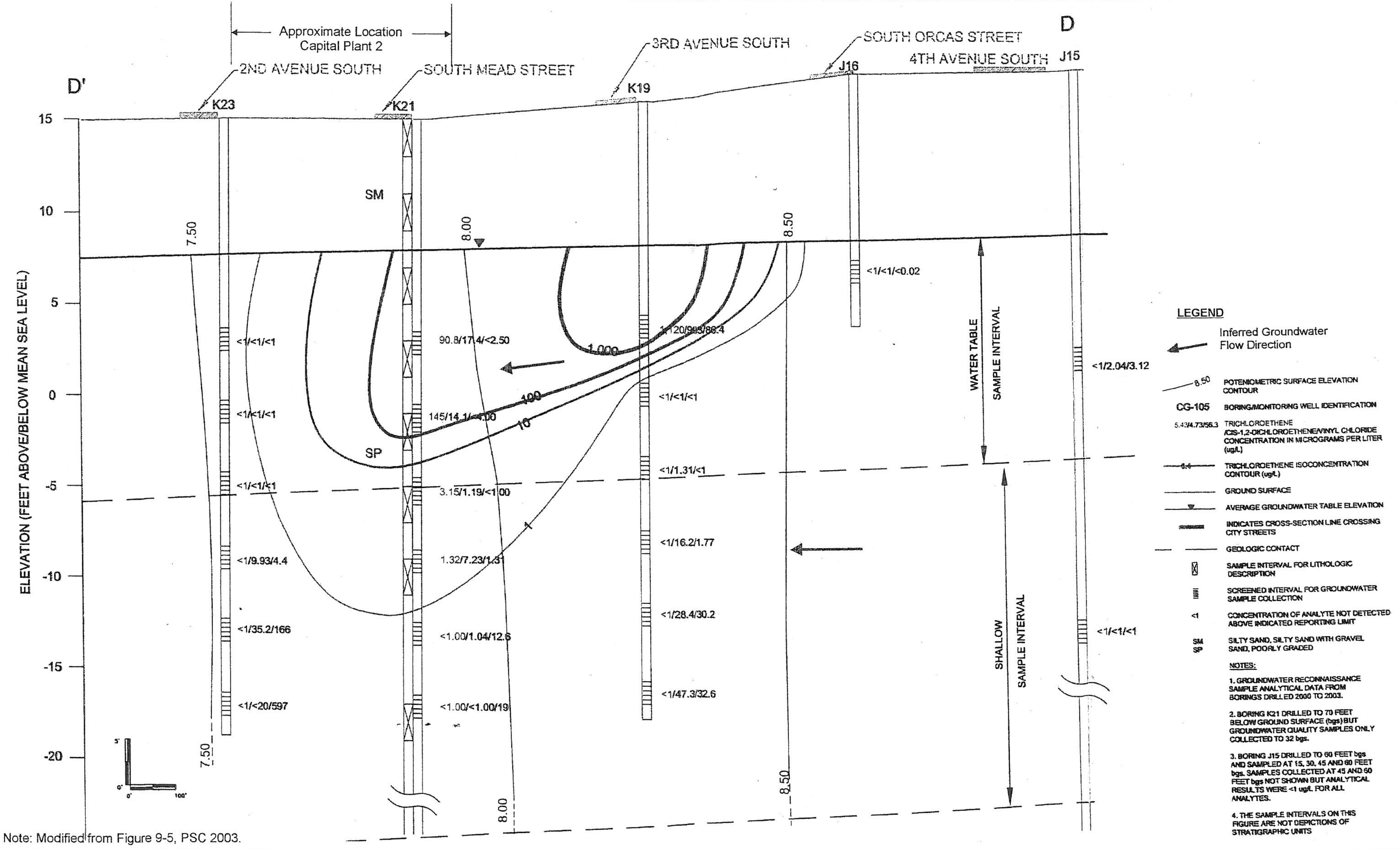
3. VERTICAL DATUM FOR GROUNDWATER LEVEL IS BASED ON NAVD88

4. THE SAMPLE INTERVALS ON THIS FIGURE ARE NOT DEPICTIONS OF STRATIGRAPHIC UNITS

Note: Modified from Figure 9-4a, PSC 2003.

Environmental Consulting Services, Inc.	Capital Industries Seattle, Washington	Figure 4-6 TCE Water Table Cross-Sections in Wells in the Capital Vicinity

G:\project\Clients\mccarthy\capital\corel\Figure 4-6



NOTES:

1. GROUNDWATER RECONNAISSANCE SAMPLE ANALYTICAL DATA FROM BORINGS DRILLED 2000 TO 2003.

2. BORING K21 DRILLED TO 70 FEET BELOW GROUND SURFACE (bgs) BUT GROUNDWATER QUALITY SAMPLES ONLY COLLECTED TO 32 bgs.

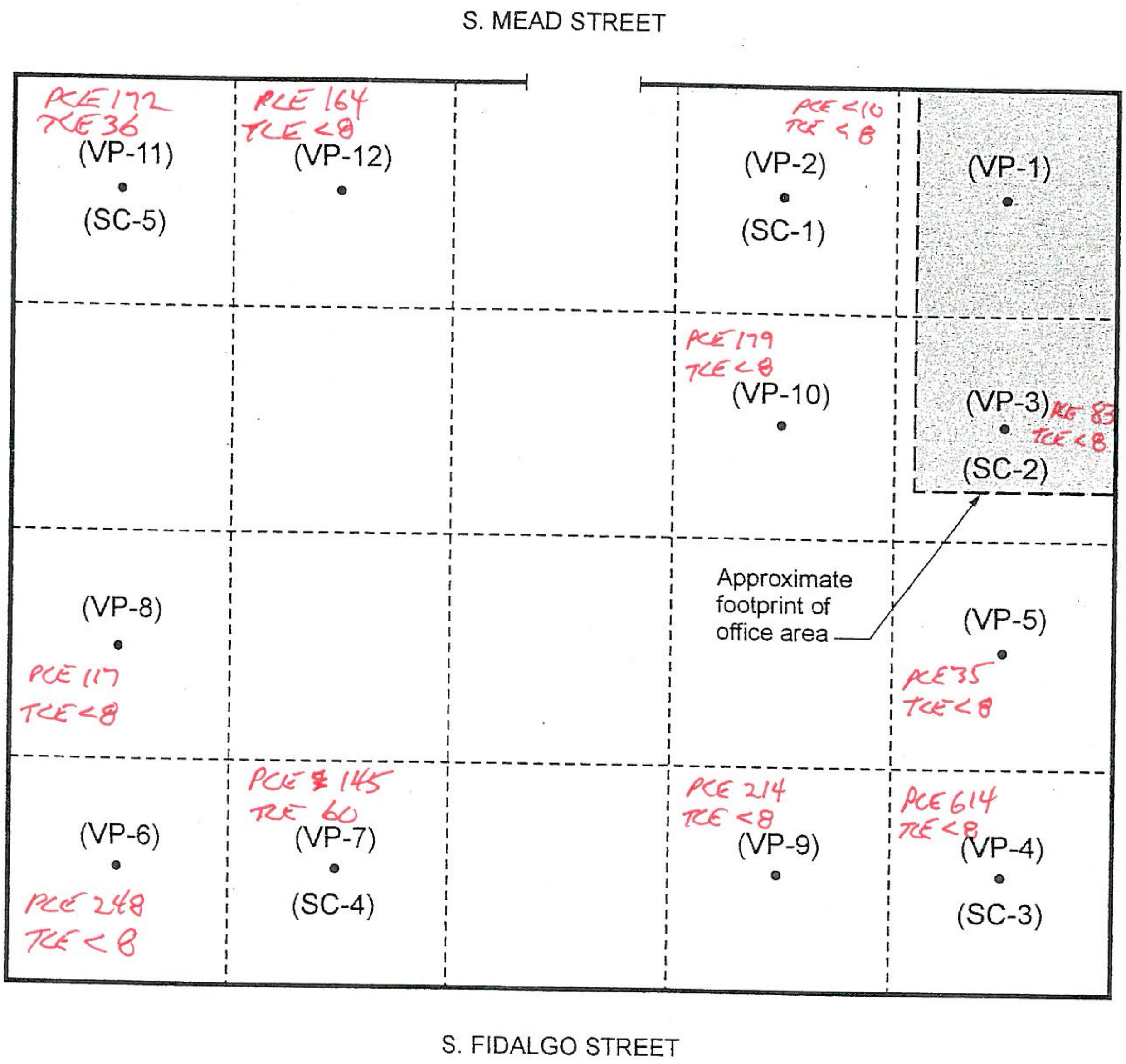
3. BORING J15 DRILLED TO 60 FEET bgs AND SAMPLED AT 15, 30, 45 AND 60 FEET bgs. SAMPLES COLLECTED AT 45 AND 60 FEET bgs NOT SHOWN BUT ANALYTICAL RESULTS WERE <1 ug/L FOR ALL ANALYTES.

4. THE SAMPLE INTERVALS ON THIS FIGURE ARE NOT DEPICTIONS OF STRATIGRAPHIC UNITS

Note: Modified from Figure 9-5, PSC 2003.

Environmental Consulting Services, Inc.	Capital Industries Seattle, Washington	Figure 4-7 TCE Cross Sections in Temporary Wells in the Capital Vicinity

G:\project\Clients\mccarthy\capital\corel\Figure 4-7



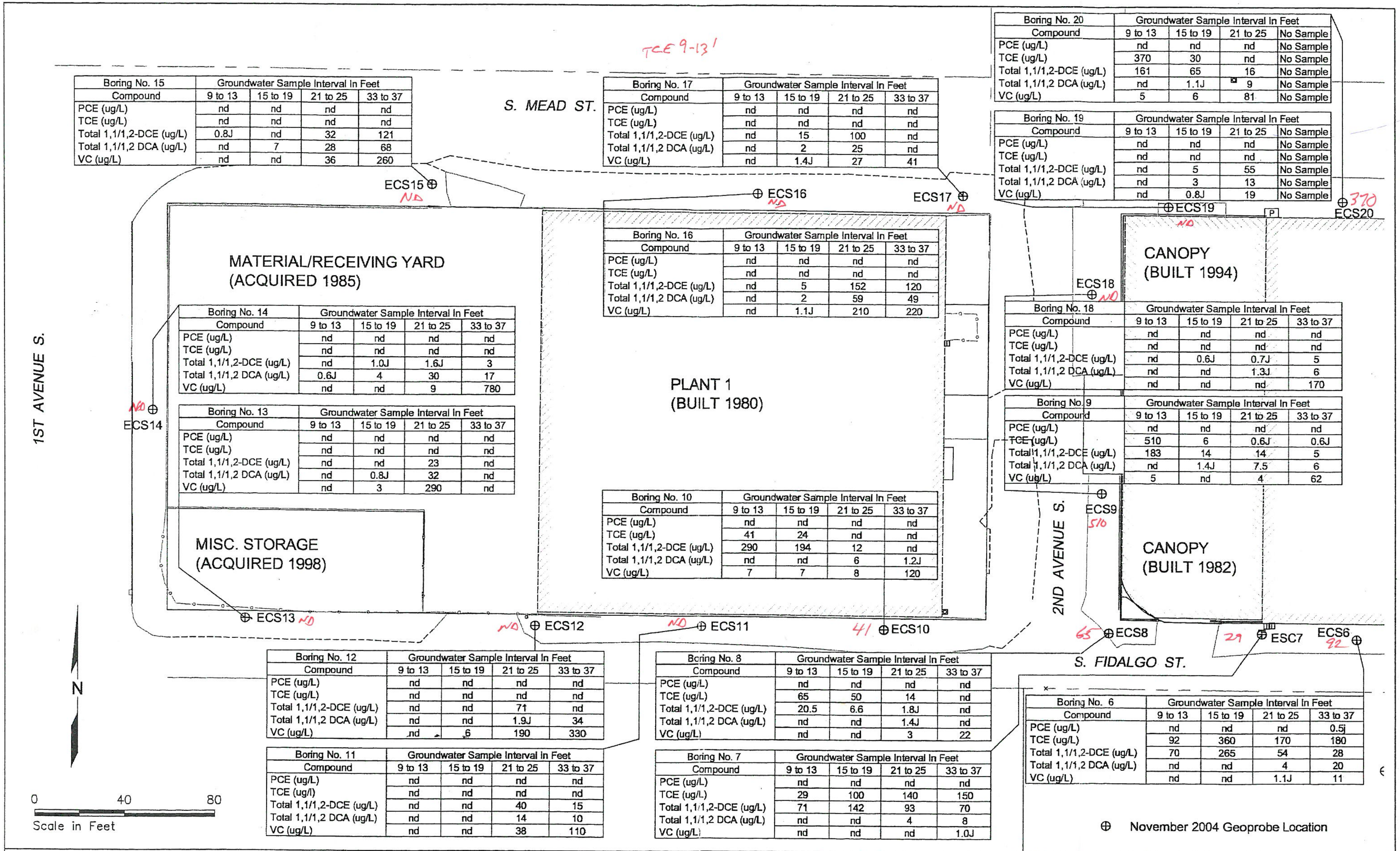
LEGEND

●	Sample Location
(VP)	On-Site Lab Soil Vapor Sample
(SC)	Off-Site Lab Summa Canister Sample

NOT TO SCALE

N

Environmental Consulting Services, Inc.	Capital Industries, Inc. Seattle, Washington	Figure 4.8 Location of Soil Vapor Samples Beneath Plant 2



Boring No. 15	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	0.8J	nd	32	121
Total 1,1/1,2 DCA (ug/L)	nd	7	28	68
VC (ug/L)	nd	nd	36	260

Boring No. 17	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	15	100	nd
Total 1,1/1,2 DCA (ug/L)	nd	2	25	nd
VC (ug/L)	nd	1.4J	27	41

Boring No. 20	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	No Sample
PCE (ug/L)	nd	nd	nd	No Sample
TCE (ug/L)	370	30	nd	No Sample
Total 1,1/1,2-DCE (ug/L)	161	65	16	No Sample
Total 1,1/1,2 DCA (ug/L)	nd	1.1J	9	No Sample
VC (ug/L)	5	6	81	No Sample

Boring No. 19	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	No Sample
PCE (ug/L)	nd	nd	nd	No Sample
TCE (ug/L)	nd	nd	nd	No Sample
Total 1,1/1,2-DCE (ug/L)	nd	5	55	No Sample
Total 1,1/1,2 DCA (ug/L)	nd	3	13	No Sample
VC (ug/L)	nd	0.8J	19	No Sample

Boring No. 16	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	5	152	120
Total 1,1/1,2 DCA (ug/L)	nd	2	59	49
VC (ug/L)	nd	1.1J	210	220

Boring No. 14	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	1.0J	1.6J	3
Total 1,1/1,2 DCA (ug/L)	0.6J	4	30	17
VC (ug/L)	nd	nd	9	780

Boring No. 18	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	0.6J	0.7J	5
Total 1,1/1,2 DCA (ug/L)	nd	nd	1.3J	6
VC (ug/L)	nd	nd	nd	170

Boring No. 13	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	nd	23	nd
Total 1,1/1,2 DCA (ug/L)	nd	0.8J	32	nd
VC (ug/L)	nd	3	290	nd

Boring No. 9	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	510	6	0.6J	0.6J
Total 1,1/1,2-DCE (ug/L)	183	14	14	5
Total 1,1/1,2 DCA (ug/L)	nd	1.4J	7.5	6
VC (ug/L)	5	nd	4	62

Boring No. 10	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	41	24	nd	nd
Total 1,1/1,2-DCE (ug/L)	290	194	12	nd
Total 1,1/1,2 DCA (ug/L)	nd	nd	6	1.2J
VC (ug/L)	7	7	8	120

Boring No. 12	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	nd	71	nd
Total 1,1/1,2 DCA (ug/L)	nd	nd	1.9J	34
VC (ug/L)	nd	6	190	330

Boring No. 11	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/l)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	nd	40	15
Total 1,1/1,2 DCA (ug/L)	nd	nd	14	10
VC (ug/L)	nd	nd	38	110

Boring No. 8	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	65	50	14	nd
Total 1,1/1,2-DCE (ug/L)	20.5	6.6	1.8J	nd
Total 1,1/1,2 DCA (ug/L)	nd	nd	1.4J	nd
VC (ug/L)	nd	nd	3	22

Boring No. 7	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	29	100	140	150
Total 1,1/1,2-DCE (ug/L)	71	142	93	70
Total 1,1/1,2 DCA (ug/L)	nd	nd	4	8
VC (ug/L)	nd	nd	nd	1.0J

Boring No. 6	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	0.5j
TCE (ug/L)	92	360	170	180
Total 1,1/1,2-DCE (ug/L)	70	265	54	28
Total 1,1/1,2 DCA (ug/L)	nd	nd	4	20
VC (ug/L)	nd	nd	1.1J	11

⊕ November 2004 Geoprobe Location

Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 5-1a
Summary of November 2004 Groundwater Test Results
Plant 1 and West Plant 2

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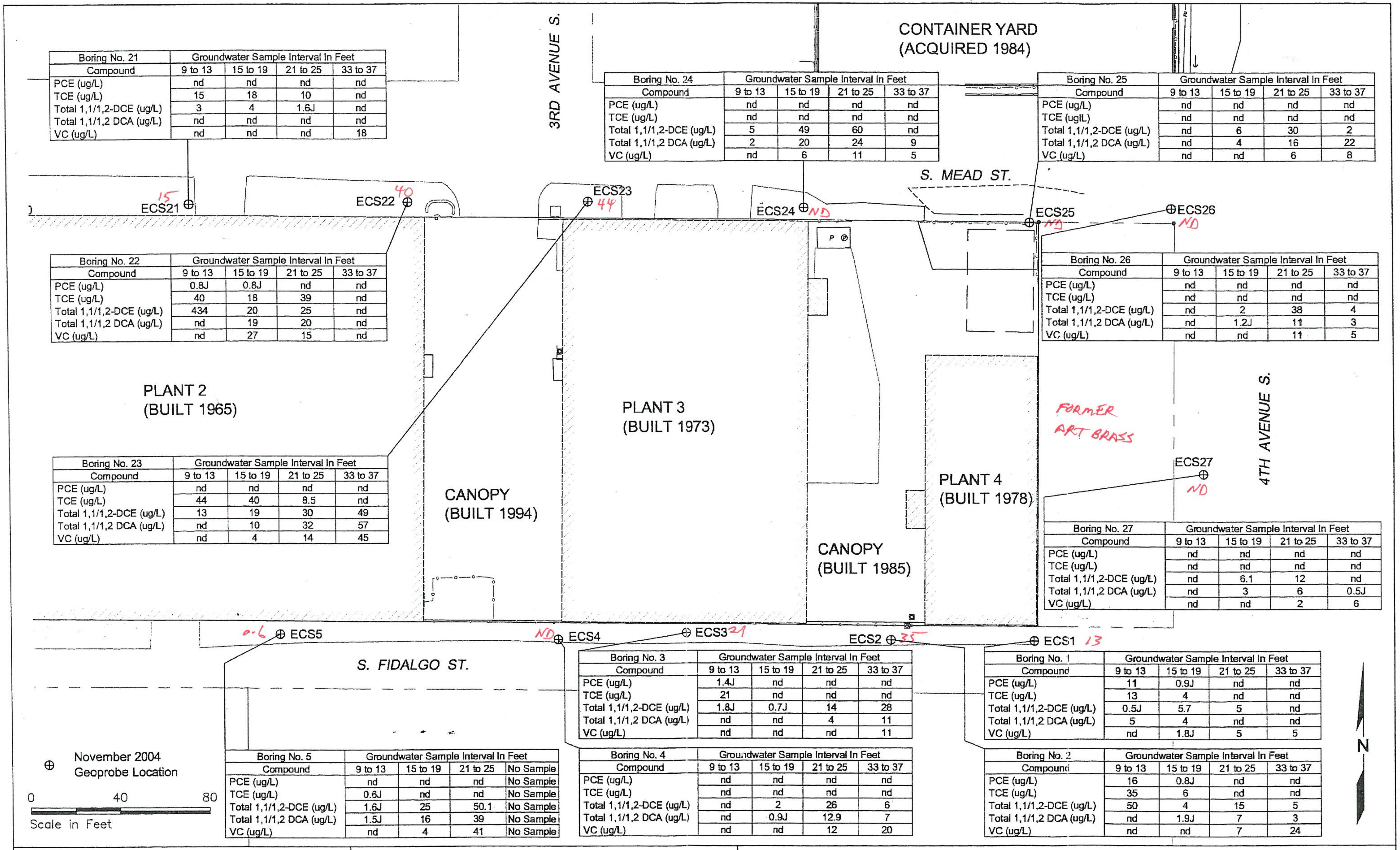

Boring No. 21	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	15	18	10	nd
Total 1,1/1,2-DCE (ug/L)	3	4	1.6J	nd
Total 1,1/1,2 DCA (ug/L)	nd	nd	nd	nd
VC (ug/L)	nd	nd	nd	18

Boring No. 22	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	0.8J	0.8J	nd	nd
TCE (ug/L)	40	18	39	nd
Total 1,1/1,2-DCE (ug/L)	434	20	25	nd
Total 1,1/1,2 DCA (ug/L)	nd	19	20	nd
VC (ug/L)	nd	27	15	nd

Boring No. 23	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	44	40	8.5	nd
Total 1,1/1,2-DCE (ug/L)	13	19	30	49
Total 1,1/1,2 DCA (ug/L)	nd	10	32	57
VC (ug/L)	nd	4	14	45

Boring No. 24	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	5	49	60	nd
Total 1,1/1,2 DCA (ug/L)	2	20	24	9
VC (ug/L)	nd	6	11	5

Boring No. 25	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ugIL)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	6	30	2
Total 1,1/1,2 DCA (ug/L)	nd	4	16	22
VC (ug/L)	nd	nd	6	8

Boring No. 26	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	2	38	4
Total 1,1/1,2 DCA (ug/L)	nd	1.2J	11	3
VC (ug/L)	nd	nd	11	5

Boring No. 27	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	6.1	12	nd
Total 1,1/1,2 DCA (ug/L)	nd	3	6	0.5J
VC (ug/L)	nd	nd	2	6

Boring No. 5	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	No Sample
PCE (ug/L)	nd	nd	nd	No Sample
TCE (ug/L)	0.6J	nd	nd	No Sample
Total 1,1/1,2-DCE (ug/L)	1.6J	25	50.1	No Sample
Total 1,1/1,2 DCA (ug/L)	1.5J	16	39	No Sample
VC (ug/L)	nd	4	41	No Sample

Boring No. 3	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	1.4J	nd	nd	nd
TCE (ug/L)	21	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	1.8J	0.7J	14	28
Total 1,1/1,2 DCA (ug/L)	nd	nd	4	11
VC (ug/L)	nd	nd	nd	11

Boring No. 4	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	nd	nd	nd	nd
TCE (ug/L)	nd	nd	nd	nd
Total 1,1/1,2-DCE (ug/L)	nd	2	26	6
Total 1,1/1,2 DCA (ug/L)	nd	0.9J	12.9	7
VC (ug/L)	nd	nd	12	20

Boring No. 1	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	11	0.9J	nd	nd
TCE (ug/L)	13	4	nd	nd
Total 1,1/1,2-DCE (ug/L)	0.5J	5.7	5	nd
Total 1,1/1,2 DCA (ug/L)	5	4	nd	nd
VC (ug/L)	nd	1.8J	5	5

Boring No. 2	Groundwater Sample Interval In Feet			
Compound	9 to 13	15 to 19	21 to 25	33 to 37
PCE (ug/L)	16	0.8J	nd	nd
TCE (ug/L)	35	6	nd	nd
Total 1,1/1,2-DCE (ug/L)	50	4	15	5
Total 1,1/1,2 DCA (ug/L)	nd	1.9J	7	3
VC (ug/L)	nd	nd	7	24

Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 5-1b
Summary of November 2004 Groundwater Test Results
East Plant 2, Plant 3, and Plant 4

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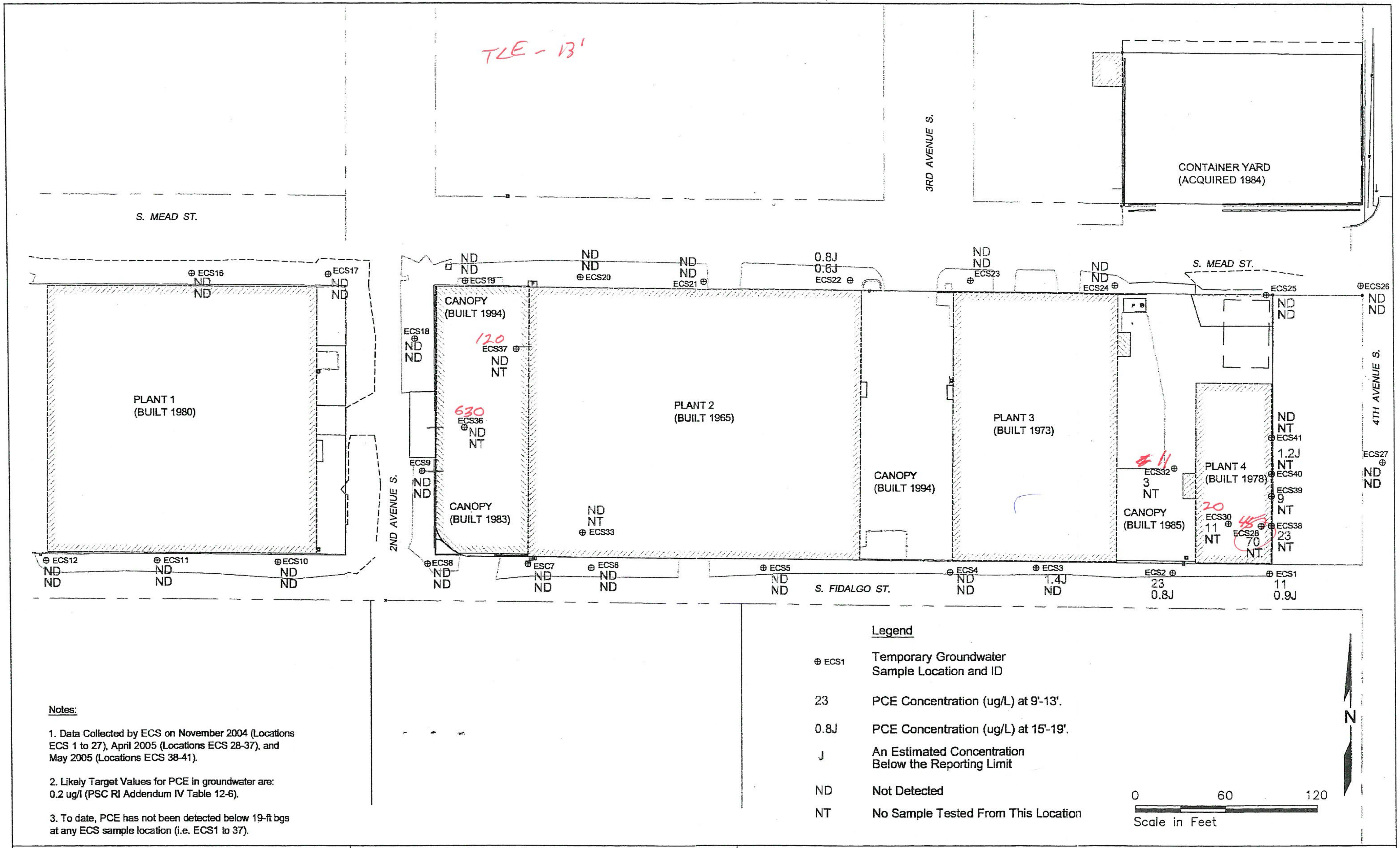

Notes:

1. Data Collected by ECS on November 2004 (Locations ECS 1 to 27), April 2005 (Locations ECS 28-37), and May 2005 (Locations ECS 38-41).

2. Likely Target Values for PCE in groundwater are: 0.2 ug/l (PSC RI Addendum IV Table 12-6).

3. To date, PCE has not been detected below 19-ft bgs at any ECS sample location (i.e. ECS1 to 37).

Legend

⊕ ECS1	Temporary Groundwater Sample Location and ID
23	PCE Concentration (ug/L) at 9'-13'.
0.8J	PCE Concentration (ug/L) at 15'-19'.
J	An Estimated Concentration Below the Reporting Limit
ND	Not Detected
NT	No Sample Tested From This Location

Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 5-2
PCE in Groundwater (9'-13' and 15'-19' Below Ground Surface)

DWG NAME: G:\project\Clients\mccarthy\capital\c_indu025 (PCE).dwg
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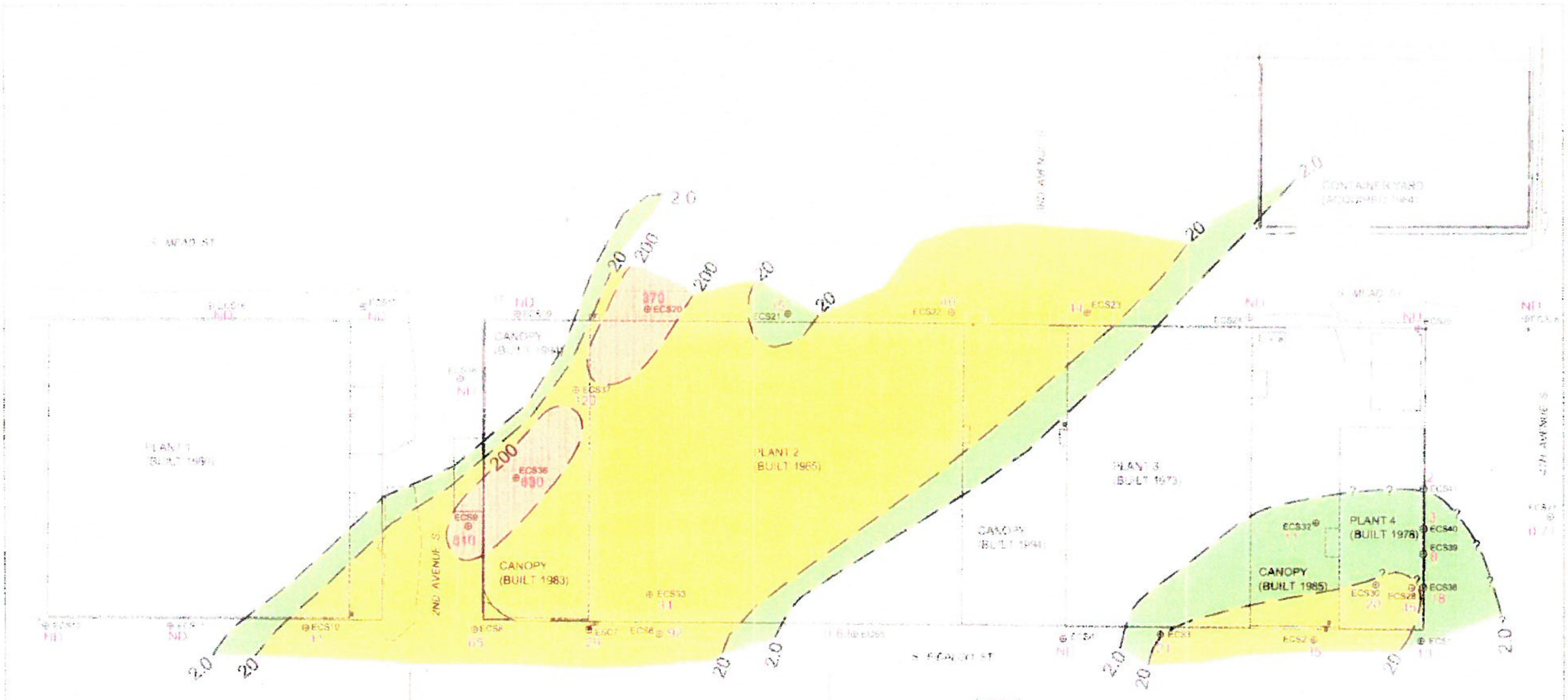


Notes

1. Data collected by ECS in November 2004 (locations ECS 1 to 27), April 2005 (locations ECS 28-34), and May 2005 (locations ECS 30-41).

2. Likely Target Values for TCE in groundwater are 0.404 ug/l (< 20 feet bgs) and 0.785 ug/l (> 20 feet bgs) (OSC RI Addendum IV Table 12-6).

3. TCE was not detected in ECS exploration locations west of here.

Legend

---20---	Isoconcentration Contour
⊕ ECS2	Temporary Groundwater Sample Location and ID
11	TCE Concentration (ug/l)
ND	Not Detected
J	An Estimated Concentration Below the Reporting Limit

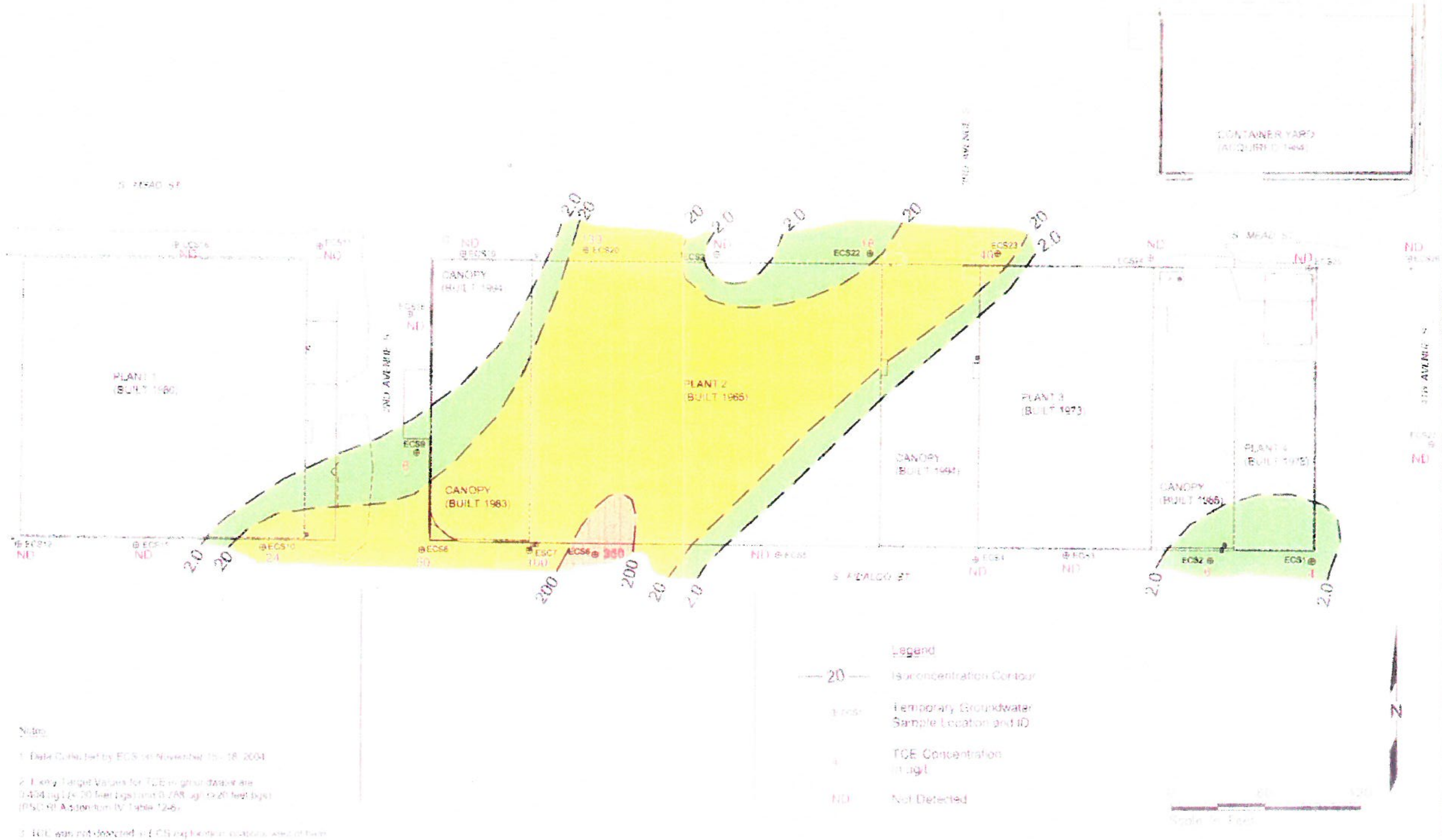
N

Scale in Feet

Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 5-3a
TCE in Groundwater (9'-13' Below Ground Surface)



Notes:

1. Data Collected by ECS on November 15 - 18, 2004

2. Likely Target Values for TCE in groundwater are 0.454 ug/l (< 20 feet bgs) and 0.788 ug/l (> 20 feet bgs) (PSC RI Addendum IV Table 12-6)

3. TCE was not detected in ECS exploration locations west of [illegible]

Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 5-3b
TCE in Groundwater (15'-19' Below Ground Surface)

Legend

- 20 — Isoconcentration Contour
- ⊕ECS# Temporary Groundwater Sample Location and ID
- 8.5 TCE Concentration (ug/L)
- ND Not Detected

Notes:

1. Data Collected by ECS on November 15 - 18, 2004

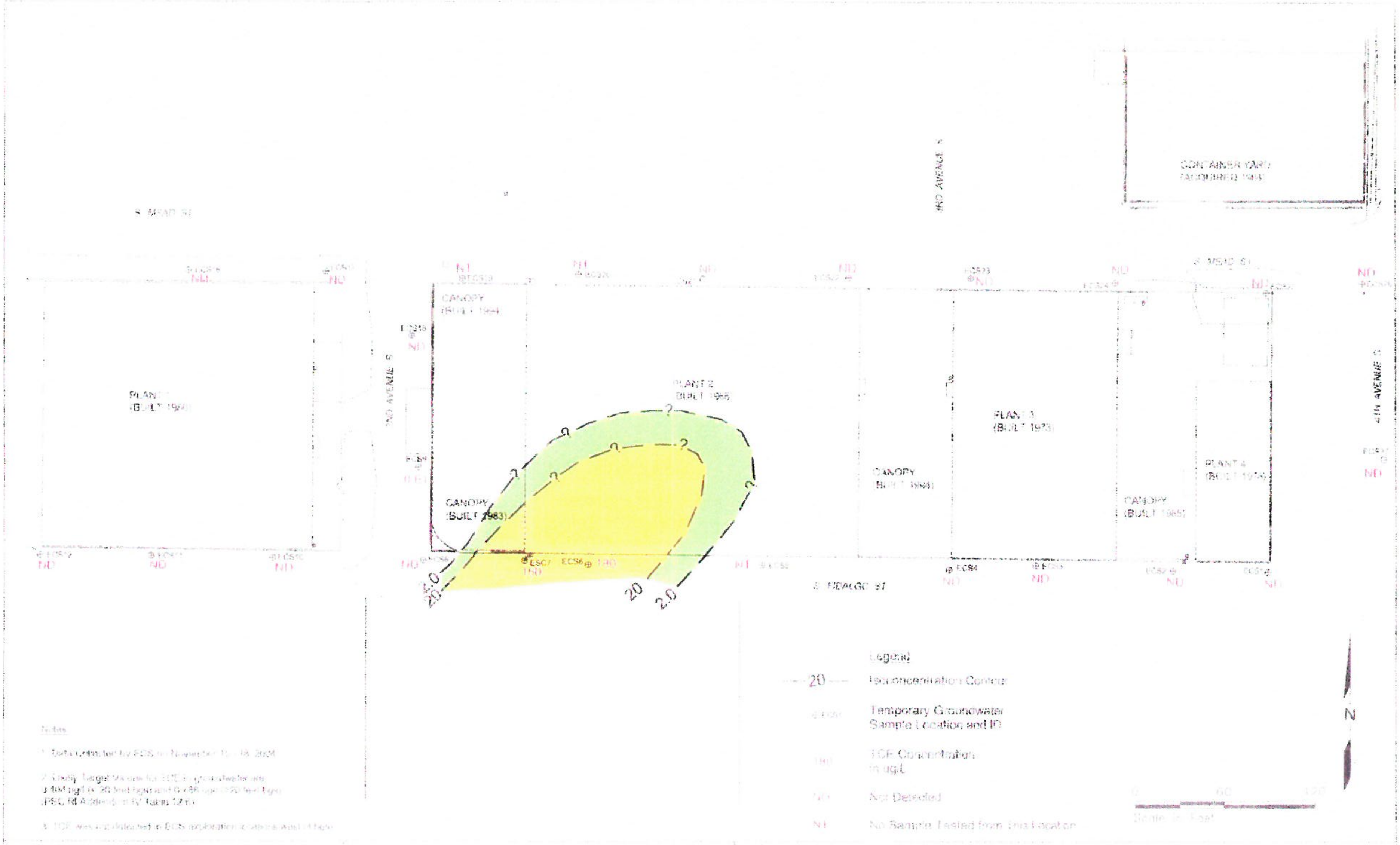
2. Cleanup Target Values for TCE in groundwater are 0.404 ug/l (< 20 feet bgs) and [illegible] ug/l (>20 feet bgs) (PSC RI Addendum IV Table 12-6)

3. TCE was not detected in ECS exploration locations [illegible]

Environmental Consulting Services, Inc.

Capital Industries
Seattle, Washington

Figure 5-3c
TCE in Groundwater (21'-25' Below Ground Surface)



Notes

1. Data collected by ECS on November [illegible]

2. Likely Target Volume for TCE in groundwater are [illegible] ug/l (< 20 feet bgs) and [illegible] (> 20 feet bgs) (PSC RI Addendum IV Table 12-[illegible])

3. TCE was not detected in ECS exploration locations [illegible]

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Services, Inc.

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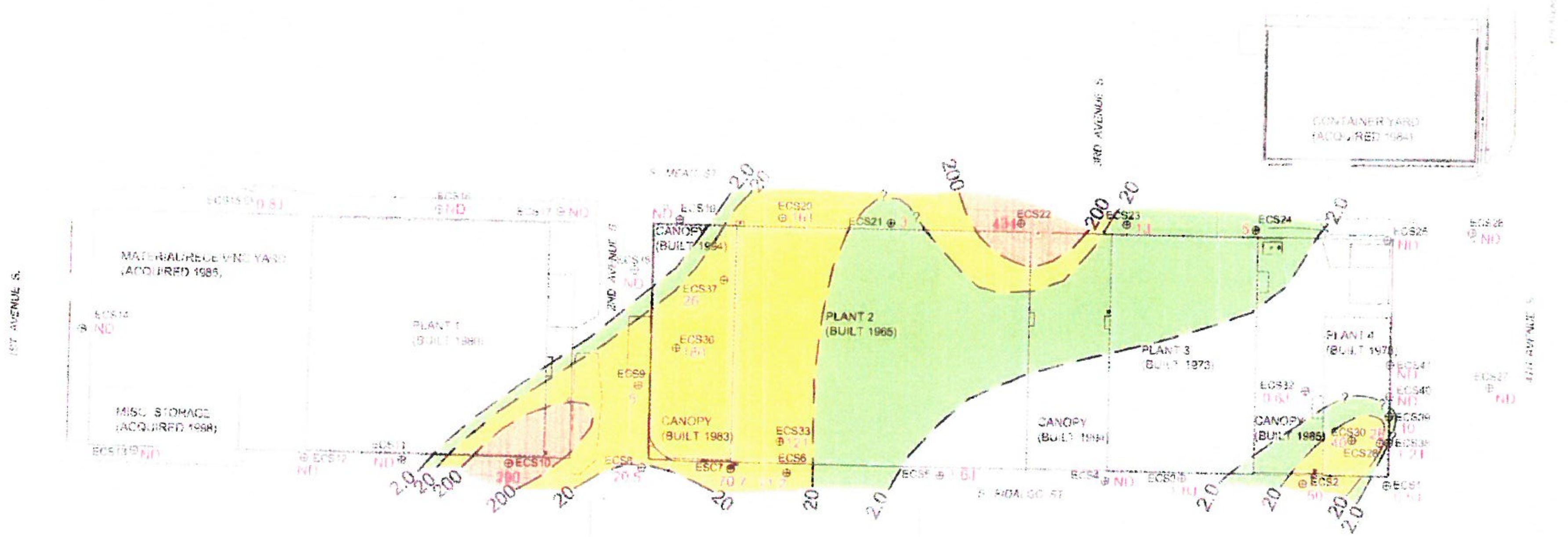
Seattle, Washington

Figure 5-3d
TCE in Groundwater (33'-37' Below Ground Surface)
)



Legend

—20— Isoconcentration Contour

⊕ECS1 Temporary Groundwater Sample Location and ID

290 Total DCE Concentration in ug/l

ND Not Detected

J An Estimated Concentration Below the Reporting Limit

0 80 160

Scale in Feet

N

Notes:

1. Data Collected by ECS on November 2004 (Locations ECS 1 to 27), April 2005 (Locations ECS 28-37) and May 2005 (Locations ECS 38-41)

2. Likely Target Value for 1,1 DCE in groundwater is 3.7 ug/l (PSC RI Addendum IV Table 12-6)

3. Likely Target Values for Cis 1,2 DCE in groundwater are 72.7 ug/l (< 20 feet bgs) and 165 ug/l (>20 feet bgs) (PSC RI Addendum IV Table 12-6)

4. Likely Target Values for Trans 1,2 DCE in groundwater are 65.3 ug/l (< 20 feet bgs) and 1690 ug/l (>20 feet bgs) (PSC RI Addendum IV Table 12-6)

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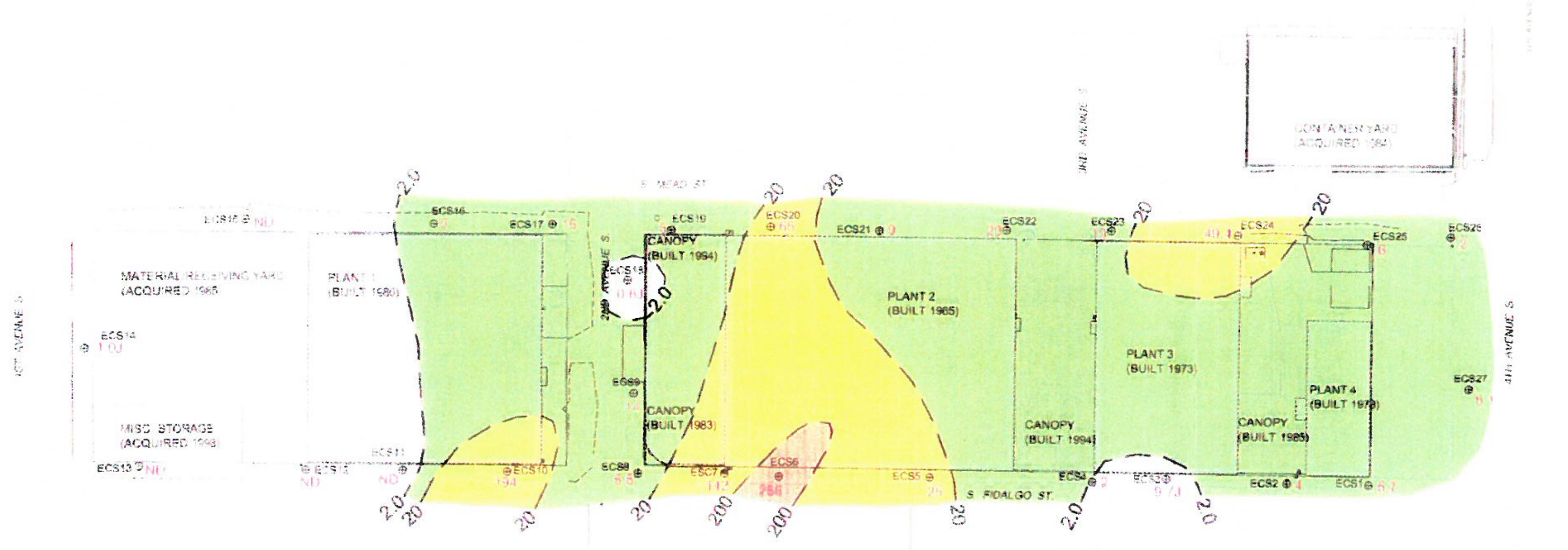
Figure 5-4a
Total DCE in Groundwater (9'-13' Below Ground Surface)



Notes:

1. Data Collected by ECS on November 15 - 18, 2004

2. Likely Target Value for 1,1 DCE in groundwater is 3.2 ug/l (PSC RI Addendum IV Table 12.6)

3. Likely Target Values for Cis 1,2 DCE in groundwater are 72.7 ug/l (< 20 feet bgs) and 165 ug/l (>20 feet bgs) (PSC RI Addendum IV Table 12.6)

4. Likely Target Values for Trans 1,2 DCE in groundwater are 65.3 ug/l (< 20 feet bgs) and 1690 ug/l (>20 feet bgs) (PSC RI Addendum IV Table 12.6)

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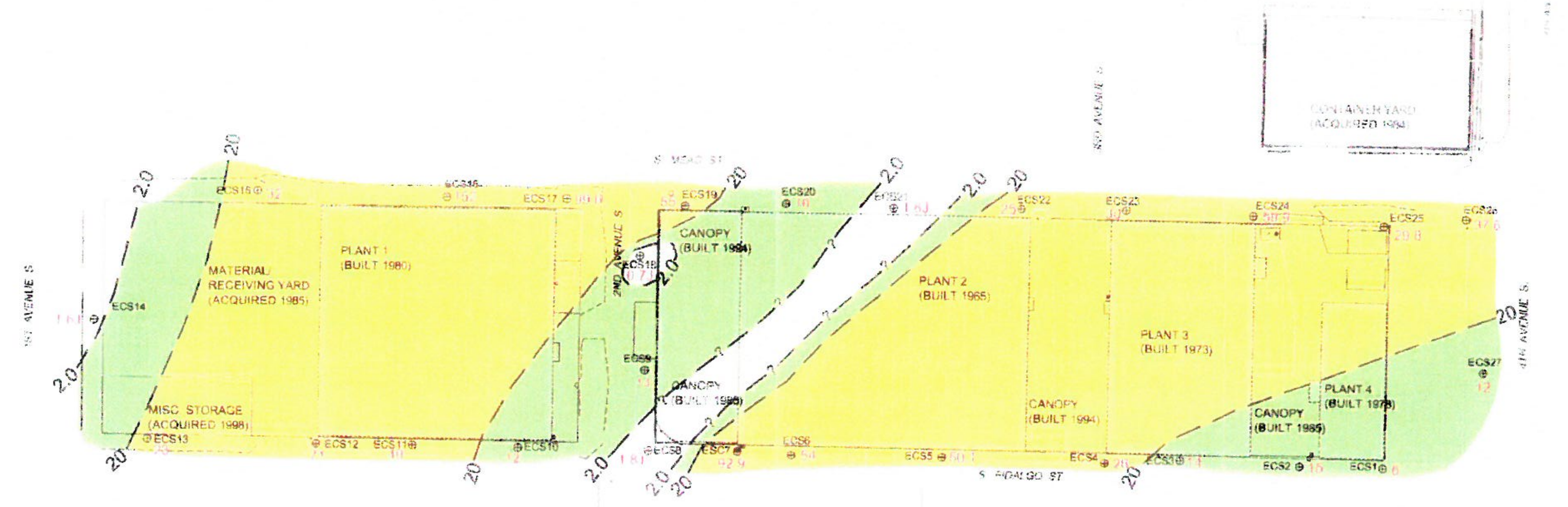
Figure 5-4b
Total DCE in Groundwater (15'-19' Below Ground Surface)



Legend

- --20-- Isoconcentration Contour
- ⊕ ECS1 Temporary Groundwater Sample Location and ID
- 12 Total DCE Concentration in ug/l
- ND Not Detected

N

0 80 160

Scale in Feet

Notes

1. Data Collected by ECS on November 15 - 18, 2004
2. Likely Target Value for 1,1 DCE in groundwater is 3.2 ug/l (PSC RI Addendum IV Table 12.6)
3. Likely Target Values for Cis 1,2 DCE in groundwater are 72.7 ug/l (< 20 feet bgs) and 155 ug/l (>20 feet bgs) (PSC RI Addendum IV Table 12.6)
4. Likely Target Values for Trans 1,2 DCE in groundwater are 65.3 ug/l (< 20 feet bgs) and 1690 ug/l (>20 feet bgs) (PSC RI Addendum IV Table 12.6)

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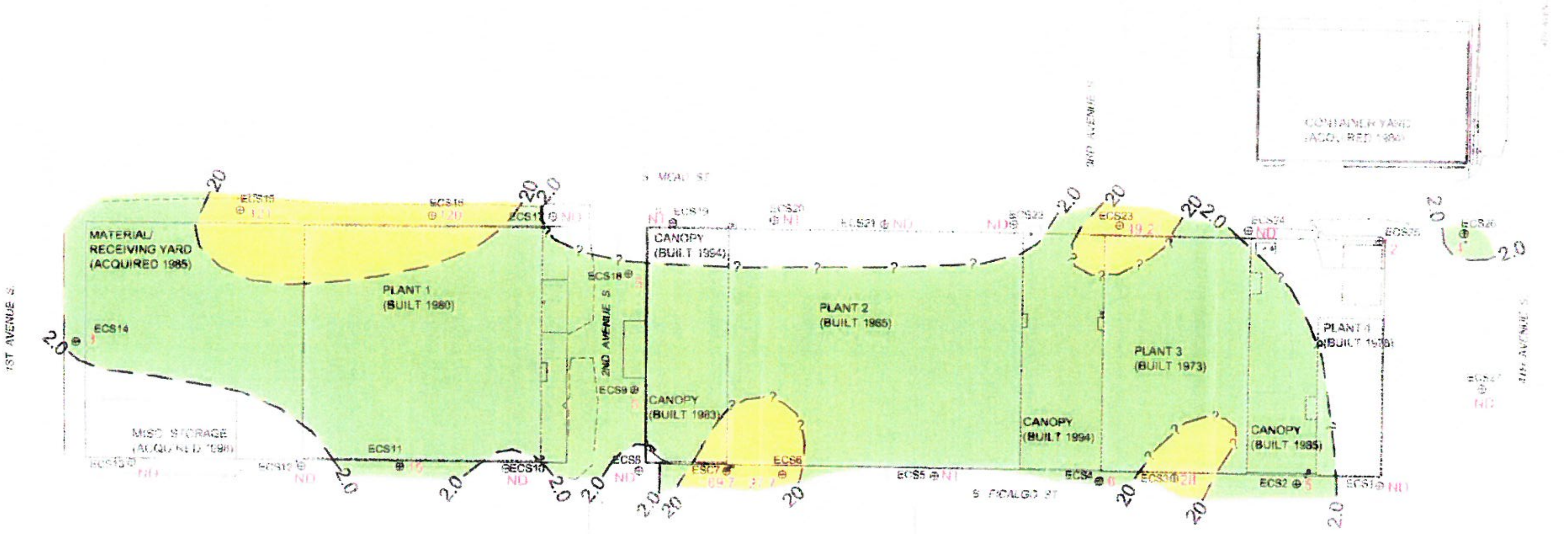
Figure 5-4c
Total DCE in Groundwater (21'-25' Below Ground Surface)



Legend

- ---20--- Isoconcentration Contour
- ⊕ ECS1 Temporary Groundwater Sample Location and ID
- 15 Total DCE Concentration in ug/L
- ND Not Detected
- NT No Sample Tested from This Location

N

0 80 160

Scale in Feet

Notes:

1. Data Collected by ECS on November 15 - 16, 2004
2. Likely Target Value for 1,1-DCE in groundwater is 3.2 ug/l (PSC RI Addendum IV Table 12.6)
3. Likely Target Values for Cis-1,2-DCE in groundwater are 72.7 ug/l (< 20 feet bgs) and 165 ug/l (>20 feet bgs) (PSC RI Addendum IV Table 12.6)
4. Likely Target Values for Trans-1,2-DCE in groundwater are 65.3 ug/l (< 20 feet bgs) and 1690 ug/l (>20 feet bgs) (PSC RI Addendum IV Table 12.6)

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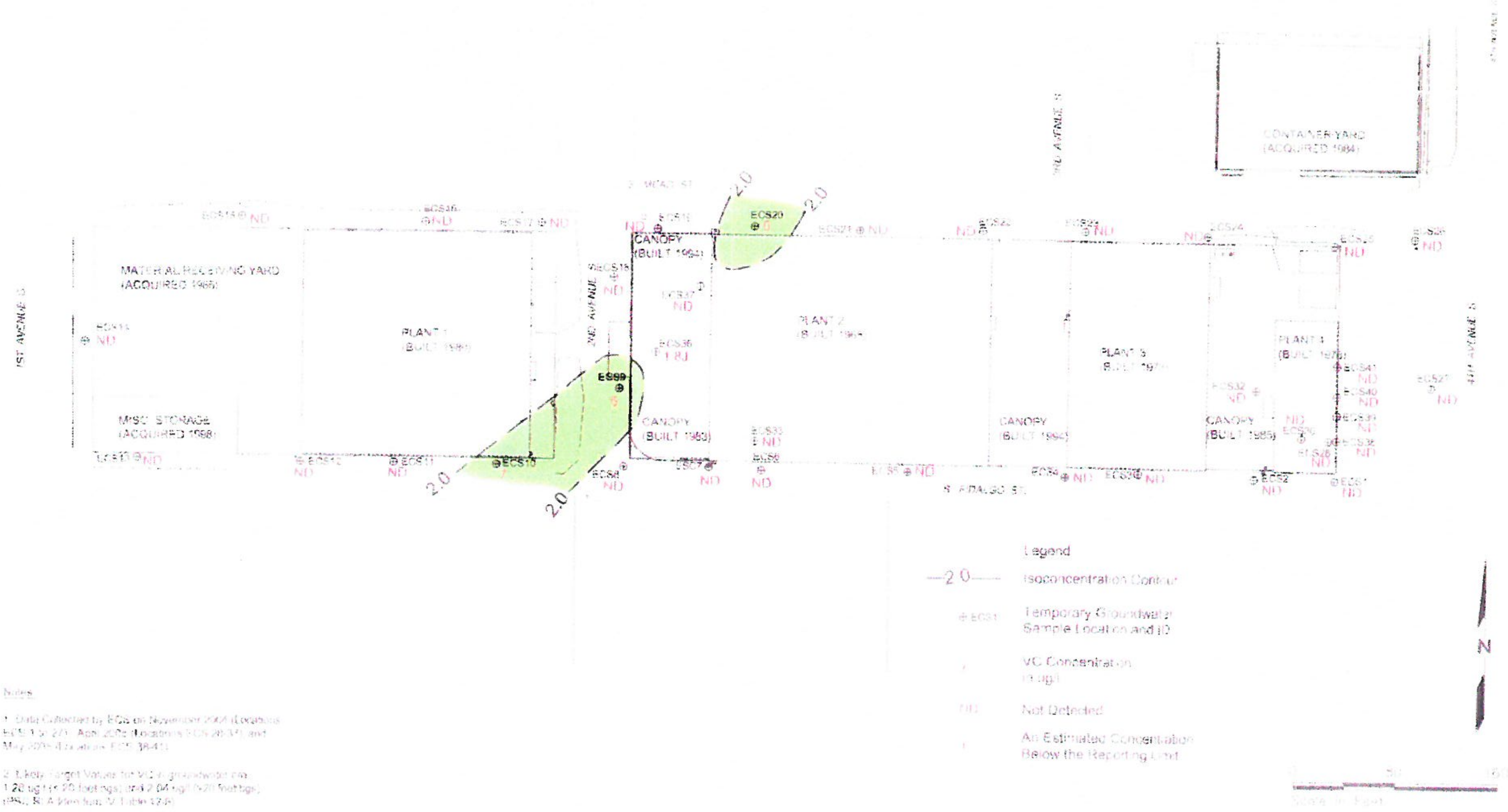
Figure 5-4d
Total DCE in Groundwater (33'-37' Below Ground Surface)



Notes

1. Data Collected by ECS on November 2004 (Locations ECS 1 to 27), April 2005 (Locations ECS 28-37), and May 2005 (Locations ECS 38-41).

2. Likely Target Values for VC in groundwater are 1.28 ug/l (<20 feet bgs) and 2.04 ug/l (>20 feet bgs) (PSC, RI-A Volume IV, Table 12-6)

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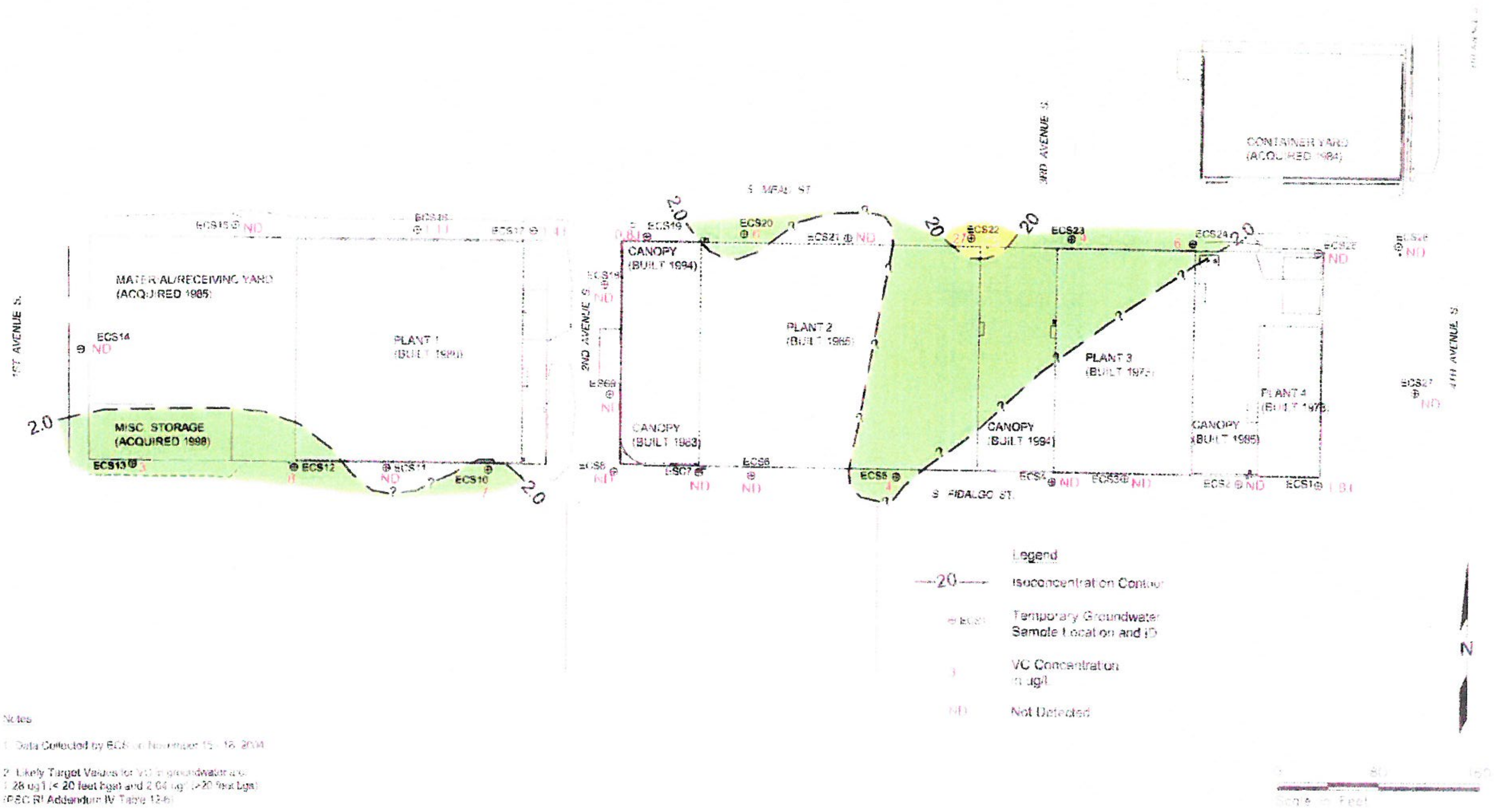
Figure 5-5a
Vinyl Chloride in Groundwater (9'-13' Below Ground Surface)



Notes

1. Data Collected by ECS on November 15 - 18, 2004

2. Likely Target Values for VC in groundwater are: 1.28 ug/l (< 20 feet bgs) and 2.04 ug/l (>20 feet bgs) (RSC RI Addendum IV Table 12-6)

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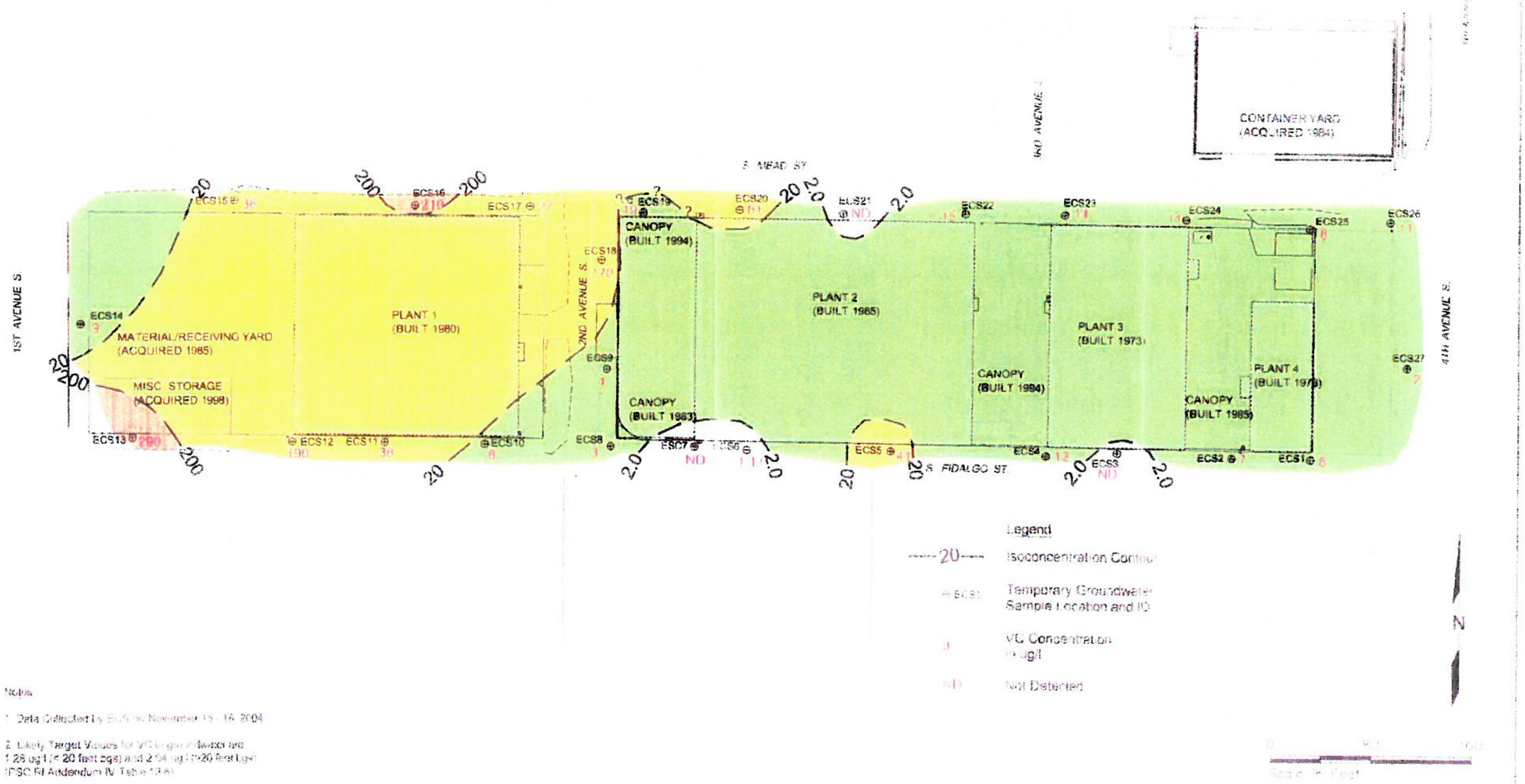
Figure 5-5b
Vinyl Chloride in Groundwater (15'-19' Below Ground Surface)



Notes

1. Data Collected by ECS on November 15 - 16, 2004

2. Likely Target Values for VC in groundwater are
1.28 ug/l (< 20 feet bgs) and 2.04 ug/l (>20 feet bgs)
(PSC RI Addendum IV Table 12-6)

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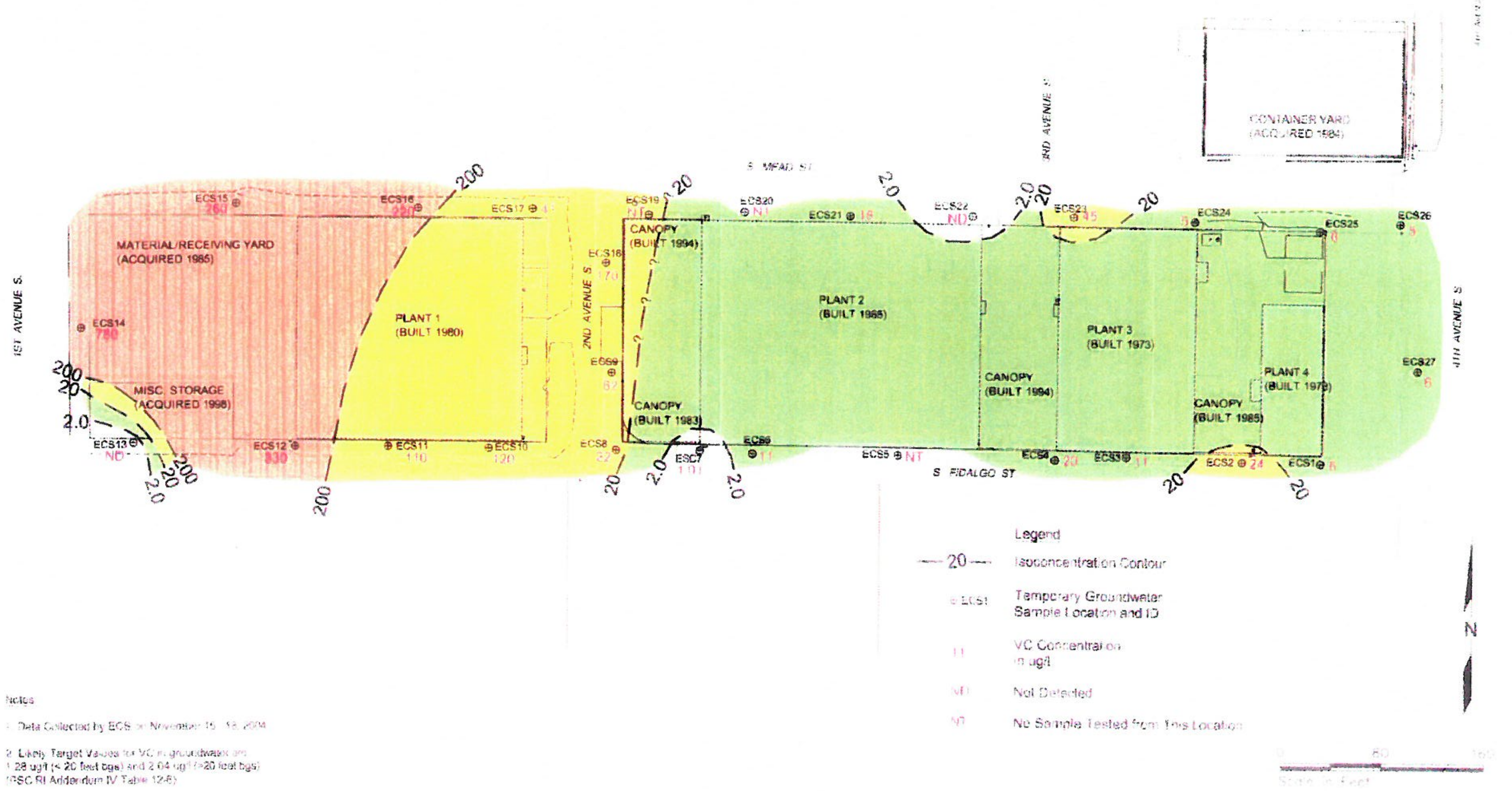
Figure 5-5c
Vinyl Chloride in Groundwater (21'-25' Below Ground Surface)



Notes

1. Data Collected by ECS on November 15 - 18, 2004

2. Likely Target Values for VC in groundwater are 1.28 ug/l (< 20 feet bgs) and 2.04 ug/l (>20 feet bgs) (CSC RI Addendum IV Table 12-6)

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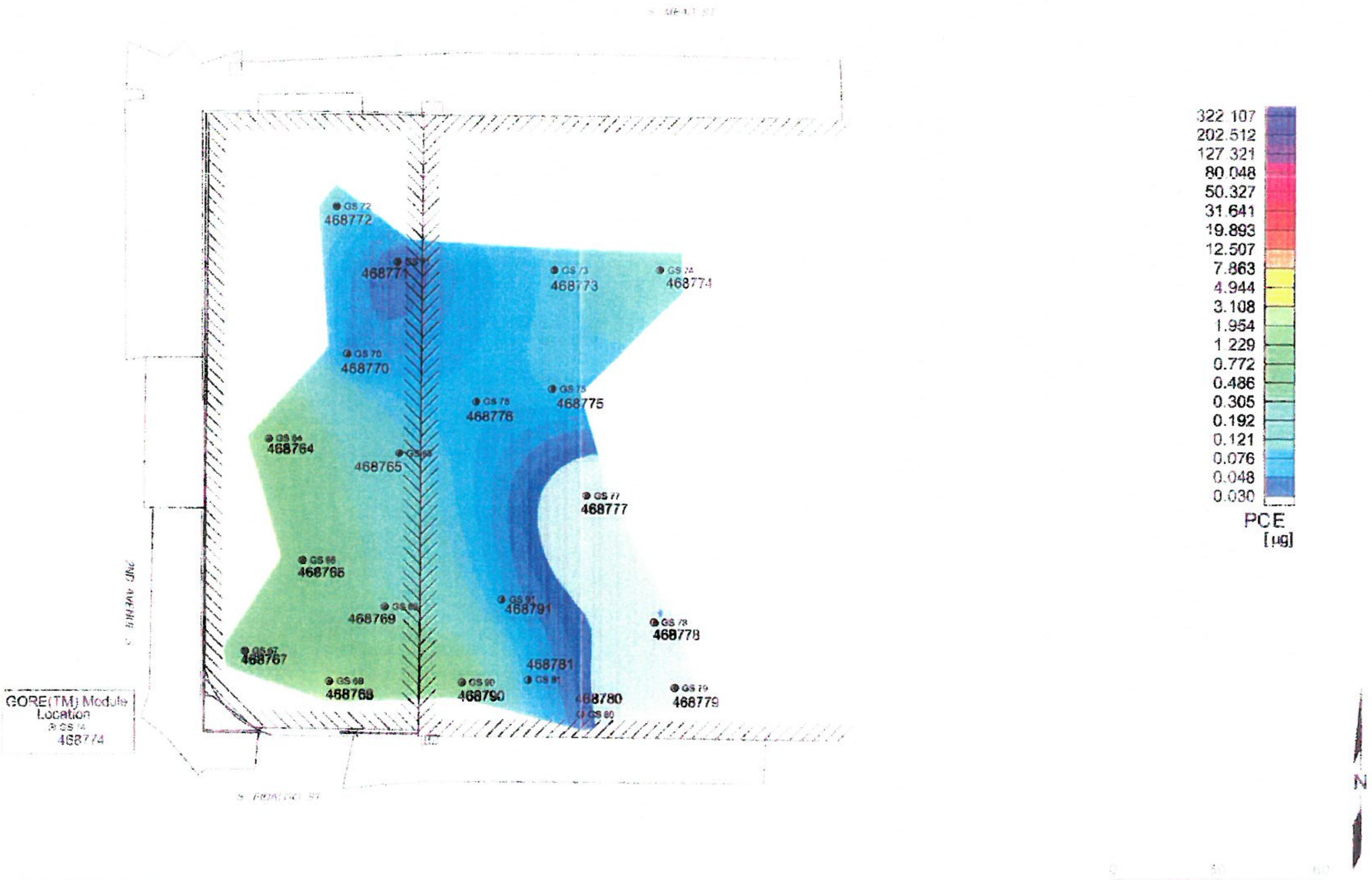
Figure 5-5d
Vinyl Chloride in Groundwater (33'-37' Below Ground Surface)



Note: This figure taken from Gore Surveys for Site Assessment and Monitoring, Final Report by W.L. Gore & Assoc. 3/29/05

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Figure 5-6a
PCE in Gore Sorbers, Plant 2 and Plant 2 Canopy

DWG NAME:
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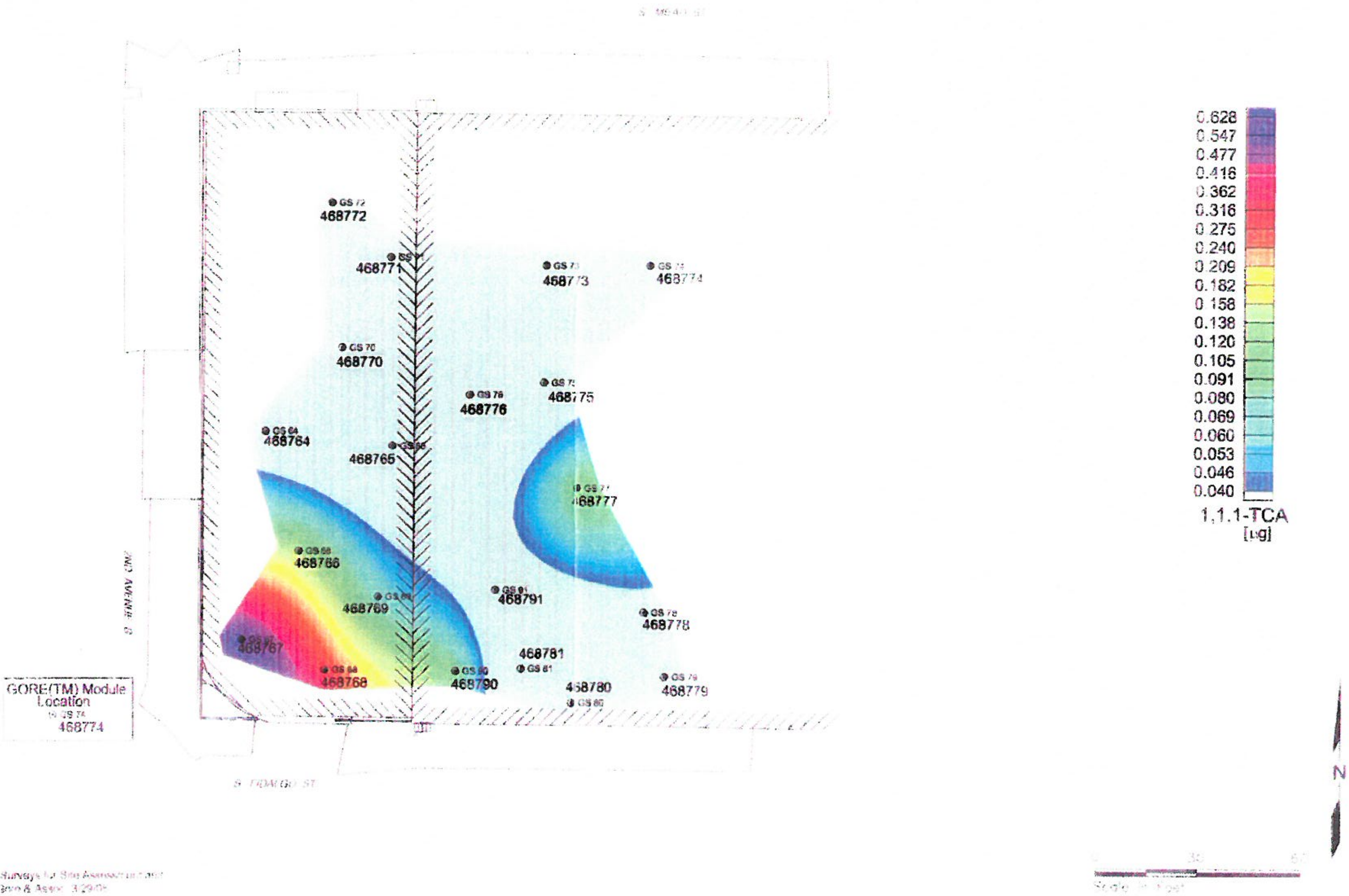

Note: This figure taken from Gore Surveys for Site Assessment and Monitoring, Final Report, by W.L. Gore & Assoc. 3/29/05

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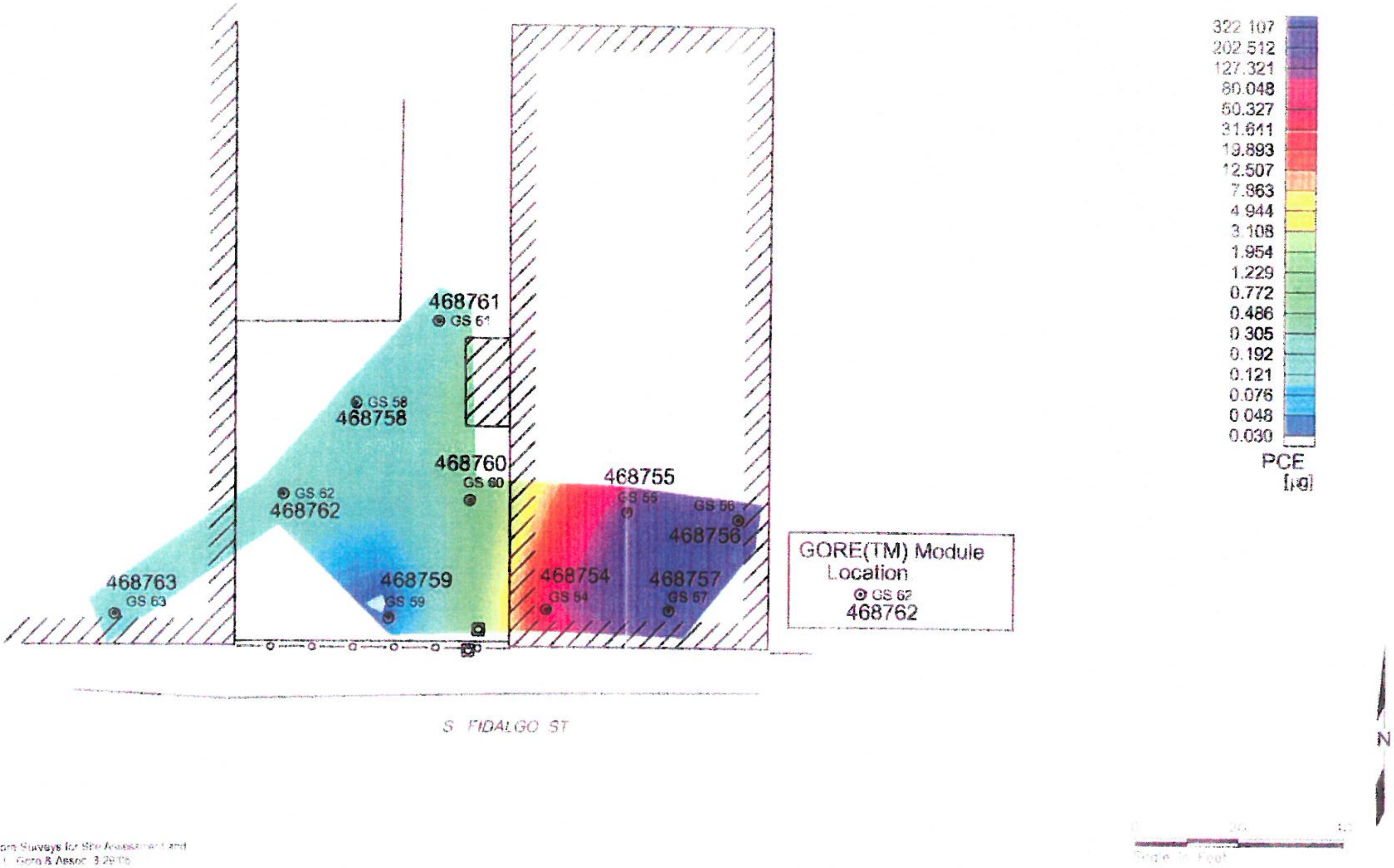
Figure 5-6b
TCA in Gore Sorbers, Plant 2 and Plant 2 Canopy

DWG NAME: [illegible]
DATE: 05/24/05 3:46pm



Note: This figure taken from Gore Surveys for Site Assessment and Monitoring, Final Report, by W.L. Gore & Assoc. 3.29.05

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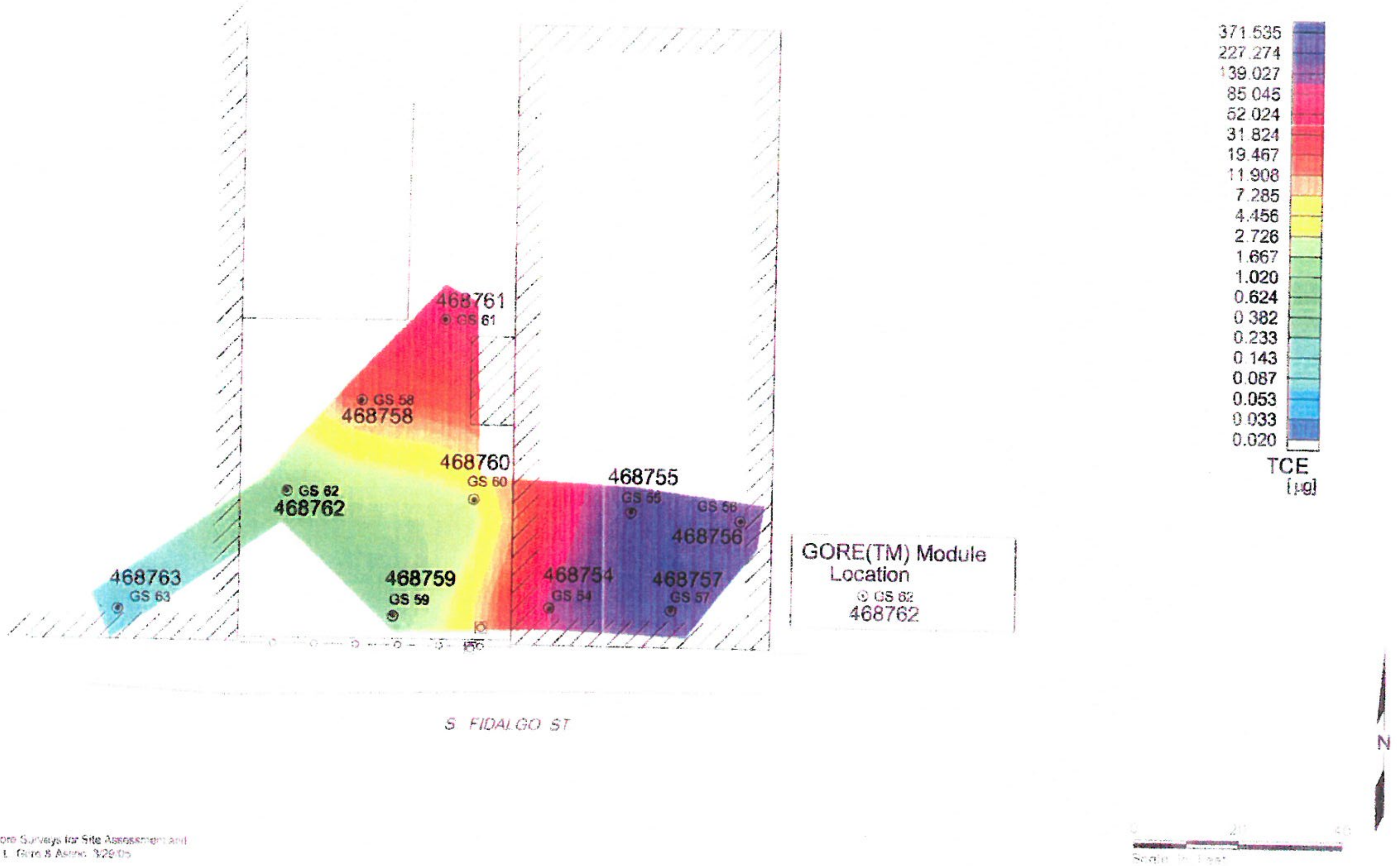
Figure 5-7a
PCE in Gore Sorbers, Plant 4 and Plant 4 Canopy

DWG NAME: [illegible]
DATE: [illegible]



Note: This figure taken from Gore Surveys for Site Assessment and Monitoring Final Report by W.L. Gore & Assoc. 3/29/05

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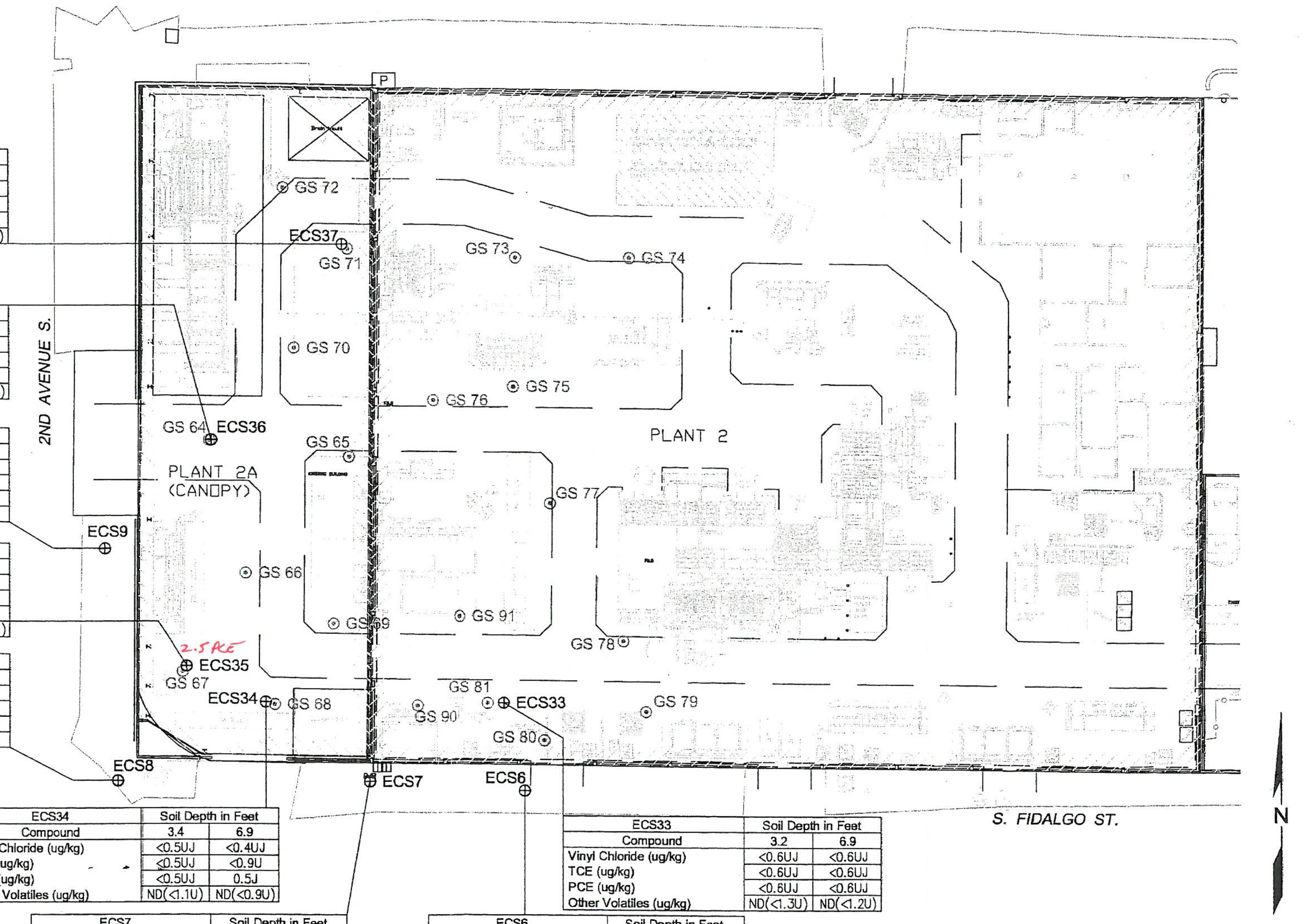
Figure 5-7b
TCE in Gore Sorbers, Plant 4 and Plant 4 Canopy



ECS37	Soil Depth in Feet	
Compound	1.5	4.2
Vinyl Chloride (ug/kg)	<0.4UJ	<0.6UJ
TCE (ug/kg)	<0.4UJ	<0.6UJ
PCE (ug/kg)	<0.4UJ	<0.6UJ
Other Volatiles (ug/kg)	ND(<0.8U)	ND(<1.2U)

ECS36	Soil Depth in Feet	
Compound	3.8	6.7
Vinyl Chloride (ug/kg)	<0.5UJ	<0.4UJ
TCE (ug/kg)	<0.5UJ	<0.4UJ
PCE (ug/kg)	<0.5UJ	<0.4UJ
Other Volatiles (ug/kg)	ND(<1.0U)	ND(<0.9U)

ECS9	Soil Depth in Feet		
Compound	0.0	2.0	6.0
Vinyl Chloride (ug/kg)	<10U	<10U	<10U
TCE (ug/kg)	<10U	<10U	<10U
PCE (ug/kg)	<10U	<10U	<10U
Other Volatiles (ug/kg)	<10U	<10U	<10U

ECS35	Soil Depth in Feet	
Compound	3.8	6.5
Vinyl Chloride (ug/kg)	<0.4UJ	<0.4UJ
TCE (ug/kg)	<0.4UJ	<0.4UJ
PCE (ug/kg)	**2.5**	<0.4UJ
Other Volatiles (ug/kg)	ND(<0.9U)	ND(<0.9U)

ECS8	Soil Depth in Feet	
Compound	4.5	6.7
Vinyl Chloride (ug/kg)	<10U	<10U
TCE (ug/kg)	<10U	<10U
PCE (ug/kg)	<10U	<10U
Other Volatiles (ug/kg)	<10U	<10U

ECS34	Soil Depth in Feet	
Compound	3.4	6.9
Vinyl Chloride (ug/kg)	<0.5UJ	<0.4UJ
TCE (ug/kg)	<0.5UJ	<0.9U
PCE (ug/kg)	<0.5UJ	0.5J
Other Volatiles (ug/kg)	ND(<1.1U)	ND(<0.9U)

ECS33	Soil Depth in Feet	
Compound	3.2	6.9
Vinyl Chloride (ug/kg)	<0.6UJ	<0.6UJ
TCE (ug/kg)	<0.6UJ	<0.6UJ
PCE (ug/kg)	<0.6UJ	<0.6UJ
Other Volatiles (ug/kg)	ND(<1.3U)	ND(<1.2U)

ECS7	Soil Depth in Feet	
Compound	3.0	7.0
Vinyl Chloride (ug/kg)	<10U	<10U
TCE (ug/kg)	<10U	<10U
PCE (ug/kg)	<10U	<10U
Other Volatiles (ug/kg)	<10U	<10U

ECS6	Soil Depth in Feet	
Compound	3.0	6.0
Vinyl Chloride (ug/kg)	<10U	<10U
TCE (ug/kg)	<10U	<10U
PCE (ug/kg)	<10U	<10U
Other Volatiles (ug/kg)	<10U	<10U

⊙ Gore Sorber Location, March 2005

⊕ Geoprobe Location, November 2004 (ECS6,7,8, and 9) and April 2005.

U = Indicates that the compound was not detected at the reported concentration

J = Estimated concentration when the value is less than the reporting limit established by the laboratory

Soil Target Value for cis 1,2 Dichloroethene = 9.93 ug/kg
Soil Target Value for TCE = 0.624 ug/kg
Soil Target Value for PCE = 1.87 ug/kg
Soil Target Value for vinyl chloride = 1.2 ug/kg

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Figure 5-8
Summary of Soil Test Results
Plant 2 and Plant 2 Canopy Areas

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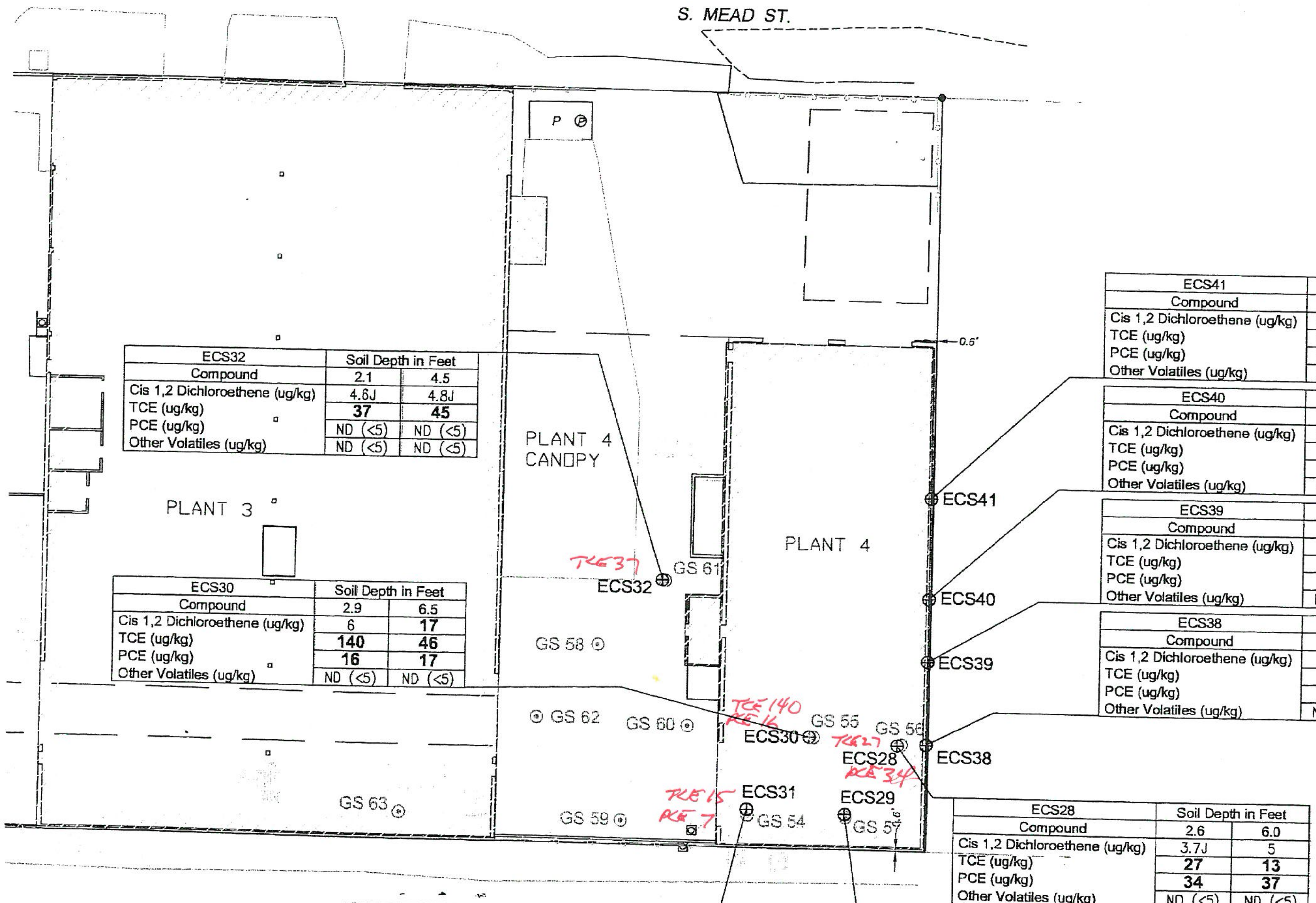

ECS41	Soil Depth in Feet		
Compound	0.6	2.2	5.9
Cis 1,2 Dichloroethene (ug/kg)	ND (<5)	ND (<5)	2J
TCE (ug/kg)	ND (<5)	**1.5J**	**1.4J**
PCE (ug/kg)	ND (<5)	ND (<5)	ND (<5)
Other Volatiles (ug/kg)	ND (<5)	ND (<5)	ND (<5)

ECS40	Soil Depth in Feet		
Compound	0.6	2.1	6.3
Cis 1,2 Dichloroethene (ug/kg)	ND (<5)	**29**	**10**
TCE (ug/kg)	**4.4J**	**15**	**9**
PCE (ug/kg)	1.5J	**9**	**4.5J**
Other Volatiles (ug/kg)	ND (<5)	ND (<5)	ND (<5)

ECS39	Soil Depth in Feet			
Compound	0.7	1.9	5.8	8.3
Cis 1,2 Dichloroethene (ug/kg)	**17**	**38**	**23**	3.7J
TCE (ug/kg)	**15**	**13**	**2.4J**	ND (<5)
PCE (ug/kg)	**6**	**9**	**2.4J**	ND (<5)
Other Volatiles (ug/kg)	ND (<5)	ND (<5)	ND (<5)	ND (<5)

ECS38	Soil Depth in Feet	
Compound	3.6	5.6
Cis 1,2 Dichloroethene (ug/kg)	2.9J	2.2J
TCE (ug/kg)	**6**	**4.1J**
PCE (ug/kg)	**14**	**38**
Other Volatiles (ug/kg)	ND (<5)	ND (<5)

ECS32	Soil Depth in Feet	
Compound	2.1	4.5
Cis 1,2 Dichloroethene (ug/kg)	4.6J	4.8J
TCE (ug/kg)	**37**	**45**
PCE (ug/kg)	ND (<5)	ND (<5)
Other Volatiles (ug/kg)	ND (<5)	ND (<5)

ECS30	Soil Depth in Feet	
Compound	2.9	6.5
Cis 1,2 Dichloroethene (ug/kg)	6	**17**
TCE (ug/kg)	**140**	**46**
PCE (ug/kg)	**16**	**17**
Other Volatiles (ug/kg)	ND (<5)	ND (<5)

ECS28	Soil Depth in Feet	
Compound	2.6	6.0
Cis 1,2 Dichloroethene (ug/kg)	3.7J	5
TCE (ug/kg)	**27**	**13**
PCE (ug/kg)	**34**	**37**
Other Volatiles (ug/kg)	ND (<5)	ND (<5)

ECS31	Soil Depth in Feet	
Compound	3.6	6.2
Cis 1,2 Dichloroethene (ug/kg)	ND (<5)	ND (<5)
TCE (ug/kg)	**15**	1.8J
PCE (ug/kg)	**7**	1.5J
Other Volatiles (ug/kg)	ND (<5)	ND (<5)

ECS29	Soil Depth in Feet	
Compound	3.1	5.0
Cis 1,2 Dichloroethene (ug/kg)	ND (<5)	1.7J
TCE (ug/kg)	**7**	**17**
PCE (ug/kg)	**2.8J**	**12**
Other Volatiles (ug/kg)	ND (<5)	ND (<5)

Method A
PCE 50 ug/kg
TCE 30 ug/kg

⊙ Gore Sorber Location, March 2005

⊕ Geoprobe Location, April 2005, May 2005

U = Indicates that the compound was not detected at the reported concentration

J = Estimated concentration when the value is less than the reporting limit established by the laboratory

Soil Target Value for cis 1,2 Dichloroethene = 9.93 ug/kg
Soil Target Value for TCE = 0.624 ug/kg
Soil Target Value for PCE = 1.87 ug/kg
Soil Target Value for vinyl chloride = 1.2 ug/kg

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Seattle, Washington

Figure 5-9
Summary of Soil Test Results
Plant 4 and Plant 4 Canopy Areas

DWG NAME: G:\project\clients\mccarthy\capital\c_indu020 (Apr2005 Geoprobe).dwg
DATE: 06/01/05 11:17am