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GROUNDWATER INVESTIGATION REPORT

GRACE'S PLAZA CLEANERS
717 WEST MAIN STREET, BATTLE GROUND PLAZA
BATTLE GROUND, WASHINGTON

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For:
Grace's Plaza Cleaners
717 West Main Street
Battle Ground, Washington

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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CMT	continuous multichannel tubing
DCE	dichloroethene
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
Farallon	Farallon Consulting, L.L.C.
GeoEngineers	GeoEngineers, Inc.
HVOCs	halogenated volatile organic compounds
µg/l	micrograms per liter
mg/kg	milligrams per kilogram
MTCA	Washington State Department of Ecology Model Toxics Control Act Cleanup Regulation
PCE	tetrachloroethene
PQL	practical quantitation limit
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RCW	Revised Code of Washington
Site	Grace's Plaza Cleaners located at 717 West Main Street in Battle Ground, Washington
SVE	soil vapor extraction
1,1,1-TCA	1,1,1 - trichloroethane
TCE	trichloroethene
VCP	Voluntary Cleanup Program
WAC	Washington Administrative Code

EXECUTIVE SUMMARY

Farallon Consulting, L.L.C. (Farallon) has prepared this report documenting the results of the first phase of groundwater investigation at Grace's Plaza Cleaners located at 717 West Main Street in Battle Ground, Washington (herein referred to as the Site). Farallon conducted the investigation at the Site on behalf of the current owner of Grace's Plaza Cleaners, who will continue to perform the remaining remedial investigation activities, the feasibility study, and cleanup with oversight by the Washington State Department of Ecology (Ecology) under the Voluntary Cleanup Program. The work has been performed in accordance with the *Work Plan for Groundwater Investigation, Grace's Plaza Cleaners, 717 West Main Street, Battle Ground Plaza, Battle Ground, Washington* dated October 18, 2004, prepared by Farallon.

The purpose of this phase of investigation is to assess whether groundwater will be retained as a medium of concern, and to aid in defining the appropriate cleanup levels for soil and groundwater. The vertical distribution of the dry cleaning solvent tetrachloroethene (PCE) and/or its natural degradation products trichloroethene (TCE), dichloroethene (DCE) isomers, and vinyl chloride in soil and groundwater were assessed by installing three borings using sonic drilling to approximate depths of 92.5 to 105 feet below ground surface (bgs). Monitoring wells MW-1D through MW-3D were installed in each boring at a depth of the first deep water-bearing zone, located between approximately 72.5 to 88 feet bgs.

Concentrations of PCE and its degradation products all were below Ecology's Model Toxics Control Act Cleanup Regulation (MTCA) Method A (PCE and TCE) or Method B (DCE isomers and vinyl chloride) cleanup levels in 11 of 12 soil samples that were collected from the 3 borings. The soil sample collected from a depth of 20 to 25 feet bgs at boring MW-2D contained a concentration of PCE above the MTCA Method A cleanup level.

Monitoring wells MW-1D through MW-3D were installed by Farallon in the first-encountered water-bearing zone located from 72.5 to 88.5 feet bgs. Monitoring well boring MW-1D was advanced to 105 feet bgs and a second, deeper, water-bearing zone was encountered at 102 feet bgs. An approximate 13.5-foot-thick, dry, cemented gravel layer was encountered between the two water-bearing zones. Farallon screened all of the monitoring wells in the upper water-bearing zone to assess whether PCE or its degradation products were present.

Two City of Battle Ground municipal wells (No. 1 and No. 2) are located at the intersection of 5th Avenue and Southwest 1st Street, approximately 700 feet northeast of the Site. These municipal wells were installed in 1954 and remain active. The wells were drilled to depths of 144 to 152 feet bgs, and include well-screen intakes as shallow as 93.5 feet bgs, and as deep as 144 feet bgs. Low concentrations of PCE and TCE have recently been detected in these wells. The groundwater elevation contour maps prepared as part of this investigation indicate that the groundwater flow direction in the first-encountered zone trends to the north-northeast and not directly toward the municipal wells. This water-bearing zone therefore, may not be directly influenced by the extraction of groundwater from the municipal wells.

Groundwater samples were collected from monitoring wells MW-1D through MW-3D in accordance with the U.S. Environmental Protection Agency guidance document *Low-Flow Ground-Water Sampling Procedures*. The intake for the pump was set at a depth of 81 to 82.5 feet below the top of the well casing during purging and sampling of the monitoring wells. A representative from GeoEngineers, Inc. was present throughout the sampling activities, and collected duplicate groundwater samples. The groundwater analytical results indicated that PCE was detected in groundwater samples collected from monitoring wells MW-1D through MW-3D at concentrations ranging from 0.250 to 1.68 micrograms per liter (µg/l). Concentrations of 1,1,1-trichloroethane also were detected in groundwater samples collected from monitoring wells MW-1D through MW-3D at concentrations ranging from 0.220 to 0.290 µg/l. Chloroform was detected in the groundwater sample collected from monitoring well MW-3D at a concentration of 0.280 µg/l. All detected concentrations of PCE, 1,1,1-trichloroethane, and chloroform were below the respective MTCA cleanup levels of 5.0, 200.0, and 7.17 µg/l.

Farallon will be performing a second phase of groundwater investigation. The next phase of work will involve investigation of the water-bearing zone from which the City of Battle Ground municipal wells extract groundwater. Farallon will also be assessing the potential for soil vapor extraction to be utilized as a potential technically feasible remedial alternative for the cleanup of PCE in the unsaturated soil beneath the building.

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this report to document the results of an investigation of groundwater conditions at Grace's Plaza Cleaners located at 717 West Main Street in Battle Ground, Washington (herein referred to as the Site) (Figure 1). Farallon conducted the groundwater investigation at the Site on behalf of the owner of Grace's Plaza Cleaners. The work was performed as an independent remedial action under the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP) in accordance with the *Work Plan for Groundwater Investigation, Grace's Plaza Cleaners, 717 West Main Street, Battle Ground Plaza, Battle Ground, Washington* (Farallon 2004a).

1.1 PURPOSE

The purpose of this phase of the groundwater investigation was to assess whether groundwater will be retained as a medium of concern, and to aid in defining the appropriate cleanup levels for soil and groundwater. The vertical distribution of the dry cleaning solvent tetrachloroethene (PCE) and/or its natural degradation products trichloroethene (TCE), dichloroethene (DCE) isomers, and vinyl chloride were assessed by drilling three monitoring wells into the first deep water-bearing zone, located between 72.5 and 88 feet below ground surface (bgs). This phase of investigation was required by Ecology due to the presence of PCE and TCE in the City of Battle Ground municipal wells No. 1 and No. 2, located approximately 700 feet northeast of the Site, and limitations on access to characterize the vertical distribution of soil contamination beneath the building.

1.2 ORGANIZATION

This report has been prepared to meet the documentation requirements for a groundwater investigation under the Model Toxics Control Act Cleanup Regulation (MTCA), specifically Chapter 173-340-840 of the Washington Administrative Code (WAC 173-340-840). The report has been organized into the following sections:

- **Section 2 – Background.** This section provides a description of the Site features, location, and environmental setting; a summary of historical Site use; and previous environmental investigations conducted at the Site. The environmental setting includes a summary of the geology, hydrogeology, and historical land use pertaining to the Site. The summary of previous investigations includes work conducted by Farallon and others.
- **Section 3 – Field Program.** This section provides a description of the groundwater investigation activities, including drilling and soil sampling protocols.
- **Section 4 –Results.** This section presents the results of the groundwater investigation, including details of the drilling activities, soil sampling results, and groundwater monitoring results.
- **Section 5 – Conclusions.** This section presents Farallon's conclusions regarding the results of the groundwater investigation.

- **Section 6 – References.** This section presents a list of the other documents cited in this report.
- **Section 7 – Limitations.** This section presents Farallon's standard limitations associated with completion of the groundwater investigation and preparation of this report.

2.0 BACKGROUND

This section defines the Site and provides a description of Site features and the surrounding land use. Also included is a summary of the Site history, local geology and hydrogeology, and previous subsurface investigations.

2.1 SITE LOCATION AND DESCRIPTION

The results of previous environmental investigations indicate that according to the definition of a "site" under MTCA and RCW 70.105D.020(4), the Site is currently defined as the area within the property boundaries of 717 West Main Street in Battle Ground, Clark County, Washington, which includes Clark County Tax Parcel No. 091055-146 and does not extend beyond these limits. The Site is located in the northwest quarter of the northeast quarter of Section 3, Township 3 North, and Range 2 East of the Willamette Meridian, at 45.781 degrees north latitude and 122.546 degrees longitude. The Site includes approximately 0.96 acre (41,818 square feet) of land. The Site is enrolled in the VCP with Ecology Identification Number 86416754.

According to the Clark County Tax Assessor's Office, the Site is located in an area zoned for general commercial use. The Site is part of the Battle Ground Plaza, a small shopping complex that consists of strip mall-type buildings under the ownership of Irwin Jessen, et al. Surrounding properties include other commercial buildings in the Battle Ground Plaza to the north and west; 7th Avenue and a vacant undeveloped lot consisting of grassfields beyond and to the east; and a mobile home park to the south. With the exception of the mobile home park, the remaining area surrounding the Site and Battle Ground Plaza is used for general commercial purposes. Several government offices, including the City of Battle Ground's Fire/Police Station and City Hall are located east of the Site among the commercial buildings.

The building that houses Grace's Plaza Cleaners also includes tenant space occupied by a State of Washington liquor store and the Battle Ground Pharmacy/Dollar Store. One tenant space between Grace's Plaza Cleaners and the pharmacy was formerly occupied by Music World, a retail music store, but has been vacant for an unknown period of time. A florist, a hairdresser, and a Mexican restaurant occupy the Battle Ground Plaza building located north of the Site. The Site and adjacent buildings and features are depicted on Figure 2.

2.2 SITE HISTORY

Grace's Plaza Cleaners has operated at the Site from 1982 to the present, and has used several dry cleaning machines during this time period. An older PCE dry cleaning machine that was located near the southwestern wall of the dry cleaner facility had leaked periodically, according to Ms. Grace Anderson, owner/operator of the business. This machine was replaced with two new PCE dry cleaning machines in the 1990s. These two machines were removed during remedial excavation activities in 2002. Following completion of the remedial activities, a Model KT340 Realstar dry-to-dry machine was installed. The Realstar dry cleaning machine uses the synthetic hydrocarbon DF-2000, manufactured by ExxonMobil.

The floor of the dry cleaner facility is concrete overlain by vinyl floor tile. No floor drains are present near the dry cleaning machines with the exception of a drain that receives water directly from the overhead steam lines and is connected directly to the sanitary sewer. This drain is constructed above the floor such that spills cannot enter the drain. A floor drain is present in the boiler room located in the southeastern corner of the dry cleaner facility near the washing machines along the eastern wall of the facility. A restroom is located immediately north of the boiler room, against the east wall of the building.

Prior to 1998, Ms. Anderson contracted with Safety Kleen of Clackamas, Oregon for removal of all wastes generated by the dry cleaning business. Since 1998, Ms. Anderson has contracted with TechniChem of Emeryville, California for all waste removal.

2.3 SITE GEOLOGY AND HYDROGEOLOGY

The surface geology of the Battle Ground area consists of catastrophic flood deposits derived from the late Pleistocene floods in the Columbia River valley from glacial Lake Missoula. The flood deposits consist of sand, silt, gravel, and various sized rocks of up to boulder size. The flood deposits may be as thick as 75 feet in the Battle Ground area (United States Geological Survey 2002). Underlying the flood deposits is the alluvial-fan member of the Troutdale Formation that consists of gravel and can be up to 100 feet thick.

The City of Battle Ground has two municipal wells (No. 1 and No. 2) that are located at the intersection of 5th Avenue and Southwest 1st Street, approximately 700 feet northeast of the Site (Figure 1). Both of these wells were installed in 1954 and remain active (City of Battleground Public Works Department 2004b). The wells were drilled to depths of 144 to 152 feet bgs, and include well-screen intakes as shallow as 93.5 feet bgs, and as deep as 144 feet bgs. Boring logs for the City of Battle Ground municipal wells No. 1 and No. 2 indicate that soil types that are consistent with catastrophic flood deposits are present near the Site to a depth of approximately 67 feet bgs. Soil consistent with the alluvial-fan member of the Troutdale Formation was observed in the borings from 67 feet bgs to the total depth of the borings of approximately 152 feet bgs. Municipal wells No. 1 and No. 2 are completed in the alluvial-fan member of the Troutdale Formation. Municipal well No. 3 was located at the Fire/Police Station to the east, but was decommissioned in 1996 to allow the transfer of water rights for this well to newly installed water supply wells in other areas of Battle Ground.

The pumping rates for municipal wells No. 1 and No. 2 range from 240 to 280 gallons per minute. The water extracted from the wells is treated at the wellhead using chlorine and fluorine. The combined water from the wells is then distributed into the main water supply system for Battle Ground. Municipal wells No. 1 and No. 2 have had detections of both PCE and TCE since at least 2002 (City of Battle Ground Public Works Department 2004a). The 2004 well-testing data indicate concentrations of PCE and TCE of 0.3 micrograms per liter (µg/l).

The presence of shallow water-bearing zones in the flood deposits have been documented at other sites in the area where resource protection wells have been installed for ongoing environmental investigations. The closest of these sites to Grace's Plaza Cleaners is the Shell Station (Ecology Identification Number 58523474) located at 917 West Main Street, less than

500 feet north of the Site. According to the available boring logs, groundwater at this location was encountered between 4 and 12 feet bgs during drilling, and monitoring wells have been installed. Surveys, Inc. reported that their review of the Shell Station project file indicated that shallow groundwater has a hydraulic gradient to the south (Surveys, Inc. 2001).

A shallow water-bearing zone was also encountered at the Battle Ground Plaza Mini-Mart site, which is located less than 300 feet north of the Site. GeoEngineers, Inc. (GeoEngineers) collected groundwater samples at borings GGP-6 through GGP-18 that were advanced with a direct-push drill rig to depths of 8 to 10 feet bgs. However, none of the boring logs presented in the Phase II Site Investigation report indicated the depths to the groundwater table (GeoEngineers 2003). Monitoring wells were not installed during this phase of investigation at the Mini-Mart site.

Farallon installed three monitoring wells (MW-1, MW-2, and MW-3), each to a depth of approximately 20 feet bgs at Grace's Plaza Cleaners in July 2004 to assess whether a shallow water-bearing zone existed at the Site. A shallow water-bearing zone was not encountered; however, wet soil conditions were noted on the boring logs at depths ranging from 12 to 14 feet bgs. Soil encountered consisted of up to 5 feet of sand and gravel fill underlain by silt to a depth of 14 to 16 feet bgs, underlain by a silty gravel with a sand layer to the maximum depth of exploration of 25 feet bgs. The density of the soil reached over 50 blow counts per 6-inch interval at depths as shallow as 12.5 feet bgs, but may be overstated due to the gravel and cobble-sized materials encountered. Mottling typical of soil with increased moisture content was observed in the interval from 11 to 20 feet bgs.

To further investigate groundwater conditions, Farallon installed three deep monitoring wells (MW-1D, MW-2D, and MW-3D), each to a depth ranging from 86 to 87.5 feet bgs. The monitoring wells were screened across the first consistent water-bearing zone which was located from approximately 72.5 feet to 87.5 feet bgs. As part of the investigation, the borehole for monitoring well MW-1D was advanced to a total depth of 105 feet bgs to assess the thickness of a dry soil layer that could be a possible aquitard or aquiclude. After drilling, the borehole was backfilled to 98 feet bgs with bentonite chips prior to installing the well casing.

Soil conditions from 0 to 25 feet bgs were consistent with the three shallow wells installed by Farallon in July 2004. Soil lithology from 25 feet to 92.5 feet consisted of medium dense to very dense cemented sand and gravel. Monitoring well MW-1D was advanced to a total depth of 105 feet bgs, through a thick, dry layer of cemented sand and gravel, where a second water-bearing zone was encountered at 102 feet bgs. The thickness of the dry soil layer was approximately 13 feet. This dry layer of soil could represent a potential aquitard or aquiclude.

Groundwater was encountered in MW-1D at depths of 72.5 feet and 102 feet bgs. Groundwater was encountered in MW-2D and MW-3D at 72.5 feet bgs. A water-bearing zone was consistently present in all monitoring wells from 72.5 feet to 88.5 feet bgs. Two separate water-bearing zones were encountered during the advancement of MW-1D. The water-bearing zones are separated by the dry cemented sand and gravel layer from 87.5 to 102 feet bgs.

2.4 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Since January 2001, environmental investigations have been conducted in conjunction with the pending sale of the properties comprising the Battle Ground Plaza, which includes the Site. A summary of the investigations conducted specific to Grace's Plaza Cleaners was presented in the *Phase III Subsurface Investigation Report, Grace's Plaza Cleaners, 717 West Main Street, Battle Ground Plaza, Battle Ground, Washington* (Farallon 2004b). A summary of the information presented therein follows:

Farallon conducted the Phase III Subsurface Investigation (Farallon 2004b) that included installation of shallow monitoring wells MW-1 through MW-3, each to a depth of approximately 20 feet bgs (Figure 3). Soil samples were collected continuously during drilling for the well installation to ensure that no potential water-bearing zone was missed. Although saturated soil conditions were not encountered during drilling, wet soil conditions were noted at depths ranging from 12 to 14 feet bgs. A total of 12 soil samples were submitted for analysis for HVOCs. The analytical results indicated that the concentrations of PCE and its degradation products in these soil samples did not exceed the MTCA Method A (PCE and TCE) or Method B (DCE isomers and vinyl chloride) cleanup levels that were used for preliminary screening purposes (Figure 3). No groundwater was present in the wells one week after installation. Farallon concluded that additional groundwater monitoring was warranted to assess whether shallow groundwater was present on a seasonal basis.

Farallon proposed that another phase of investigation be performed to assess whether the vertical distribution of contamination extended to and affected the deep water-bearing zone(s). This work is required by Ecology to confirm that the PCE release at the Site has not affected groundwater at depth, including the water-bearing zone from which the City of Battle Ground obtains its drinking water (Farallon 2004).

3.0 FIELD PROGRAM

The groundwater investigation conducted between May 15 and 20, 2005 by Farallon involved drilling three borings using sonic drilling techniques and installing a monitoring well in each boring. The borings were drilled to approximate depths of 92.5 to 105 feet bgs, and monitoring wells MW-1D through MW-3D were installed at a depth 86 of 87.5 feet bgs in each boring. The approximate locations of the monitoring wells are illustrated on Figure 3 and described as follows:

- Boring MW-1D was located proximal to monitoring well MW-1, west of the entrance to the dry cleaner facility;
- Boring MW-2D was located approximately ten feet east of monitoring well MW-2, north of the northeast corner of the dry cleaner facility; and
- Boring MW-3D was located proximal to the southeast corner of the dry cleaner facility approximately three feet south of monitoring well MW-3.

Prior to drilling, Farallon contacted the Utility Underground Locating Center to request that utility mains and stub locations be marked on the Site. Farallon also retained a private utility locating subcontractor to locate utilities in the vicinity of the boring locations. The locations of all utilities and other pertinent Site features are shown on Figure 2.

3.1 DRILLING AND MONITORING WELL INSTALLTION

A Farallon Staff Scientist observed subsurface conditions during drilling. The information recorded included soil types, evidence of anomalous visual and olfactory soil conditions, and evidence of volatile organic vapors present in each sample, as measured using a photoionization detector. Soil samples were collected continuously from each boring from the surface to the total depth explored. Soil samples were collected from a split-spoon sampler and transferred directly into laboratory-prepared, glass sample containers fitted with Teflon-lined lids, using the protocols detailed in Ecology's Implementation Memorandum #5, *Collecting and Preparing Soil Samples for VOC Analysis* (Ecology 2004). The soil samples were placed on ice in a cooler and delivered to the analytical laboratory, North Creek Analytical of Bothell, Washington under standard chain-of-custody procedures.

Farallon analyzed up to five soil samples per boring for HVOCs by U.S. Environmental Protection Agency (EPA) Method 8260B. The remaining soil samples were placed on hold at the analytical laboratory pending review of the initial analytical results.

The monitoring wells were constructed in accordance with the Minimum Standards for Construction and Maintenance of Wells, as established in WAC 173-160. The monitoring wells have a 2-inch-diameter PVC blank casing with 10 to 15 feet of 0.010-inch, machine-slotted screen. The well screens were installed to intersect the water-bearing zone encountered between approximately 72 to 87 feet bgs. Each monitoring well was completed in a traffic-rated, flush-mounted monument with a locking cap. A survey of the top of the monitoring well casings

relative to an arbitrary datum established at the Site with an accuracy of 0.01 foot was completed to facilitate estimation of the groundwater gradient and flow direction.

All soil cuttings and decontamination water generated were placed in labeled 55-gallon steel drums. The analytical results of the soil samples were used to develop a waste profile to determine the most cost-effective waste disposal method.

3.2 MONITORING WELL DEVELOPMENT AND SAMPLING

Monitoring well development occurred immediately after well construction. Each monitoring well was surged using a stainless steel surge rod to flush water into the soil surrounding the well screen and loosen fine-grained sediment and then extract it from the monitoring well and surrounding sand filter pack. A stainless steel bailer was used to evacuate the water from the monitoring well. This process was repeated until approximately 10 well casing volumes of water were removed from the monitoring well and the turbidity of the extracted groundwater was minimized.

Groundwater samples were collected and handled in accordance with the EPA guidance, *Low-Flow Ground Water Sampling Procedures,* using the following procedures:

- The locking well cap was removed from each monitoring well and the groundwater level was allowed to equilibrate to atmospheric pressure for at least 30 minutes. Depth-to-groundwater measurements were taken periodically to determine when water levels have stabilized.
- The depth-to-groundwater at each monitoring well was measured from the surveyed location on the top of each well casing, as indicated by the black line/notch on the north side of each well casing, to the nearest 0.01 foot, using an electronic water level measuring device. The groundwater level measurements at each monitoring well were taken within a 1-hour period. The depth to the monitoring well bottom also was measured to evaluate siltation of the monitoring wells. All reusable equipment was decontaminated between uses.
- Each monitoring well was purged at a low-flow rate (i.e., 100 to 300 milliliters per minute) using a bladder pump. The pump intake was placed between 81 to 82.5 feet below the top of the monitoring well casing near the center of the monitoring well screen interval. Temperature, pH, and conductivity were monitored while purging using a YSI Model 600XL water quality meter or equivalent instrumentation equipped with a flow-through cell to determine when stabilization of these parameters occurred. Dissolved oxygen and oxidation-reduction potential also were measured with the YSI Model 600XL to assess groundwater geochemistry.
- Groundwater samples were collected directly from the pump outlet following stabilization of temperature, pH, and conductivity.
- Groundwater samples were placed directly into laboratory-supplied sample containers, taking care to minimize turbulence and to prevent handling the seal and/or lid of the

container when placing the sample in the containers. The containers were completely filled to eliminate any headspace, and the seal and/or lid was secured.

- The sample container was labeled with the date and time sampled, well identification and number, project number, and preservative(s), if any. The sample identification included the well identification as the prefix, and the date sampled as the suffix.
- Sampling information was documented on a chain-of-custody form, and the groundwater sample was placed in a chilled cooler at approximately 4 degrees Celsius for transport to the laboratory. Chain-of-custody protocols were maintained during sample transport and submittal to the laboratory.
- All purge water was placed in labeled containers on the Site pending receipt of the waste profiling results. An estimated volume of 15 gallons of purge and decontamination water was generated during the sampling event.
- Groundwater samples will be submitted for analysis of HVOCs by EPA Method 8260B.

4.0 RESULTS

This section presents the results of the groundwater investigation at the Site. The results include a summary of subsurface conditions, groundwater conditions, and analytical results. Boring logs and laboratory analytical results are presented in Appendices A and B, respectively.

4.1 DRILLING PROGRAM AND SOIL ANALYTICAL RESULTS

The soil encountered up to 25 feet beneath the Site was consistent with that identified in the previous environmental investigations. Soil encountered consisted of up to 5 feet of sand and gravel fill underlain by silt to 14 to 18 feet bgs, underlain by a silty gravel with a sand layer to the depth of 25 feet bgs. Soil from 25 to 55 feet bgs was comprised of sands and gravels with intermittent silt layers. From 55 feet bgs to the total depth of each boring, the lithology varies and is described below.

The soil in boring MW-1D from 55 to 59 feet bgs consisted of dry, cemented gravel underlain by a medium dense sand and gravel with some cobble from 59 feet to 65 feet bgs. Soil from 65 feet to 67.5 feet bgs consisted of a medium dense wet gravel indicating a small water-bearing zone. This zone is underlain with cemented sand and gravel from 67.5 feet to 72.5 feet. Soil from 72.5 feet to 87.5 feet bgs consisted of water-bearing sand and gravel. This water-bearing zone is underlain by dry, cemented gravel from 87.5 feet to 102 feet bgs. Soil at 102 to 105 feet bgs, the total boring depth, consisted of wet gravel. The lithology of the deepest water-bearing zone encountered is consistent with the City of Battle Ground's municipal water wells drilled in the area.

The soil in boring MW-2D from 55 feet to 72.5 feet bgs consisted of a dry, cemented gravel and sand underlain by wet gravel and sand from 72.5 feet to 81 feet bgs. A dry, cemented gravel layer is present from 81 feet to 85 feet bgs, underlain by wet gravels and sands from 85 to 87.5 feet bgs. Soil from 87.5 to 92.5 feet bgs, at the total boring depth, consisted of dry, cemented gravel.

The soil in boring MW-3D consisted of a moist silt layer from 55 to 57.5 feet bgs underlain by a dry, cemented gravel layer from 57.5 feet to 62.5 feet bgs. Soil from 62.5 feet to 70 feet bgs consisted of dry to moist medium dense gravel underlain by dry, cemented gravel from 70 to 72.5 feet bgs. The soil from 72.5 feet bgs to 92.5 feet bgs, at the total boring depth, consisted of gravel with a water-bearing zone present from 72.5 to 73.5 and from 87.5 to 88.5 feet bgs. Soil between 73.5 and 87.5 consisted of dry, cemented sands and gravels. The water-bearing zone at 87.5 feet was underlain by a dry, cemented gravel layer that is present in all borings beginning at approximately 88 feet bgs.

Farallon submitted 12 soil samples for laboratory analysis of HVOCs from borings MW-1D through MW-3D. Five soil samples were selected from boring MW-1D, four soil samples from boring MW-2D, and three soil samples from boring MW-3D. The analytical results are summarized in Table 2 and on Figure 3.

The soil sample analytical results for PCE and TCE were compared to the MTCA Method A soil cleanup levels being used for preliminary screening purposes for this Site in this report. These cleanup levels are conservative and protective of a potable groundwater source that could be affected via the soil to a groundwater-leaching pathway.

The results of the analysis for the soil samples collected from monitoring well MW-1D, located west of the entrance to the dry cleaner facility indicated that concentrations of PCE and its degradation products were not detected in the samples submitted. Soil samples were submitted from the 45 to 50 foot, 60 to 65 foot, 75 to 80 foot, 100 to 102.5 foot and 102.5 to 105 foot bgs intervals (Figure 3).

The analytical results for the soil samples collected from monitoring well MW-2D, located approximately 10 feet east of MW-2 at the northeast corner of the dry cleaner facility, indicated that PCE was detected in the soil samples collected from depths of 20 to 25 feet bgs and 50 to 55 feet bgs. The concentrations of PCE were 0.349 mg/kg and 0.00996 mg/kg respectively. PCE was not detected in the soil samples collected from depths of 70 to 75 feet bgs and 87.5 to 90 feet bgs. Concentrations of the PCE degradation product cis-1,2-DCE were detected in the soil samples collected from 20 to 25 feet bgs and 50 to 55 feet bgs. The concentrations of cis-1,2-DCE were 0.472 and 0.00585 mg/kg, respectively, which do not exceed the MTCA Method B cleanup level of 800 mg/kg.

The analytical results for the soil samples collected from monitoring well MW-3D, located proximal to the southeast corner of the dry cleaner facility and approximately three feet south of MW-3, indicated that concentrations of PCE and its degradation products were not detected in the soil samples submitted. Soil samples were submitted from the 65 to 70 foot, 70 to 75 foot, and 87.5 to 90 foot bgs depth intervals. No PCE degradation products were detected in any of the soil samples submitted for laboratory analysis. However, the low concentrations of DCE isomers and vinyl chloride that have been detected historically in soil samples collected at the Site confirm that PCE degradation is occurring.

Quality assurance/quality control (QA/QC) testing performed by North Creek Analytical included an evaluation of surrogate recoveries, method blanks, and matrix spike/duplicates. The laboratory QA/QC data were within acceptable ranges of tolerance with the following exceptions:

- The spike recovery of benzene in the matrix spike and the recovery of benzene and TCE in the Matrix spike duplicate in laboratory batch B5E0667 were below the established control limits of 63 to 148 percent and 80 to 126 percent, respectively. The percent recovery failure was due to high analyte concentrations in the parent sample. However, the parent sample spike was from another laboratory batch and not associated with the Site. All other laboratory QC was within acceptable limits and the data are acceptable.
- The initial analytical results for sample MW-2D-20-25 were outside of the instruments calibration range for cis-1,2-DCE and PCE. The laboratory completed a second analysis of the sample that provided results within the calibration range and were reported as the final results herein.

The QA/QC discrepancies noted above have not affected the integrity of the analytical data. Laboratory analytical results are presented in Table 2 and the analytical reports are presented in Appendix B.

4.2 FIRST QUARTER GROUNDWATER MONITORING RESULTS

The first quarter groundwater monitoring and sampling was performed at the Site on June 1, 2005. Groundwater monitoring and sampling was limited to deep monitoring wells MW-1D through MW-3D. No groundwater was present in the shallow monitoring wells MW-1 through MW-3.

Static groundwater was measured in each of the wells and ranged from 60.99 to 61.41 feet below the top of the well casing (Table 3). Calculated groundwater elevations ranged from 37.78 to 38.73 feet relative to an arbitrary datum of 100.00 feet established at the Site by Farallon (Table 3). The direction of groundwater flow is to the north/northeast at an approximate hydraulic gradient of 0.0180 foot per foot. The groundwater elevations and estimated direction of groundwater flow are shown on Figure 4.

The groundwater analytical results indicated that PCE was detected in groundwater samples collected from monitoring wells MW-1D through MW-3D at concentrations ranging from 0.250 to 1.68 µg/l. The concentrations of PCE were all below the MTCA Method A cleanup level of 5.0 µg/l. The groundwater results are summarized on Table 4 and on Figure 5.

Concentrations of 1,1,1-trichloroethane (1,1,1-TCA) were also detected in groundwater samples collected from monitoring wells MW-1D through MW-3D at concentrations ranging from 0.220 to 0.290 µg/l (Figure 5). The concentrations of 1,1,1-TCA were all below MTCA Method A cleanup level of 200 µg/l. The solvent 1,1,1-TCA was commonly used as a metal degreaser and as a component of some common household products such as a spot remover to be used on fabric. Also 1,1,1-TCA was used as a dry cleaning solvent at facilities that clean leather and suede, but could only be used in a specially designed machine. Historically, this compound has also been used at dry cleaners in small quantities as a spotting agent. The use of 1,1,1-TCA was phased out by the mid-1990s as manufacturers complied with the Montreal Protocol and stopped production of products containing this ozone-depleting chemical. Based on information provided by Grace's Plaza Cleaners, a leather and suede dry cleaning machine has never been present at the Site nor do their records show any evidence of using products containing 1,1,1-TCA. Concentrations of 1,1,1-TCA have not been detected in soil samples collected during this investigation or the previous investigations performed by Farallon and others.

Chloroform was detected in the groundwater sample collected from MW-3D at a concentration of 0.280 µg/l. The concentration of chloroform was below the MTCA Method B cleanup level of 7.17 µg/l. Chloroform is a chemical that is commonly found in trace amounts in drinking water that has been treated with chlorine, and may also be associated with any water containing chlorine.

4.3 WASTE DISPOSAL

All soil cuttings, well development water, and purge water from the monitoring wells was profiled and removed from the Site by Stratus Corporation of Beaverton, Oregon. Soil was transported to Waste Management in Hillsboro, Oregon.

5.0 CONCLUSIONS

The soil analytical results indicate that only 1 of the 12 soil samples collected during the investigation contained a concentration of PCE above the MTCA Method A soil cleanup level of 0.05 mg/kg. The one soil sample exceeding the MTCA Method A cleanup level was collected from the 20- to 25-foot bgs interval at boring MW-2D. Concentrations of the compounds formed by degradation of PCE were nondetect at the laboratory PQL, except for low concentrations of cis-1,2-DCE in two soil samples collected at boring MW-2D. Concentrations of the compounds formed by degradation of PCE were nondetect at the laboratory PQL, except for low concentrations of cis-1,2-DCE in two soil samples collected at boring MW-2D. Farallon noted that the hard drilling conditions resulted in soil samples being hotter than typically expected for some sampling intervals, with volatilization of water observed in soil samples collected within the water-bearing zone(s). Because concentrations of PCE and/or its degradation products were detected, the physical condition of the soil samples does not appear to have adversely affected the integrity of the analysis, further indicating that a significant source of PCE would have been identified during drilling, if one was present at the boring location(s). However, there is the potential that PCE and/or its degradation products present in soil at very low concentrations could have been lost to volatilization effects and therefore not be detected at concentrations above the laboratory PQLs. Soil with such low levels of PCE would not likely exceed the MTCA soil cleanup levels nor be representative of a source of contamination to groundwater.

Boring MW-1D was drilled to a depth of approximately 105 feet bgs to assess the potential thickness of the dry soil layer in this location. This soil layer may represent an aquitard or aquiclude between the first-encountered water-bearing zone and the underlying water-bearing zone from which the City of Battle Ground's municipal wells No. 1 and No. 2 extract water. The dry soil layer consisted of dense, cemented gravel to a depth of approximately 87 feet to 102 feet bgs at this boring location. Due to the thickness of the dry soil layer, Farallon concludes that if continuous below the site, it may impede the downward migration of the PCE release.

The direction of groundwater flow in the first-encountered water-bearing zone is to the north/northeast at an approximate hydraulic gradient of 0.0180 foot per foot (Figure 4). The direction of groundwater flow is not directly toward the municipal wells. This water-bearing zone may not be directly influenced by the extraction of groundwater from the municipal wells.

The groundwater analytical results indicate that:

1. PCE has reached the first-encountered water-bearing zone; however, the concentrations of PCE are not above MTCA Method A cleanup levels;

2. The low concentration of PCE in the first-encountered water-bearing zone indicates that dense nonaqueous-phase liquid PCE is not present at depth;

3. 1,1,1-TCA was detected in the groundwater samples collected at concentrations well below the MTCA Method A cleanup level of 200 µg/l. Therefore, no cleanup of 1,1,1-TCA is required at the Site. The source of 1.1.1-TCA was not identified; and

4. Chloroform was detected in the groundwater samples collected. Chloroform is commonly present in treated water. The source of chloroform may therefore be associated with any treated water seeping through the subsurface beneath the Site and not associated with a source at Grace's Plaza Cleaners.

Additional groundwater monitoring and sampling will be required to assess whether groundwater will be retained as a medium of concern. Additionally, the vertical distribution of PCE in groundwater has not been fully assessed.

6.0 PLANNED WORK

Farallon has proposed installation of one additional groundwater monitoring well located near monitoring wells MW-2 and MW-2D, where the highest concentrations of PCE have been identified in groundwater. The monitoring well installed will be a continuous multichannel tubing (CMT) well. The well will be installed at a total depth of approximately 145 feet bgs. Farallon proposes to set the screens at three different intervals to assess whether PCE and/or its degradation products are present in the regional aquifer, and, if present, the vertical distribution of the PCE. The well will be screened from 105 to 110 feet bgs, 120 to 125 feet bgs, and 140 to 145 feet bgs. Two weeks after the CMT well is installed, Farallon will sample the well. The new CMT well also will be included in the ongoing quarterly groundwater monitoring sampling at the Site.

In addition, Farallon will install a soil vapor extraction (SVE) pilot test well approximately 20-feet north of MW-3. The SVE well will be installed to a depth of 20 feet bgs and will be utilized in a future SVE pilot test. The pilot test will be utilized to determine if SVE is a suitable remediation technology to remediate the concentrations of PCE in the unsaturated soil beneath the building.

7.0 REFERENCES

City of Battle Ground Public Works Department. 2004a. Email regarding analytical testing results for municipal water wells No. 1 and No. 2. From Ms. Darsie Slawson, City of Battle Ground Public Works Department Spokesperson. To Mr. Jeffrey Kaspar, Senior Project Manager, Farallon. July 20.

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8.0 LIMITATIONS

The conclusions and recommendations contained in this report/assessment are based on professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with currently accepted hydrogeologic and engineering standards and practices applicable to this location, and are subject to the following inherent limitations:

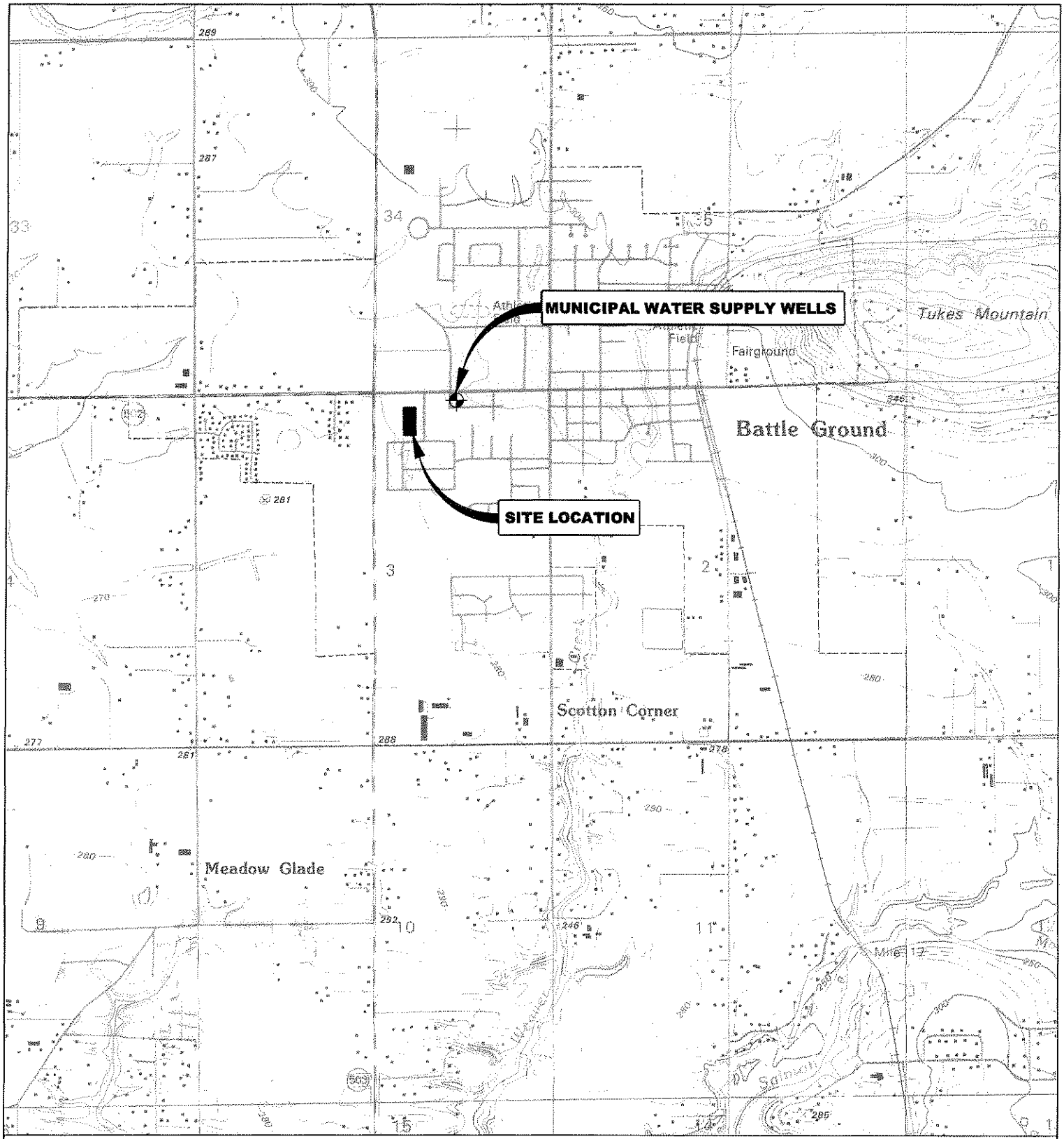
- **Accuracy of Information.** Certain information used by Farallon in this report/assessment has been obtained, reviewed, and evaluated from various sources believed to be reliable, including the previously discussed interviews. Although Farallon's conclusions, opinions, and recommendations are based in part on such information, Farallon's services did not include the verification of its accuracy or authenticity. Should such information prove to be inaccurate or unreliable, Farallon reserves the right to amend or revise its conclusions, opinions, and/or recommendations.
- **Reconnaissance.** Farallon performed a reconnaissance of the Site that is the subject of this report/assessment to document current conditions. Farallon focused on areas deemed more likely to exhibit hazardous materials conditions, while other areas received limited attention or were inaccessible at the time of our reconnaissance.

FIGURES

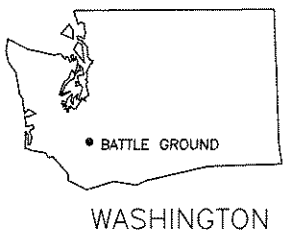
GROUNDWATER INVESTIGATION REPORT

Grace's Plaza Cleaners
717 West Main Street, Battle Ground Plaza
Battle Ground, Washington

Farallon PN: 355-001



REFERENCE: 7.5 MINUTE USGS QUADRANGLE BATTLE GROUND, WASHINGTON. DATED 1953 AND PHOTOREVISED 1981



FARALLON CONSULTING
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FIGURE 1

SITE LOCATION MAP
GROUNDWATER INVESTIGATION
GRACE'S PLAZA CLEANERS
BATTLE GROUND, WASHINGTON

FARALLON PN: 355-001

Drawn By: DEW	Checked By: JK	Date: 9/15/05	Disk Reference: 355-001

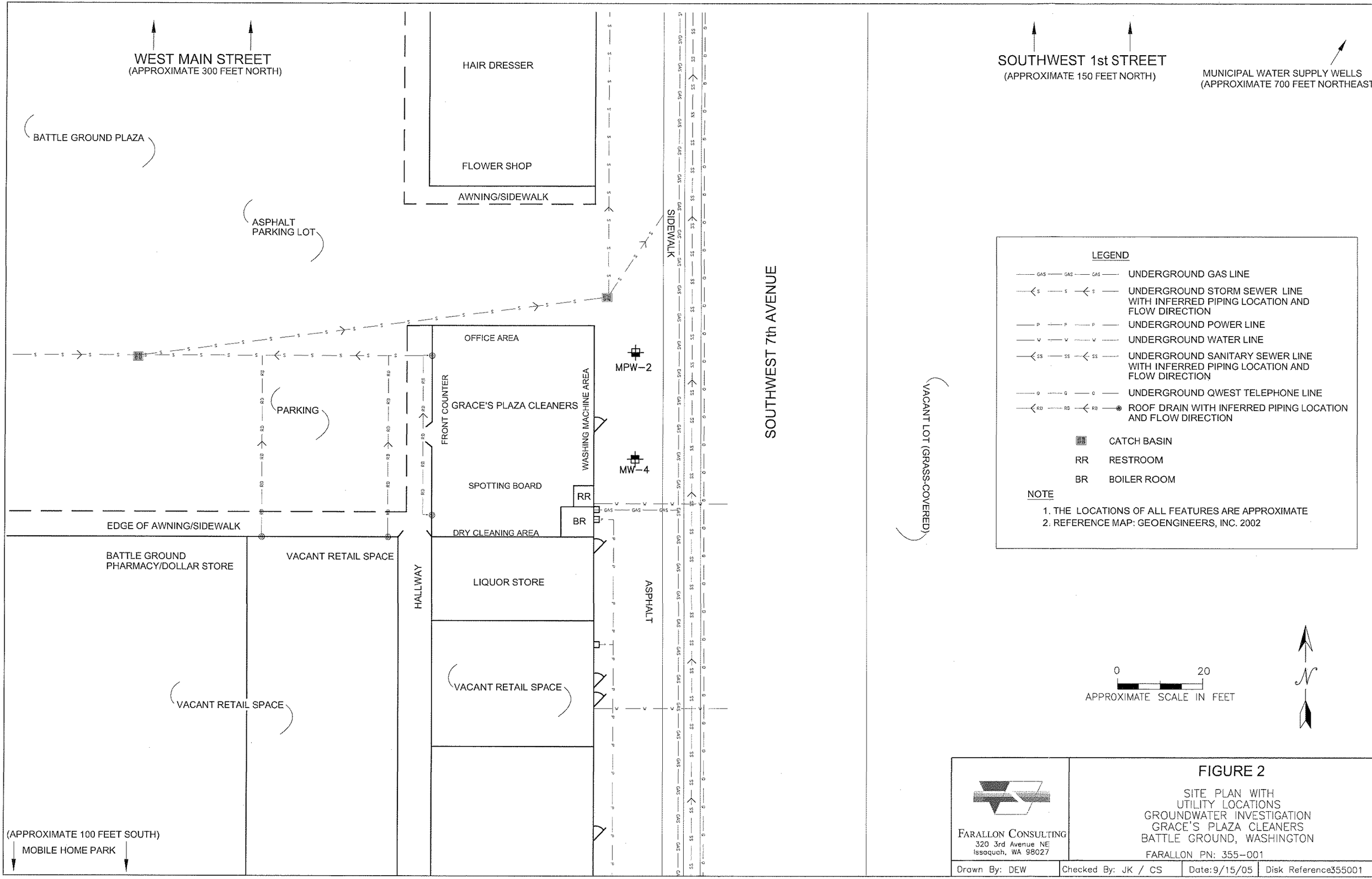

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FIGURE 2

SITE PLAN WITH
UTILITY LOCATIONS
GROUNDWATER INVESTIGATION
GRACE'S PLAZA CLEANERS
BATTLE GROUND, WASHINGTON

FARALLON PN: 355–001

Drawn By: DEW	Checked By: JK / CS	Date: 9/15/05	Disk Reference355001

WEST MAIN STREET
(APPROXIMATE 300 FEET NORTH)

SOUTHWEST 1st STREET
(APPROXIMATE 150 FEET NORTH)

MUNICIPAL WATER SUPPLY WELLS
(APPROXIMATE 700 FEET NORTHEAST)

BATTLE GROUND PLAZA

HAIR DRESSER

FLOWER SHOP

AWNING/SIDEWALK

ASPHALT
PARKING LOT

SIDEWALK

SOUTHWEST 7th AVENUE

VACANT LOT (GRASS-COVERED)

DEPTH	PCE	TCE	cDCE	VC
20'-25'	**0.349**	<0.1	0.472	<0.1
50'-55'	0.00996	<0.00445	0.00585	<0.00445
70'-75'	<0.005	<0.005	<0.005	<0.005
87.5'-90'	<0.00563	<0.00563	<0.00563	<0.00563

MW-2
MW-2D
MPW-2

OFFICE AREA

PARKING

MW-1D
MW-1

DEPTH	PCE	TCE	cDCE	VC
45'-50'	<0.005	<0.005	<0.005	<0.005
60'-65'	<0.00447	<0.00447	<0.00447	<0.00447
75'-80'	<0.005	<0.005	<0.005	<0.005
100'-102.5'	<0.00408	<0.00408	<0.00408	<0.00408
102.5'-105'	<0.00431	<0.00431	<0.00431	<0.00431

FRONT COUNTER

GRACE'S PLAZA CLEANERS

WASHING MACHINE AREA

MW-4

SPOTTING BOARD

RR

BR

DRY CLEANING AREA

MW-3
MW-3D

EDGE OF AWNING/SIDEWALK

BATTLE GROUND
PHARMACY/DOLLAR STORE

VACANT RETAIL SPACE

HALLWAY

LIQUOR STORE

ASPHALT

VACANT RETAIL SPACE

VACANT RETAIL SPACE

DEPTH	PCE	TCE	cDCE	VC
65'-70'	<0.00413	<0.00413	<0.00413	<0.00413
70'-75'	<0.00371	<0.00371	<0.00371	<0.00371
87.5'-90'	<0.00380	<0.00380	<0.00380	<0.00380

(APPROXIMATE 100 FEET SOUTH)
MOBILE HOME PARK

LEGEND

MW-3 SHALLOW MONITORING WELL COMPLETED BY FARALLON, JULY 2004

MW-3D DEEP MONITORING WELL COMPLETED BY FARALLON, MAY 2005

ALL RESULTS IN MILLIGRAMS PER KILOGRAM
DEPTH IN FEET BELOW GROUND SURFACE
PCE = TETRACHLOROETHENE
TCE = TRICHLOROETHENE
cDCE = cis-1,2-DICHLOROETHENE
VC = VINYL CHLORIDE
< = DENOTES CONCENTRATION IS BELOW LABORATORY PRACTICAL QUANTITATION LIMIT INDICATED
BOLD = DENOTES EXCEEDANCE OF PRELIMINARY SCREENING LEVELS

CATCH BASIN

RR RESTROOM

BR BOILER ROOM

NOTE

1. THE LOCATIONS OF ALL FEATURES ARE APPROXIMATE
2. REFERENCE MAP: GEOENGINEERS, INC. 2002

0 20
APPROXIMATE SCALE IN FEET

N

FIGURE 3

SITE PLAN WITH SOIL ANALYTICAL RESULTS
DEEP MONITORING WELLS
GROUNDWATER INVESTIGATION
GRACE'S PLAZA CLEANERS
BATTLE GROUND, WASHINGTON

FARALLON PN: 355-001

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Drawn By: DEW | Checked By: JK / CS | Date: 9/15/05 | Disk Reference: 355001

WEST MAIN STREET
(APPROXIMATE 300 FEET NORTH)

SOUTHWEST 1st STREET
(APPROXIMATE 150 FEET NORTH)

MUNICIPAL WATER SUPPLY WELLS
(APPROXIMATE 700 FEET NORTHEAST)

BATTLE GROUND PLAZA

HAIR DRESSER

FLOWER SHOP

AWNING/SIDEWALK

ASPHALT
PARKING LOT

SIDEWALK

SOUTHWEST 7th AVENUE

VACANT LOT (GRASS-COVERED)

MW-2

MW-2D
(37.78)

OFFICE AREA

38.00

38.00

38.25

GRACE'S PLAZA CLEANERS

38.25

PARKING

MW-1D
(38.44)

38.50

FRONT COUNTER

WASHING MACHINE AREA

MW-1

SPOTTING BOARD

RR

BR

38.50

EDGE OF AWNING/SIDEWALK

DRY CLEANING AREA

MW-3

MW-3D
(38.73)

BATTLE GROUND
PHARMACY/DOLLAR STORE

VACANT RETAIL SPACE

HALLWAY

LIQUOR STORE

ASPHALT

VACANT RETAIL SPACE

VACANT RETAIL SPACE

(APPROXIMATE 100 FEET SOUTH)
MOBILE HOME PARK

LEGEND

MW-3	SHALLOW MONITORING WELL COMPLETED BY FARALLON, JULY 2004
MW-3D	DEEP MONITORING WELL COMPLETED BY FARALLON, MAY 2005
(38.73)	GROUNDWATER ELEVATION (JUNE 2005)
38.25	GROUNDWATER ELEVATION CONTOUR LINE
	APPROXIMATE DIRECTION OF GROUNDWATER FLOW
	CATCH BASIN
RR	RESTROOM
BR	BOILER ROOM

NOTE

1. THE LOCATIONS OF ALL FEATURES ARE APPROXIMATE
2. REFERENCE MAP: GEOENGINEERS, INC. 2002

0 20
APPROXIMATE SCALE IN FEET

N

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FIGURE 4

SITE PLAN WITH GROUNDWATER ELEVATION
CONTOUR MAP DEEP MONITORING WELLS (JUNE 2005)
GROUNDWATER INVESTIGATION
GRACE'S PLAZA CLEANERS
BATTLE GROUND, WASHINGTON

FARALLON PN: 355-001

Drawn By: DEW	Checked By: JK / CS	Date: 9/15/05	Disk Reference355001

WEST MAIN STREET
(APPROXIMATE 300 FEET NORTH)

SOUTHWEST 1st STREET
(APPROXIMATE 150 FEET NORTH)

MUNICIPAL WATER SUPPLY WELLS
(APPROXIMATE 700 FEET NORTHEAST)

BATTLE GROUND PLAZA

HAIR DRESSER

FLOWER SHOP

AWNING/SIDEWALK

ASPHALT
PARKING LOT

SIDEWALK

SOUTHWEST 7th AVENUE

VACANT LOT (GRASS-COVERED)

CF	PCE	1,1,1-TCA
<0.200	1.68	0.290

MW-2

MW-2D

MPW-2

OFFICE AREA

FRONT COUNTER

GRACE'S PLAZA CLEANERS

WASHING MACHINE AREA

PARKING

MW-1D

CF	PCE	1,1,1-TCA
<0.200	0.250	0.280

MW-1

MW-4

SPOTTING BOARD

RR

BR

EDGE OF AWNING/SIDEWALK

DRY CLEANING AREA

MW-3

MW-3D

CF	PCE	1,1,1-TCA
0.280	0.480	0.220

BATTLE GROUND
PHARMACY/DOLLAR STORE

VACANT RETAIL SPACE

HALLWAY

LIQUOR STORE

ASPHALT

VACANT RETAIL SPACE

VACANT RETAIL SPACE

(APPROXIMATE 100 FEET SOUTH)
MOBILE HOME PARK

LEGEND

MW-3 SHALLOW MONITORING WELL COMPLETED BY FARALLON, JULY 2004

MW-3D DEEP MONITORING WELL COMPLETED BY FARALLON, MAY 2005

ALL RESULTS IN MICROGRAMS PER LITER
CF = CHLOROFORM
PCE = TETRACHLOROETHENE
1,1,1-TCA = 1,1,1-TRICHLOROETHANE
< = DENOTES CONCENTRATION IS BELOW LABORATORY PRACTICAL QUANTITATION LIMIT INDICATED

CATCH BASIN

RR RESTROOM

BR BOILER ROOM

NOTE

1. THE LOCATIONS OF ALL FEATURES ARE APPROXIMATE
2. REFERENCE MAP: GEOENGINEERS, INC. 2002

0 20
APPROXIMATE SCALE IN FEET

N

FIGURE 5

SITE PLAN WITH GROUNDWATER ANALYTICAL RESULTS
DEEP MONITORING WELLS (JUNE 2005)
GROUNDWATER INVESTIGATION
GRACE'S PLAZA CLEANERS
BATTLE GROUND, WASHINGTON

FARALLON PN: 355-001

FARALLON CONSULTING
320 3rd Avenue NE
Issaquah, WA 98027

Drawn By: DEW	Checked By: JK / CS	Date: 9/15/05	Disk Reference: 355001

TABLES

GROUNDWATER INVESTIGATION REPORT

Grace's Plaza Cleaners
717 West Main Street, Battle Ground Plaza
Battle Ground, Washington

Farallon PN: 355-001

Table 1
Summary of Soil Analytical Results:
Phase III Investigation
Grace's Plaza Cleaners
Battle Ground, WA
Farallon PN: 355-001

Monitoring Well	Date Sampled [1]	Sample Identification	Sample Depth (feet bgs)	Analytical Results (milligrams per kilogram) [2]								
				PCE	TCE	cis 1,2-Dichloroethene	trans 1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride	Acetone	Total Organic Carbon [3]	Chemical Oxygen Demand [4]
MW-1	7/16/2004	MW1-5-6.5-071604	5-6.5	< 0.002	< 0.0025	< 0.003	< 0.0025	< 0.003	< 0.0025	< 0.03	—	—
	7/16/2004	MW1-6.5-8-071604	6.5-8	—	—	—	—	—	—	—	5,220	6,110
	7/16/2004	MW1-9.5-11-071604	9.5-11	0.0122	< 0.0025	< 0.003	< 0.0025	< 0.003	< 0.0025	< 0.03	—	—
	7/16/2004	MW1-12.5-14-071604	12.5-14	—	—	—	—	—	—	—	1,610	—
	7/16/2004	MW1-14-15.5-071604	14-15.5	0.00919	< 0.0025	< 0.003	< 0.0025	< 0.003	< 0.0025	< 0.03	1,030	—
	7/16/2004	MW1-17-18.5-071604	17-18.5	< 0.002	< 0.0025	< 0.003	< 0.0025	< 0.003	< 0.0025	< 0.03	—	—
	7/16/2004	MW1-20-21.5-071604	20-21.5	0.0074	< 0.0025	< 0.003	< 0.0025	< 0.003	< 0.0025	< 0.03	—	—
MW-2	7/16/2004	MW2-5-6.5-071604	5-6.5	< 0.002	< 0.0025	< 0.003	< 0.0025	< 0.003	< 0.0025	< 0.03	—	—
	7/16/2004	MW2-8-9.5-071604	8-9.5	< 0.002	< 0.0025	0.00598	< 0.0025	< 0.003	< 0.0025	< 0.03	—	—
	7/16/2004	MW2-18.5-20-071604	18.5-20	< 0.002	< 0.0025	0.00368	< 0.0025	< 0.003	< 0.0025	< 0.03	—	—
MW-3	7/23/2004	MW3-5-6.5-072304	5-6.5	0.00579	< 0.00312	< 0.00375	< 0.00312	< 0.00375	< 0.00312	< 0.0375	—	—
	7/23/2004	MW3-12.5-14-072304	12.5-14	0.0334	< 0.0025	< 0.003	< 0.0025	< 0.003	< 0.0025	0.119	—	—
	7/23/2004	MW3-14-15.5-072304	14-15.5	0.0414	< 0.00293	< 0.00352	< 0.00293	< 0.00352	< 0.00293	0.0394	646	—
	7/23/2004	MW3-18-18.5-072304	18-18.5	0.0445	< 0.00281	< 0.00337	< 0.00281	< 0.00337	< 0.00281	< 0.0337	—	—
MTCA Cleanup Levels for Soil [5]				**0.05[5]**	**0.03[5]**	**800[6]**	**1,600[6]**	**1.67[6]**	**0.667[6]**	**8,000[6]**	**Not Applicable**	**Not Applicable**

NOTES:

< denotes concentration is below laboratory practical quantitation limit indicated.

[1] Sampled by Farallon Consulting, L.L.C.

[2] Analyzed by U.S. Environmental Protection Agency (EPA) Method 8260.

[3] Analyzed by EPA Method 410.4.

[4] Analyzed by EPA Method 9060.

[5] Model Toxics Control Act Cleanup Regulation (MTCA), Chapter 173-340 of the Washington Administrative Code, as amended February 2001. MTCA Method A cleanup levels indicated for compounds with established Method A cleanup levels.

[6] MTCA Cleanup Levels and Risk Calculations (CLARC) Standard Method B Formula Values, Version 3.1, updated November 2001. MTCA Method B cleanup levels are shown where no Method A cleanup level is established.

— = not analyzed
bgs = below ground surface
PCE = tetrachloroethene
TCE = trichloroethene

Table 2
Soil Analytical Results
Groundwater Investigation
Grace's Plaza Cleaners
Battle Ground, Washington
Farallon PN: 355-001

Monitoring Well	Date Sampled [1]	Sample Identification	Sample Depth (feet bgs)	Analytical Results (milligrams per kilogram) [2]					
				PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
MW-1D	5/15/2005	MW1D-45-50	45-50	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	5/15/2005	MW1D-60-65	60-65	<0.00447	<0.00447	<0.00447	<0.00447	<0.00447	<0.00447
	5/15/2005	MW1D-75-80	75-80	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	5/16/2005	MW1D-100-102.5	100-102.5	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408
	5/16/2005	MW1D-102.5-105	102.5-105	<0.00431	<0.00431	<0.00431	<0.00431	<0.00431	<0.00431
MW-2D	5/17/2005	MW2D-20-25	20-25	**0.349**	< 0.1	0.472	<0.1	<0.1	<0.1
	5/17/2005	MW2D-50-55	50-55	0.00996	<0.00445	0.00585	<0.00445	<0.00445	<0.00445
	5/18/2005	MW2D-70-75	70-75	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	5/18/2005	MW2D-87.5-90	87.5-90	<0.00563	<0.00563	<0.00563	<0.00563	<0.00563	<0.00563
MW-3D	5/20/2005	MW3D-65-70	65-70	<0.00413	<0.00413	<0.00413	<0.00413	<0.00413	<0.00413
	5/20/2005	MW3D-70-75	70-75	<0.00371	<0.00371	<0.00371	<0.00371	<0.00371	<0.00371
	5/20/2005	MW3D-87.5-90	87.5-90	<0.00380	<0.00380	<0.00380	<0.00380	<0.00380	<0.00380
MTCA Cleanup Levels for Soil [3]				**0.05[3]**	**0.03[3]**	**800[4]**	**1,600[4]**	**1.67[4]**	**0.667[4]**

NOTES:

< denotes concentration is below laboratory practical quantitation limit indicated.

[1] Sampled by Farallon Consulting, L.L.C.

[2] Analyzed by U.S. Environmental Protection Agency (EPA) Method 8260B.

[3] Washington State Department of Ecology Model Toxics Control Act Cleanup Regulation (MTCA), Chapter 173-340 of the Washington Administrative Code, as amended February 2001. MTCA Method A cleanup levels indicated for compounds with established Method A cleanup levels.

[4] MTCA Cleanup Levels and Risk Calculations (CLARC) Standard Method B Formula Values, Version 3.1, updated November 2001. MTCA Method B cleanup levels are shown where no Method A cleanup level is established.

bgs = below ground surface
PCE = tetrachloroethene
TCE = trichloroethene

Table 3
Summary of Groundwater Elevations
Groundwater Investigation
Grace's Plaza Cleaners
Battle Ground, WA
Farallon PN: 355-001

Well Identification	Well Screened Interval (feet [1]	Top of Casing Elevation [2]	Date Measured	Depth to Water (feet) [3]	Groundwater Elevation [2]
MW-1D	72.5-87.5	99.48	6/1/2005	61.04	38.44
MW-2D	71-86	99.19	6/1/2005	61.41	37.78
MW-3D	72.5-87.5	99.72	6/1/2005	60.99	38.73

NOTES:
[1]Screened interval in feet below ground surface (bgs).
[2]Elevation in feet based on an assumed 100-foot arbitrary datum.
[3]Depth to water measured in feet below the top of the well casing.