REMEDIAL INVESTIGATION REPORT

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FORMER TEXACO SERVICE STATION No. 211577
631 QUEEN ANNE AVENUE NORTH
SEATTLE, WASHINGTON

MARCH 3, 2003

Delta Environmental Consultants, Inc.

Inogen® Environmental Alliance

Remedial Investigation Report

FORMER TEXACO SERVICE STATION No. 211577
631 QUEEN ANNE AVENUE NORTH
SEATTLE, WASHINGTON

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1.0 INTRODUCTION

Delta Environmental Consultants (Delta), on behalf of Chevron Environmental Management Company a subsidiary of ChevronTexaco Corporation (ChevronTexaco), developed a Site Conceptual Model (SCM), Risk Assessment (RA) and supplemental investigation proposal for Former Texaco Station No. 211577 located at 631 Queen Anne Avenue North in Seattle, Washington (a site location map is included as **Figure 1**). The SCM/RA summarized activities and information collected at this location by several previous consultants and the Washington State Department of Ecology (WDOE) since 1986. Based on the SCM/RA, a Remedial Investigation Work Plan (RIWP) was developed which defined the purpose, scope and methods to be used while conducting the Remedial Investigation (RI).

2.0 BACKGROUND INFORMATION

2.1 Property Description

The former Texaco Queen Anne Service Station No. 211577 was located at 631 Queen Anne Avenue North, at the intersection of West Roy Street, in the City of Seattle, Washington. The property is located in a residential/commercial neighborhood in the Queen Anne District of northwest Seattle. Located within one city block east, west and south of the former facility location are several multi-story apartment buildings, a hotel, several retail and commercial shops and a former Union Oil Company 76 (Unocal) service station located at 700 Queen Anne Avenue North (**Figure 2**).

2.2 Property History

A gasoline service station has operated in various configurations at this location for approximately 66 years, ending in 1993. In early 1978, residents of the Monterey Apartments notified the Seattle Fire Department of the presence of hydrocarbon odors in the basement laundry room and lower apartments. The Fire Department investigation focused on the then active Texaco Service Station (also referred to as the Arnold Property), and a then-active Unocal gas station located at 700 Queen Anne Avenue North (**Figure 2**).

After the odors apparently abated in March 1978, no complaints were documented until January 1984 when Monterey Apartments residents complained of gasoline odors. Investigation identified the presence of separate phase hydrocarbons (SPH) in a sump at the Monterey Apartments. The Arnold Property and Unocal station were suspected as the likely sources.

2.3 Previous Investigations

Since the first reported hydrocarbon vapor complaints at the Monterey Apartments in February 1978, various agencies, consultants and contractors have conducted a number of separate investigations and sampling events at the Monterey Apartments and the Arnold Property. Several remedial actions have also been performed with varying levels of success. Information from these investigations is summarized in the Conceptual Site Model, Risk Assessment and Supplemental Investigation Proposal, (Delta Environmental Consultants, May 2002). Prior to the RI, there were 20 groundwater monitoring wells in the vicinity, 5 of which were on the Arnold property and 15 of which were located on adjacent properties.

2.4 Current Status

The subject property located at 631 Queen Anne Avenue North is currently owned by the Arnolds and is occupied by a deli/convenience store known as the "Manhattan Express".

2.5 Regional and Area-Specific Geology and Hydrology

REGIONAL GEOLOGY

Regional geologic mapping of the Queen Anne area indicates that Vashon Till underlies the base of Queen Anne Hill with Older Sand units adjacent to the hill on the north side. The Vashon Till is a well-graded, consolidated mixture of clays and gravels and contains local lenses of sand and gravel. The till is very dense and typically has a very low hydraulic permeability. The Older Sand (i.e. Esperance Sand) underlies the Vashon Till and consists of a well graded, medium to course grained sand with silt stringers and interbeds. Underlying the Esperance Sand is the Lawton Clay described as an older mixture of clay, till, and gravel and contains both vertical and lateral variations. The Lawton Clay has a mostly low to medium hydraulic permeability.

Ecology and Environment, Inc. (E&E) interpreted the soil underlying the Property soils to be within a transitional zone of the Esperance Sand to the underlying Lawton Clay that are described as underlying the Vashon Till. Based on the regional geologic mapping, boring logs prepared by others, and previous aquifer tests, soil underlying the property has low hydraulic permeability. Farallon Consulting (Farallon) concluded that the soil underlying the area consists of a transitional zone between the Vashon Till and Esperance Sand.

AREA-SPECIFIC GEOLOGY

GeoEngineers described soils underlying the investigation area as silty sand and gravel fill to 11 feet below ground surface (bgs), native silty sand extending to 16 to 29 bgs, and a basal unit of gray, silty clay (presumably the Lawton Clay) at the bottom of the borings. The depth to the top of the clay is deeper towards the southwest of the site where the bottom of the clay was not reached in any of the previous borings performed.

HYDROLOGY

Groundwater occurs a few feet above the previously described clay at depths ranging from 10 to 20 feet bgs. Based on a review of the available boring logs and descriptions from previous reports, the shallow groundwater in the area appears to be perched in discontinuous lenses and layers of fill, silty sand and sand that overlay the clay. Previous studies have indicated that the natural groundwater flow direction is towards the west-southwest (**Figure 3**).

The fill likely has a highly variable permeability that is more permeable than the underlying native soils. The native soils which are saturated, may be of low permeability as suggested by previous aquifer tests, well de-watering, and the local presence of impermeable glacial till. The sands that are interbedded with glacial till, silts and clay, are relatively more permeable, and are expected to be laterally discontinuous and variable. Pathways in native soil of varying permeability are expected to exist in the subsurface. Farallon indicated that groundwater beneath the Arnold property may be comprised of multiple shallow water-bearing zones each with unique flow directions and rates.

3.0 PURPOSE

The purpose of the RI was to further assess and document the nature and extent of gasoline, diesel and oil range petroleum hydrocarbons and possibly chlorinated solvents in soil and groundwater beneath both the former service station property and beneath several adjoining properties including the neighboring Monterey Apartments. Additional objectives of this investigation included:

- Further assessment and documentation of the indoor air quality within the Monterey Apartments,
- Collection of site-specific soil physical data for modeling potential indoor air risks at other surrounding properties, and
- Determining if other soil, groundwater or vapor exposure pathways are present and/or need to be addressed as part of the final remedial solution for this site.

This report presents the data collected from the RI procedures defined in the RI work plan. This data was collected to fill data gaps necessary for the selection of a site-specific remedy.

4.0 SCOPE OF WORK

The scope of work performed during this investigation included the following tasks:

- A 3rd Quarter 2002 groundwater monitoring event which included gauging and sampling 19 existing monitoring wells,
- Collection of soil and groundwater samples from directly beneath the basement floor of the Monterey Apartments,
- Installation of two vapor probes beneath the floor of the Monterey Apartments basement at each of the soil and groundwater sampling locations,
- Perform seven soil borings by Geoprobe on the Arnold property, and collect soil samples from each boring for chemical analysis,

- Perform 11 soil borings each to a total depth of between 20 and 40-feet bgs at locations on the Arnold and Monterey Apartments Properties and within the Queen Anne Avenue N. and 1st Avenue W. right-of-ways,
- Collect soil samples at 2.5-foot or 5.0-foot intervals from each of the soil borings,
- Complete six of the soil borings as groundwater monitoring wells,
- Collect soil vapor samples from the two soil vapor probes installed in the basement of the Monterey Apartments,
- Develop the newly installed monitoring wells,
- Perform a 4th quarter groundwater monitoring event and collect groundwater samples from each of the newly installed and existing monitoring wells.
- Prepare a report describing the work performed.

5.0 FIELD ACTIVITIES

5.1 Third Quarter Groundwater Monitoring and Sampling

On July 24, 2002, monitoring wells VP-1, VP-3 [MW-2], VP-4, VP-6, VP-7 [MW-3], VP-8 [MW-7], MW-4, MW-6, MW-9, MW-10, MW-11 and RW-4 were gauged and sampled by a representative from Gettler-Ryan, Inc. (GRI), ChevronTexaco's groundwater sampling consultant. These wells are located on the Arnold and Monterey Apartments properties and at the southeast corner of the 18 Mercer Street building (**Figure 4**). The sampler could not locate Wells VP-2, RW-2, RW-3 and RW-5, and was unable to access wells VP-5, VP-9 and MW-9. Well VP-3 was dry at the time of sampling. One additional un-designated well (MP-1) was observed near the northeast corner of the Alvena Vista Apartments. No construction details or record of ownership of this well could be located, and the sampler was unable to open the monument cover of this well, therefore this well was not sampled.

Prior to purging and sampling, Depth To Water (DTW) and Separate Phase Hydrocarbon (SPH) thickness (if present) was measured with respect to Top Of well Casing (TOC) to the nearest 0.01-foot using an electronic interface probe.

A minimum of three bore volumes of groundwater was purged from each well with a disposable polyethylene bailer prior to sample collection. In the event a monitoring well ran dry during purging, the groundwater level in the well was allowed to recover to 75 percent of its original static level and purging continued. If the well again purged dry, it was allowed to recover to 75 percent of its original static water level (if possible) at which point it was considered sufficiently purged.

After purging was completed, groundwater samples were collected by bailer for laboratory analysis. Groundwater samples collected for laboratory analysis were transferred to laboratory supplied sample containers and immediately placed in a pre-chilled cooler for storage prior to transport to Northcreek Analytical (NCA) in Bothel, Washington. Groundwater samples collected for dissolved metals analyses were placed in un-preserved containers and filtered by the analytical laboratory.

Groundwater samples from each well sampled were analyzed for BTEX compounds by EPA Method 8021b, Total Petroleum Hydrocarbons as Gasoline (TPH-G) by Northwest Method NWTPH-g. Total Petroleum Hydrocarbons as Diesel fuel and as Oil (TPH-D and TPH-O) were quantified using Northwest Method NWTPH-D extended (ext.) with silica gel cleanup (hereafter denoted as TPH-D ext). A groundwater sample from each well sampled was also analyzed for dissolved lead using EPA 6000/7000 series methods.

In addition to the analyses listed above, samples from select groundwater monitoring wells were collected for the following analysis.

- Groundwater samples for Volatile Organic Compounds (VOCs) analysis by EPA Method 8260b, were collected from wells MW-2/VP-3, MW-4, MW-5/VP-5, MW-10, MW-11 and RW-4.
- Groundwater samples for Semi-Volatile Organic Compounds (SVOCs) and cPAHs analysis by EPA Method 8270C were collected from wells MW-3/VP-7, MW-4, MW-5/VP-5, MW-7/VP-8, MW-10, MW-11, VP-2 and RW-4.

- Groundwater samples for dissolved Resource Conservation and Recovery Act (RCRA) listed metals analysis were collected from wells MW-3/VP-7, MW-4, MW-5/VP-5, MW-7/VP-8, MW-10, VP-9, RW-2 and RW-4.

Data from these analyses is presented in **Table 1**, a discussion of the results of this sampling is presented in section 9 of this report and the field sheets, laboratory reports and a copy of the GRI '*Groundwater Monitoring and Sampling Report*' is included with this report as **Appendix A**.

5.2 Soil Vapor Probe Installation

Between September 12th and 13th, 2002, Cascade Drilling, Inc. (Cascade) of Woodinville, Washington and representatives from Delta installed two soil vapor sampling probes beneath the concrete slab floor of the basement of the Monterey Apartments. Soil and groundwater samples were collected from beneath the floor of the apartment buildings basement at each soil vapor probe installation location. These probes were installed to enable collection of soil vapor samples from beneath the floor of the apartment building. The following procedures were utilized during sampling and vapor probe installation -

Prior to subsurface investigation activities, Delta arranged for the location of underground utilities to be marked by contracting Applied Professional Services, Inc. (APS) of Issaquah, Washington (a private locating service) to identify, locate, and mark utilities beneath the basement floor in the areas to be sampled.

The carpet and padding on the floor of the basement corridor was then peeled back to expose the concrete. A six-inch diameter hole was cored from the concrete slab of the basement floor and a hand auger was used to complete a hand boring to between 6.5 and 7 feet below the level of the basement floor and approximately 12-15 inches below the static groundwater depth. Soil samples were collected from the hand auger at one foot and five feet below the level of the basement floor at both locations. Each soil sample collected was field screened for the presence of volatile petroleum hydrocarbons using a Photo Ionization Detector (PID), and tested for the presence of heavy oils and hydrocarbons by sheen screening. Soil samples were also collected from each location for laboratory analysis. Samples collected for laboratory analysis

were placed in laboratory supplied glass samples jars and stored in a pre-chilled ice chest prior to and during transport to NCA.

Following soil sample collection, a 2 ½ foot length of 1-inch diameter schedule 80 Poly Vinyl Chloride (PVC) well screen containing 0.010 inch factory machined slots was placed in the bottom of each hand boring. Attached to each length of well screen was a five-foot length of 1-inch diameter PVC blank well casing. Once this temporary well had been set at the bottom of each hand boring, the boring was back-filled with 3-4 feet of silica sand to provide a filter pack around the well during groundwater sample collection. Each temporary well was then developed and sampled in the following manner:

1. A length of disposable polyethylene tubing was placed into each temporary monitoring well and lowered to within 6 inches of the bottom of the well.
2. The polyethylene tubing was connected to a short length of flexible tubing attached to a peristaltic sampling pump.
3. Prior to groundwater sample collection, each temporary well was developed using a peristaltic pump to purge water from each well until the groundwater being generated from each well was clear (none-turbid), or until a minimum of one liter of groundwater had been purged.
4. Groundwater samples from each temporary well were then collected into laboratory supplied sample containers using the peristaltic pump.
5. The groundwater samples collected were placed in a pre-chilled ice chest and delivered to NCA for analysis.
6. Following groundwater sample collection each temporary well was withdrawn, and the sand-pack was allowed to collapse into the resulting hole.

Once each temporary well had been removed, each sampling location was converted to a permanent soil vapor sampling port in the following manner:

1. Each auger hole was back-filled with silica sand to within 9-10 inches of the top of the basement floor, and a soil vapor probe was inserted in to the sand. Each vapor probe consisted of a length of ¼-inch diameter stainless steel tubing which had been closed at

the bottom and, which had been perforated with 30 or more small diameter holes along its length. The top of each vapor probe was fitted with a 3/8-inch male National Pipe Thread (NPT) fitting to which a threaded brass cap had been attached.

2. Approximately two inches of concrete was then poured into the augured hole on top of the silica sand and around the vapor probe. A floor mounted electrical box was then slid over the probe by inserting the probe through a hole in the bottom of the box. The electrical box was then set in concrete level with the surface of the concrete floor and the top of each vapor probe positioned approximately one inch below the top of the electrical box. The interior of each electrical box was then filled with approximately 3/4 of an inch of concrete to seal the space between the vapor probe and the hole in the bottom of the box.
3. The carpet in the basement hallway was re-laid and the concrete around each electrical box was allowed to harden overnight. The following day, a brass carpet ring was secured to the electrical box, which sealed down around a hole cut in the carpet at each location. Each electrical box has been fitted with a removable brass cover to allow future access of monitoring and sample collection. Sampling and vapor probe locations are depicted in **Figure 5**.

Each of the soil samples collected during vapor probe installation were submitted to NCA and analyzed for TPH-G, TPH-D ext, VOCs, SVOCs and Carcinogenic Poly-Aromatic Hydrocarbons (cPAHs) with Selective Ion Monitoring (SIM) analysis by EPA Method 8270c, EPH and VPH analysis and for RCRA metals (including lead).

One groundwater sample from each temporary well was submitted to NCA and analyzed for BTEX compounds, TPH-G and TPH-D ext.

Soil data from these analyses is presented in **Table 2**, groundwater data is presented in **Table 3**, and the associated laboratory reports are contained in **Appendix B**.

5.3 Geoprobing and Soil Sampling

On September 18th and 20th 2002, soil samples were collected by geoprobe at seven locations (DP-1 through DP-7) on the Arnold Property. See **Figure 5** for Geoprobing locations.

Prior to subsurface investigation activities, Delta arranged for the location of underground utilities to be marked by 1) contacting the Utilities Underground Location Center, and 2) contracting APS to identify, locate, and mark utilities in the areas to be sampled.

At each probing location, a truck mounted probing rig operated by Cascade was used to advance a 1 3/8-inch diameter soil sampler to the upper interface of the Lawton clay which was generally encountered at depths between 30 and 40 feet below grade (bg). Soil samples were collected continuously at each probe location by pushing a soil-sampling probe containing an acetate sample liner ahead of a hollow outer tube.

Soil from the bottom 2-3-inches of each sample liner was cut–off, and soil from this portion of the acetate liner was logged by a Delta Environmental geologist in accordance with the Unified Soil Classification System ("USCS") Visual-Manual Procedure (American Society for Testing and Materials Method D2488), screened for the presence of hydrocarbons using a photo-ionization detector (PID) with a 10.0 electron volt (eV) lamp and tested for the presence of non-volatile heavy range petroleum hydrocarbons and oils by sheen screening. The results of both headspace vapor screening and the sheen testing are recorded on the soil boring logs included in **Appendix C**. At least one soil sample from each probing location was submitted for laboratory chemical analysis based on the results of the headspace vapor screening and/or sheen testing. In general, the sampled interval containing the greatest headspace vapor concentration and/or which produced a moderate to heavy sheen was submitted for laboratory analysis. If none of the soil samples collected at a particular location produced headspace-screening concentrations exceeding background levels and no sheen is observed, then the sampled interval reflecting the capillary fringe was submitted for analysis. Soil samples collected for laboratory chemical analysis were be retained in the acetate sampling sleeve, capped at each end, sealed with tape and placed on ice while being transported to NCA for analysis. One soil sample from each probing location was analyzed for BTEX compounds, TPH-G, and TPH-D ext. A soil sample from the capillary fringe soils at each probing location was also analyzed for total lead using EPA 6000/7000 series methods.

Soil samples from four locations (DP-1 through DP-4) were also be submitted for VOCs analysis. Soil samples from two locations (DP-1 and DP-5) were submitted for SVOC and

cPAH analysis. A soil sample collected from DP-2 was submitted for EPH and VPH analysis, and soil samples from four locations (DP-1, DP-3, DP-4 and DP-6) were submitted for RCRA metals analysis.

Soil data from these analyses is presented in **Table 4**, the associated laboratory reports are presented as **Appendix B**.

5.4 Soil Borings

Based on an analysis of the results from the groundwater sampling listed above, and with input and concurrence from Mr. Brian Sato of WDOE, Mr. Thomas Morin of Environmental Partners, Inc. and Mr. Berthin Hyde of Sound Environmental Strategies, Delta finalized the locations of the proposed soil borings and monitoring wells.

On August 30, 2002, Delta meet with representatives of Cascade and King County Metro Transit at the site to determine if the soil boring locations were clear of overhead obstructions which might interfere will drilling activities and discuss potential impacts to the electric bus traffic on Queen Anne Avenue, N. from the proposed drilling activities. Based on the outcome of this meeting, a schedule for the field activities proposed was finalized and precise drilling locations were selected.

Delta arranged for the location of underground utilities to be marked by 1) contacting the Utilities Underground Location Center, and 2) contracting APS to identify, locate, and mark utilities at any location on privately owned property. Street-use permits were obtained from the City of Seattle, and a private subcontractor provided traffic control. Where required, concrete coring and safe-dig vacuum assisted bore-hole clearing was performed prior to drilling.

Between September 23 and 27, 2002, Cascade drilled 11 soil borings (DB-1 through DB-11) and completed six of these borings as groundwater monitoring wells (MW-12 through MW-17). See **Figure 5** for soil boring locations. Borings were advanced to total depths between 20 and 40 feet bgs, using a truck mounted hollow-stem auger drill rig. When present, each boring was terminated at the contact with the underlying Lawton clay layer. Soil samples were collected at 2.5-foot intervals beginning at five feet bg from soil borings DB-2, DB-3, DB-4 and DB-5. Soil samples from borings DB-1 and DB-6 through DB-11 were collected at 5.0-foot intervals

beginning at five feet bgs. At each boring location, samples were collected by driving a split-spoon soil sampler ahead of the auger flights, recovering the sampler and then placing a plug at the terminus of the lead auger prior to advancing the auger flight to the next sampling depth. Soil samples from borings DB-3, DB-4, DB-5 and DB-7 were collected for both physical and chemical analysis using brass rings placed within a Dames and Moore type sampler. Soil samples from the remaining seven locations were collected using a modified California type split-spoon sampler without brass rings. Each soil boring was logged by a registered environmental geologist in accordance with the Unified Soil Classification System ("USCS") Visual-Manual Procedure (American Society for Testing and Materials Method D2488). The sub-surface soil conditions and lithology encountered in each soil boring were recorded on a Boring and Well Construction Log (see **Appendix C** for logs).

Soil from each sampled interval was screened for the presence of hydrocarbons using a photo-ionization detector (PID) with a 10.0 electron volt (eV) lamp and for the presence of non-volatile heavy range hydrocarbons and oils by sheen screening. The results of both the headspace vapor screening and the sheen testing are recorded on the soil boring logs and used to select which samples were to be submitted for laboratory chemical analysis. At a minimum, one soil sample from the capillary fringe or vadose zone was collected and submitted for laboratory chemical analysis. Soil samples collected for laboratory chemical analysis were retained in either laboratory-supplied glass jars with Teflon® lined lids or in stainless steel soil sample liners, sealed with Teflon sheeting and capped with plastic end-caps. Each soil sample was immediately placed in a pre-cooled ice chest while onsite and during transport to NCA. At a minimum, one soil sample from each boring was analyzed for BTEX compounds, TPH-G and TPH-D ext. A soil sample from the capillary fringe in each boring was also analyzed for total lead using EPA 6000/7000 series methods.

Soil samples from eight locations (DB-1 through DB-8) were analyzed for VOCs, SVOCs, cPAHs and RCRA metals. Soil samples collected from five borings (DB-1, DB-2, DB-6, DB-7 and DB-8) were submitted for EPH and VPH analysis. These five samples were also submitted for hexane analysis by EPA method 8260B.

In addition to the analyses listed above, vadose and saturated zone soil samples were collected from borings DB-3, DB-4, DB-5 and DB-7 and submitted to Rosa Environmental and Geotechnical (REG) laboratories in Seattle, Washington for select physical analyses. These analyses are required as inputs so that soil vapor intrusion modeling could be performed and for calculation of appropriate soil and groundwater cleanup levels. Soil samples were submitted to REG for the following physical analyses-

Vadose Zone Samples and Analyses

- Fraction Organic Carbon (FOC) by ASTM D-2974
- Dry Soil Bulk density by ASTM D-2937
- Specific gravity by ASTM D-854
- Moisture content by ASTM D-2216
- Air permeability by SSSA 48 / ASTM D-4525
- Total porosity

Saturated Zone Samples and Analyses

- Total and effective porosity according to the method described in Freeze and Cherry, 1979 (Groundwater)
- Saturated hydraulic conductivity by one of the following methods – ASTM D-2434 or ASTM D-5084 (lab will determine which method used based on sample properties)
- Fraction Organic Carbon (FOC) by ASTM D-2974
- Specific gravity by ASTM D-854
- Bulk density by ASTM D-2937

Data from the chemical analyses of these soil samples is presented in **Table 5**, the physical data from these boring is presented in **Table 6**, and the associated laboratory reports are presented as **Appendix B**.

5.5 Monitoring Well Installation

Six of the exploratory soil borings were completed as monitoring wells (MW-12 through MW-17) by the installation of a 2-inch diameter, schedule 40 PVC casing with 0.010-inch factory slotted screen. Ten to fifteen feet (depending on total depth and depth to groundwater) of well screen

was placed at the bottom of each boring in the saturated zone and extend to at least five feet above the static groundwater elevation at the time of installation. The annular space across the entire screened interval and extending approximately two feet above the screened interval was filled with a graded 2x12 silica sand. The remaining annular space was then sealed with hydrated bentonite chips to approximately three-feet bg. Two-feet of concrete was then poured into the remaining annular space to provide a surface-seal at the well-head and the remaining blank well casing was cut at approximately 6 inches bg and a locking well plug installed. A traffic rated waterproof monitoring well monument set in concrete was installed at each well location flush with the surrounding surface. Well completion details are provided as part of each boring log presented in **Appendix C**. Data regarding well elevations, screened intervals and total depths are contained in **Table 7**.

5.6 Monitoring Well Survey

On September 27, 2002, the TOC elevation of each new monitoring well was surveyed to the nearest 0.01-foot using a tripod mounted survey scope and stadia rod. The TOC elevation of each new monitoring well was established with respect to two or more existing monitoring wells which had been resurveyed by Farralon Consultants in 2000. A survey reference mark was scribed on the lip of the new well casings for future groundwater elevation measurements. The survey field data sheet is presented in **Appendix C**. TOC elevations are also contained in **Table 7**. The location of each monitoring well installed was determined with respect to existing buildings and site features. Well locations were measured to the nearest 0.1-foot using a rolling-wheel measuring device. Well and soil boring locations are presented in **Figure 5**.

5.7 Monitoring Well Development

Each new monitoring well (MW-12 through MW-16) was developed by Cascade on September 27, 2002, by over pumping with an electric down-well pump (Wahl Pump). The development procedure consisted of lowering the Wahl pump into the well until it struck the surface of the water, and continuing to lower the pump to the bottom of the well. The pump was then raised and lowered repeatedly to surge the groundwater within the well. Pumping was continued until approximately 10 casing volumes of water had been removed.

5.8 Soil Vapor Sampling

On October 3, 2002 between 1220 and 1255 hours PST, Delta measured differential pressure at, and collected soil vapor samples from both of the soil vapor sampling probes installed at the Monterey Apartments. Prior to soil vapor sample collection, a barb fitting was connected to each vapor probe and a short length of tubing was slid onto the barb fitting. The differential pressure/vacuum between the soil surface beneath the basement floor and the interior building pressure was measured by connecting one side of a magnahelic gauge calibrated in inches of water column pressure/vacuum to the sampling port and leaving the other side of the gauge open to the atmosphere inside the apartment building. The differential pressure gauge remained connected to each vapor probe for a minimum of 15 minutes to allow equilibration at which time the differential pressure was recorded and the gauge and tubing removed.

Once differential pressure measurements had been collected at each vapor probe, soil vapor samples were collected from each sampling port using a lab supplied pre-evacuated 1-liter summa canister fitted with a fixed orifice sample nozzle. The orifice size of the sampling nozzle had been pre-set by the laboratory to collect the full volume of the summa canister over a 15-minute sampling period. The vapor sample collection process involved connecting a short length of small diameter Tygon ® tubing to each vapor probe and then purging each probe of stagnant soil vapor using a hand actuated vacuum pump. Immediately following purging, the tubing was disconnected from the vacuum pump and connected to a barb fitting mounted on the summa canister. The sample valve on the canister was opened and the starting time recorded. Following a 15-minute (± 10 seconds) sample collection period, the canister valve was closed, the canister and tubing removed and the vapor probe capped. Soil vapor samples were collected at a time when stable barometric pressure immediately following falling pressure had been reported (based on data from the University of Washington Atmospheric Sciences Department and collected from the roof of the Atmospheric Science building located on the University Campus). A graphic representation of barometric pressure prior to and following the date and time of sample collection is provided in **Appendix D.** Following sample collection, each canister was shipped under chain of custody control to Lancaster Laboratories (Lancaster) in Lancaster, PA for methane (C1), gasoline range hydrocarbons (C4 – C10) and VOCs analysis by EPA Test Method TO-14. Results for these analyses are presented in **Table 8.** The laboratory report and associated chain of custody are included as **Appendix E.**

5.9 Monitoring Well Purging and Sampling

Groundwater samples from two of the six new monitoring wells (MW-12 and MW-13), along with samples from 12 existing wells were collected between October 17 and 18, 2002 by a representative from GRI. Groundwater samples could not be obtained from wells MW-14 through MW-17 on these dates due to vehicles being parked on top of the wells along 1st Avenue West. Delta arranged for parking control along both sides on 1st Avenue West, and a representative from GRI returned to the site on November 14, 2002 and collected groundwater samples from monitoring wells MW-14 through MW-17.

Each monitoring well was purged using a disposable polyethylene bailer until a minimum of three bore volumes of groundwater had been removed from each well. After purging was completed, groundwater samples were collected by bailer for hydrocarbon and metals analysis. Groundwater samples collected for laboratory analysis will be collected in laboratory supplied sample containers and immediately placed in a pre-cooled ice chest for storage prior to transport to the analytical laboratory under standard chain of custody procedures. Groundwater samples collected for metals and tetraethyl lead analyses were collected in un-preserved poly-bottles and filtered by NCA using a disposable 0.45-micron groundwater filter capsule and transferred to bottles containing a nitric acid preservative.

Groundwater samples were analyzed for BTEX compounds, TPH-G and TPH-D ext. A groundwater sample from each well sampled was also analyzed for dissolved lead using EPA 6000/7000 series methods.

In addition to the analyses listed above, selected groundwater samples were also collected for the following analysis-

- Groundwater samples from wells MW-12 and MW-13 were submitted for VOC analysis.
- Groundwater samples from wells MW-12 through MW-15 were submitted for SVOC and cPAH analyses.
- Groundwater samples collected from wells MW-13 through MW-15 were submitted for RCRA metals analysis.

Data from these analyses is presented in **Table 1**, a discussion of the results of this sampling is presented in section 9 of this report and the field sheets, laboratory reports and a copy of the GRI '*Groundwater Monitoring and Sampling Report*' is included with this report as **Appendix A**.

6.0 DATA QUALITY ASSURANCE

The data quality assurance and control procedures utilized during this investigation were previously described in the RI Workplan. The following sections detail any discrepancies and/or departures from the QA/QC procedures proposed in the Workplan.

6.1 Monitoring Equipment Calibration

The portable PID used for screening soil vapor head-space was calibrated at the beginning of each day according to the manufactures recommended procedure using a laboratory certified isobutylene gas standard. No discrepancies or deviations from the prescribed calibration procedures were noted.

6.2 Decontamination Procedures

The split-spoon sampler and hand-auger were cleaned between each drilling and soil sampling location and interval by rinsing with clean tap water, scrubbing with phosphate-free detergent (alconox) and water and rinsed again with clean tap water followed by a final rinse with distilled water. All drilling equipment was steam-cleaned between boring locations. No deviations or discrepancies in the decontamination procedures specified in the Workplan were observed.

Disposable nitrile gloves, bailers, sampling pump tubing, peristaltic pump tubing and any other form of disposable sampling equipment was discarded after use at each sampling location and/or interval.

6.3 Sample Storage, Packing, and Shipment

All soil and groundwater samples were stored in an ice chest while at the site and during transportation to the laboratory. Samples were sub-packed by sample location in new zip-lock plastic bags and stored in the dark at 4° C. All soil and groundwater samples collected during this investigation arrived at NCA in good condition. No deviations or discrepancies in the sample storage, packing or shipping procedures specified in the Workplan were observed.

Soil vapor samples were collected in stainless steel summa canisters and stored in a sample cooler for protection while at the site. The canisters were wrapped in packing foam and placed in a re-enforced shipping container supplied by the laboratory for return transportation to the laboratory. Each Summa canister collected during this investigation arrived at Lancaster in good condition. No deviations or discrepancies in the sample storage, packing or shipping procedures specified in the Workplan were observed.

6.4 Chain of Custody Procedures

Chain of custody procedures were specified in the RI Workplan. Each sample cooler containing laboratory samples contained a fully completed chain of custody form. The field personnel retained a copy of the COC and the original accompanied the samples to the laboratory. No deviations or discrepancies to the chain of custody procedures were noted.

6.5 Sample Quality Assurance/ Quality Control Procedures

Quality assurance/quality control ("QA/QC") samples were collected as specified in the RI Workplan and included field blanks, trip blanks, source blanks, rinsate and duplicate soil and groundwater samples. Blanks, rinsate and duplicate samples were labeled with unique sample numbers. The laboratory had no indication that a sample was duplicate or blank. A field blank and duplicate sample were collected for each 10 soil and groundwater samples, and a trip blank accompanied each sample cooler containing soil or groundwater samples.

The quality assurance objective for this project was to ensure that chemical and physical data of known and acceptable quality was produced. To achieve this objective, all samples were analyzed in accordance with EPA or equivalent protocols. An analytical laboratory certified and approved by the state of Washington performed all analyses. No significant deviations or discrepancies regarding laboratory QA/QC procedures were noted.

7.0 STORAGE AND DISPOSAL OF RESIDUALS

Residual soil from this investigation was placed in 55-gallon DOT approved salvage drums and temporarily stored in the equipment compound on the Arnold property while awaiting analytical

results. Clearcreek Contractors later transported all drummed soil generated during this RI to Rinker Materials in Everett, Washington for treatment and disposal.

Development water and decontamination water produced during well development was contained in 55-gallon DOT approved salvage drums and temporarily stored in the equipment compound while awaiting analytical results. Clearcreek Contractors later transported the development water to Emerald Services for treatment by granular activated carbon filtration prior to disposal.

All purged groundwater produced during monitoring well sampling was treated on-site by activated carbon filtration and discharged to the storm-drain system

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8.0 RESULTS

8.1 Subsurface Conditions

Soils encountered during this investigation consisted of medium dense to very dense sand and silty sand from ground surface to between approximately 17.5 and 31 feet below grade (bg). A stiff to very hard, low to moderate plasticity clay was encountered beneath the sand in the borings. A moderate-plasticity clay was observed in boring DB-11 from the surface to approximately 7 feet bg. Boring DB-11 was located on 1st Avenue West at the southwest side of the area of investigation. The clay was underlain by a very dense clayey sand at a maximum depth of 10 feet bg, and refusal was encountered at approximately 12 feet bg. Clay was not encountered in boring DB-1 to the total depth of 17 feet bg, or in the bottom of boring DB-10 at the total depth of 34 feet bg, although a thin lens of clay was observed in DB-10 at 33 feet bg.

Two cross sections were prepared for this report. Cross section A-A' (**Figure 7**) extends from boring DB-8 in the southwest portion of the area investigated (in front of the Alvena Apartments) to boring DB-2 at the northeast area of investigation on the Arnold's property (**Figure 6** depicts the locations of both cross-sections). Cross section B-B' (**Figure 8**) extends east-west across the Arnold's property from boring DB-3 in the west to boring DB-2 in the east. As shown on the cross-sections, the area of investigation consists mostly of sand and silty-sand predominantly underlain by clay. The clay layer was not verified under the western parking area between the

Monterey and Alvena Vista Apartments, or beneath well MW-12 located on Queen Anne Avenue North. Data from this investigation indicates that the clay layer slopes to the west or southwest, as it was encountered at deeper intervals as the investigation continued in this direction. It is unclear if the clay encountered in boring DB-11 is a continuation of the same clay layer, or an isolated lens of soil. Additional investigation in this area with continuous sampling may better define the relationship of the clay layers.

Borings DB-1, DB-2, DB-6, DB-8, DB-9 and DB-10 were completed as groundwater monitoring wells during this project. At the time of well installation, groundwater was encountered between 14 and 15 feet below TOC.

8.2 Soil Analytical Results

The following sections discuss soil analytical results from the three phases of soil sampling 1) Vapor Probe Installation, 2) Geoprobe Borings on the Arnold Property, and 3) Soil Borings and Monitoring Well Installation, performed during this investigation.

VAPOR PROBE INSTALLATION SOIL SAMPLE RESULTS

Two soil samples were collected from Delta Vapor Probe #1 (DVP-1), and two more from DVP-2. Soil samples were collected at one-foot and six-feet below the floor surface (bfs) from both probe locations.

TPH-G and BTEX compounds were detected in three of the four soil samples (and a duplicate sample from DVP-2 and six-feet bfs). The soil sample from DVP-2 collected from one-foot bfs did not contain TPH-G or any of the BTEX compounds at or above the laboratory reporting limits. TPH-D and TPH-O were also present in the same three samples as TPH-G and BTEX and absent from the sample collected from DVP-2 at one-foot bfs. Three of the four soil samples were submitted for both volatile and extractable petroleum hydrocarbon analysis using the VPH and EPH procedures specified by Ecology. Both volatile and extractable petroleum hydrocarbons were present in two of the three samples collected. Soil from DVP-2 at one-foot bfs did not contain volatile or extractable petroleum hydrocarbons at or above the method detection limits.

Soil samples from DVP-1 at one and six-feet bfs and from DVP-2 at six-feet bfs were analyzed for the RCRA metals. Concentrations of arsenic, barium, chromium and lead above the method detection limits were present in each of these three samples.

Soil samples from DVP-1 and DVP-2 both from one-foot bfs were analyzed for VOCs. Ten of the VOCs detected by the analytical method utilized were present in the sample from DVP-1, but only toluene was present in the sample from DVP-2.

Two soil samples (DVP-1 and DVP-2) both collected at one-foot bfs were submitted for SVOCs analysis. Only two compounds (2-methylnaphthalene and naphthalene) were present at or above the method detection limits in the sample from DVP-1, and no SVOCs were present in the sample from DVP-2.

Soil samples from DVP-1 and DVP-2 both from one-foot bfs were also analyzed for cPAHs. Three compounds (1-methylnaphthalene, 2-methylnaphthalene and naphthalene) were present at or above the method detection limits in soil from DVP-1. None of the ten cPAHs detected by the method utilized were present in the sample from DVP-2.

Soil sample analytical results from both of the vapor probe locations are presented in **Table 2**. Analytical reports, and chain-of-custody documentation are contained in **Appendix B**.

GEOPROBE SOIL SAMPLE RESULTS

Eight soil samples were collected at various depths from seven separate (Delta Probe [DP]) locations on the Arnolds property using a Geoprobe soil sampling system. Two samples were collected from DP-2 and one each from the remaining six probe locations. Soil samples were collected at depths representing the sampled interval producing the highest headspace vapor concentrations and/or hydrocarbon sheen-test result as described in section 5.3.

TPH-G and TPH-D were detected in five of the seven soil samples collected for these analyses (an eighth sample [DP-2-20] was only analyzed for VPH and EPH. The samples from DP-1 and DP-2 collected from 16 and 14-feet below grade (bg) respectively did not contain TPH-G or TPH-D at or above the laboratory reporting limit. TPH-O was not present in any of the seven soil samples collected for this analysis at concentration at or above the laboratory reporting limit.

One or more of the BTEX compounds was present in each of the seven samples collected for this analysis. All eight soil samples collected were submitted for both VPH and EPH. VPHs ranging in concentration from 60.6 to 3,440 mg/kg were present in samples from DP-3 at 12-feet bg, DP-4 at 20-feet bg, DP-5 at 14-feet bg, DP-6 at 22-feet bg and DP- 7 at 20-feet bg. EPHs ranging in concentration from 8.64 to 1,890 mg/kg were present in samples from DP-1 at 16-feet bg, DP-3 at 12-feet bg, DP-5 at 14-feet bg, DP-6 at 22-feet bg and DP- 7 at 20-feet bg.

Soil samples from six of the seven sampled locations (DP-1 through DP-4, DP-6 and DP-7) on the Arnold property were analyzed for the RCRA metals. Concentrations of arsenic, barium, chromium and lead above the method detection limits were present in each of these six samples. Detectable concentrations of cadmium were also present in samples from DP-3 and DP-6. In addition to the RCRA metals analyses, a soil sample from the capillary fringe soil at each probing location was also analyzed for total lead using EPA 6000/7000 series methods. Total lead was detected in each of these seven samples at concentrations ranging from 1.78 to 9.48 mg/kg.

Soil samples from DP-1 through DP-7 were analyzed for VOCs. Twelve of the VOCs quantified by this analytical method were present in one or more of the seven samples analyzed at concentrations at or above the laboratory reporting limits.

Soil samples from DP-1 through DP-7 were analyzed for SVOCs. Eight of the SVOCs quantified by this analytical method were present in one or more of the seven samples analyzed at concentrations at or above the laboratory reporting limits.

Soil samples from DP-1 through DP-7 were also analyzed for PAHs. Three compounds (1-methylnaphthalene, 2-methylnaphthalene and naphthalene) were present at or above the method detection limits in samples collected from DP-3 through DP-7. None of the ten compounds detected by this analytical method were present in the soil collected from DP-1 or DP-2.

Soil sample analytical results from each of the probe locations are presented in **Table 4.** Analytical reports, and chain-of-custody documentation are contained in **Appendix B.**

SOIL BORING SAMPLE RESULTS

Seventeen soil samples were collected at various depths from eleven separate (Delta Boring [DB]) locations as depicted in **Figure 5** using a hollow-stem auger drill equipped with either a Dames and Moore or a modified California type split-spoon soil sampler. Soil samples were collected at depths representing the sampled interval producing the highest headspace vapor concentrations and/or the most positive hydrocarbon sheen-test result as described in section 5.4.

TPH-G was present in five of the seventeen soil samples collected at concentrations ranging from 5.74 to 10,200 mg/kg. The highest concentration of TPH-G (10,200 mg/kg) was detected in soil from boring DB-5 at 13 feet bg. Soil samples from DB-1, DB-2 and DB-6 through DB-11 did not contain TPH-G at or above the 5.00 mg/kg laboratory reporting limit.

TPH-D was present in six of the seventeen soil samples collected at concentrations ranging from 10.5 to 3,060 mg/kg. The greatest concentration of TPH-D (3,060 mg/kg) was detected in soil from boring DB-5 at 13 feet bg. Soil samples from DB-1, DB-2 and DB-6 through DB-10 did not contain TPH-D at or above the 10.0 mg/kg laboratory reporting limit.

TPH-O was present in only one of the seventeen soil samples collected. Soil from boring DB-11 at 10.5 feet bg contained 41.4 mg/kg of TPH-O. None of the other soil samples collected contained TPH-O at or above the 25.0 mg/kg laboratory reporting limit.

Eight of the seventeen samples collected contained one or more of the BTEX compounds. Benzene (when present) ranged in concentration from 0.0544 to 23.0 mg/kg. The greatest concentration of Benzene (23.0 mg/kg) was detected in soil from boring DB-5 at 13 feet bg.

Three soil samples (DB-2 at 14 feet bg, DB-7 at 11.5 feet bg and DB-8 at 16.5 feet bg were analyzed for both VPH and EPH. None of these three samples contained concentrations of VPH or EPH at or above the laboratory reporting limits.

Soil samples from DB-2 through DB-8 were analyzed for the RCRA listed metals. Due to refusal at 17 feet bg in boring DB-1, insufficient soil was available to submit a sample for RCRA

metal analysis. Concentrations of arsenic, barium, chromium and lead above the method detection limits were present in each of these seven samples. One sample from boring DB-2 at 14feet bg also contained a detectable concentration of selenium (0.935 mg/kg). In addition to the RCRA metals analyses, a soil sample from the capillary fringe soils at each of these seven boring location and from borings DB-9 at 16 feet bg and boring DB-10 at 11 feet bg were also analyzed for total lead using EPA 6000/7000 series methods. Total lead was detected in each of these nine samples at concentrations ranging from 1.29 to 10.5 mg/kg.

Soil samples from DB-2 through DB-8 were analyzed for VOCs. Thirteen different VOCs were present in five of the seven samples analyzed at concentrations at or above the laboratory reporting limits. Due to refusal at 17 feet bg in boring DB-1, insufficient soil was available to submit a sample for VOC analysis.

Soil samples from DB-2 through DB-8 were analyzed for SVOCs. Three compounds (Benzyl Alcohol, 2-methylnaphthalene and naphthalene) were present at or above the method detection limits in soil from DB-5 at 13 feet bg. Benzyl Alcohol was also detected in soil samples from borings DB-2 at 14 feet bg, DB-3 at 11 feet bg and DB-7 at 11.5 feet bg. None of the compounds detected by this analytical method were present in the samples from DB-4, DB-6 and DB-8 at concentrations at or above the laboratory reporting limits. Due to refusal at 17 feet bg in boring DB-1, insufficient soil was available to submit a sample for SVOC analysis.

Soil samples from DB-2 through DB-8 were also analyzed for cPAHs. Three compounds (1-methylnaphthalene, 2-methylnaphthalene and naphthalene) were preset at or above the method detection limits in samples collected from DB-4 at 9 feet bg and DB-5 at 13 feet bg. 1-methynaphthalene was also present in soil from boring DB-3 at 11 feet bg at a concentration of 0.0206 mg/kg. Naphthalene was also present in soil from boring DB-2 at 14 feet bg at a concentration of 0.0106 mg/kg. 2-methylnaphthalene and naphthalene were also present in soil from boring DB-6 at 16.5 feet bg at concentrations of 0.0106 and 0.0179 mg/kg respectively. None of the ten compounds detected by this analytical method were present in soil collected from borings DB-7 or DB-8. Soil sample analytical results from each of the boring locations are presented in **Table 5**. Analytical reports, and chain-of-custody documentation are contained in **Appendix B**.

In addition to the chemical analyses listed above, vadose and saturated zone soil samples were collected from borings DB-3, DB-4, DB-5 and DB-7 and submitted to Rosa Environmental and Geotechnical (REG) laboratories in Seattle, Washington for select physical analyses.

Soil samples were submitted to REG for the following physical analyses-

Vadose Zone Samples and Analyses

- Fraction Organic Carbon (FOC) by ASTM D-2974
- Dry Soil Bulk density by ASTM D-2937
- Specific gravity by ASTM D-854
- Moisture content by ASTM D-2216
- Air permeability by SSSA 48 / ASTM D-4525
- Total porosity

Saturated Zone Samples and Analyses

- Total and effective porosity according to the method described in Freeze and Cherry, 1979 (Groundwater)
- Saturated hydraulic conductivity by one of the following methods – ASTM D-2434 or ASTM D-5084 (lab will determine which method used based on sample properties)
- Fraction Organic Carbon (FOC) by ASTM D-2974
- Specific gravity by ASTM D-854
- Bulk density by ASTM D-2937

Analytical results for soil samples submitted to REG for physical analyses are presented in **Table 6**. Analytical reports, and chain-of-custody documentation are contained in **Appendix B**.

8.2 Groundwater Analytical Results

The following sections discuss groundwater analytical results from the three phases of groundwater sampling 1) Third Quarter Groundwater Sampling, 2) Vapor Probe Installation, and 3) Fourth Quarter Groundwater Sampling, performed during this investigation.

THIRD QUARTER GROUNDWATER MONITORING AND SAMPLING RESULTS

Groundwater Monitoring Results

On July 24, 2002, monitoring wells VP-1, VP-3 [MW-2], VP-4, VP-6, VP-7 [MW-3], VP-8 [MW-7], MW-4, MW-6, MW-9, MW-10, MW-11 and RW-4 were gauged for depth to water and separate phase hydrocarbon thickness by GRI's field technician. These wells are located on the Arnold and Monterey Apartments properties (**Figure 5**). The field technician was unable to locate wells VP-2 and RW-5, and was unable to access wells VP-5, VP-9 and MW-9; furthermore, well VP-3 [MW-2] was dry at the time of sampling. Groundwater elevations based on this data are contained in the GRI '*Groundwater Monitoring and Sampling Report*' which is included with this report as **Appendix A**.

When measured on July 24, 2002, groundwater was encountered between 9.74 feet below TOC at VP-7 [MW-3] and 19.76 feet below TOC at MW-6. Based on DTW and TOC elevations, groundwater surface elevations at each monitoring well were calculated, and ranged between 90.66 feet at VP-7 [MW-3] and 102.14 feet at MW-10, resulting in a westerly groundwater flow at a gradient of between 0.05 and 0.1 feet/foot.

Groundwater Sampling Results

Following measurement of depth to groundwater/product, groundwater samples were collected from nine monitoring wells (VP-1, VP-4, VP-7 [MW-3], VP-8 [MW-7], MW-4, MW-6, MW-10, MW-11 and RW-4). SPH (1.58 feet) was observed in well VP-6 at the time of sampling, therefore no groundwater sample was collected from this well. Groundwater analytical results from the third quarter 2002 sampling are provided in **Table 1**. Laboratory Analytical reports, including chain-of-custody documents and QA/QC results, are contained in **Appendix F.** Results from the July 24, 2002 groundwater sampling event are summarized below:

TPH-G was present in eight of the nine wells sampled at concentrations ranging from 240 to 89,000 ug/l. The highest concentration of TPH-G (89,000 ug/l) was detected in groundwater from well VP-4 on the Monterey Apartments property. A groundwater sample from well MW-11 did not contain TPH-G at or above the 50.0 ug/l laboratory reporting limit.

TPH-D was present in eight of the nine wells sampled at concentrations ranging from 320 to 78,000 ug/l. The highest concentration of TPH-D (78,000 ug/l) was detected in groundwater from well VP-4 on the Monterey Apartments property. A groundwater sample from well MW-11 did not contain TPH-D at or above the 250.0 ug/l laboratory reporting limit.

TPH-O was present in eight of the nine wells sampled at concentrations ranging from 420 to <10,000 ug/l. The highest concentration of TPH-O (10,000 ug/l) was detected in groundwater from well MW-6 on the Manhattan Express property. A groundwater sample from well MW-11 did not contain TPH-O at or above the 250.0 ug/l laboratory reporting limit.

Eight of the nine groundwater samples collected contained one or more of the BTEX compounds. Benzene (when present) ranged in concentration from 2.5 to 11,000 ug/l. The greatest concentration of Benzene (11,000 ug/l) was detected in groundwater from well MW-4 on the Monterey Apartments property.

Groundwater samples from five wells (VP-7 [MW-3], VP-8 [MW-7], MW-4, MW-10, and RW-4) were analyzed for dissolved (RCRA listed) metals. Concentrations of arsenic, barium, cadmium, chromium and lead above the method detection limits were present in each of these five samples. One sample from well VP-7/MW-3 also contained a detectable concentration of silver (0.068 ug/l). In addition to the wells sampled for RCRA metals analyses, groundwater samples from wells VP-1, VP-4, MW-6 and MW-11 were collected and analyzed for dissolved lead. Dissolved lead was detected in eight of the nine wells sampled at concentrations ranging from 1.3 to 28.0 ug/l.

Groundwater samples from wells MW-4, MW-10, MW-11 and RW-4 were analyzed for VOCs. MW-4 contained each of the BTEX compounds, isopropyl and n-propylbenzenes, 1,3,5 and 1,2,4-trimethylbenzenes, n-butylbenzene, naphthalene, MTBE and TBA at concentration at or above the laboratory reporting limits. MW-10 contained benzene and cis-1,2-dichloroethene at concentrations at or above the laboratory reporting limits. MW-11 did not contain any of the compounds detected by EPA Method 8260b at concentrations at or above the laboratory reporting limits. RW-4 contained each of the BTEX compounds, n-propylbenzene, 1,2,4-

trimethylbenzene, p-isopropyltoluene, n-butylbenzene and naphthalene at concentrations at or above the laboratory reporting limits.

Groundwater samples from seven wells (VP-1, VP-7 [MW-3], VP-8 [MW-7], MW-4, MW-10, MW-11 and RW-4) were analyzed for SVOCs and cPAHs. One or more of the following six compounds (2-methylnaphthalene and naphthalene, 2,4-dimethylphenol, 2- and 4-methylphenol and bis (2-ethylhexyl) phthalate) were present at or above the method detection limits in groundwater from wells VP-1, VP-7 [MW-3], MW-4 and MW-10. None of the compounds detected by these analytical methods were present in the samples from wells VP-8 [MW-7], MW-11 or RW-4 at concentrations at or above the laboratory reporting limits.

SOIL VAPOR PROBE INSTALLATION GROUNDWATER SAMPLING RESULTS

Following collection of soil samples from the two vapor probe hand borings performed on October 17-18, 2002, in the basement of the Monterey Apartments, groundwater samples were collected from temporary monitoring wells installed within each hand boring. Groundwater analytical results from the samples collected from DVP-1 and DVP-2 provided in **Table 3** (Note: Sample DVP-4 is a duplicate groundwater sample collected from sampling location DVP-2). Laboratory Analytical reports, including chain-of-custody documents and QA/QC results, are contained in **Appendix F.** Results from this groundwater sampling are summarized below:

TPH-G was present in groundwater samples collected from both temporary wells sampled at concentrations between 98,100 to 107,000 ug/l. The highest concentration of TPH-G (107,000 ug/l) was detected in groundwater from well DVP-2 beneath the central portion of the basement of the Monterey Apartments building.

Samples collected for both TPH-D and TPH-O were improperly processed by NCA. According to NCA Laboratories project manager, an aliquot of spike solution rather than the surrogate solution required by the analytical method was added to these samples prior to extraction. The addition of spike solution instead of surrogate prior to extraction meant that the full volume of each sample was irreversibly compromised and that no representative analytical result for TPH-D or TPH-O could then be generated. The presence of these two compounds at each of these sampled locations can only be inferred based on the soil analytical results.

Each of the groundwater samples collected contained from DVP-1 and DVP-2 contained all four of the BTEX compounds at concentrations exceeding the laboratory detection limits. Benzene was present in sample DVP-1 at 7,640 ug/l and in sample DVP-2/4 at 13,500 and 12,300 ug/l respectively. Each of the TEX compound were also present at equally elevated concentrations.

FOURTH QUARTER GROUNDWATER SAMPLING RESULTS

Groundwater Monitoring Results

Between October 17 and 18, 2002, monitoring wells VP-1, VP-2, VP-3 [MW-2], VP-4, VP-5 [MW-5], VP-6, VP-7 [MW-3], VP-8 [MW-7], VP-9, MW-4, MW-6, MW-9, MW-10, MW-11, MW-12, MW-13, RW-2, RW-4 and RW-5 were gauged for depth to water and separate phase hydrocarbon thickness by GRI's field technician. The field technician was unable to gauge the four newly installed wells on 1st Avenue W. due to vehicles being parked over these wells, was unable to locate well RW-3, and was unable to access well MP-1; furthermore, wells VP-3 [MW-2] and MW-13 were dry at the time of sampling. SPH was present in wells VP-4 (0.03 feet), VP-6 (0.65 feet) and in MW-6 (0.05 feet). Groundwater elevations based on this data are contained in the GRI '*Groundwater Monitoring and Sampling Report*' which is included with this report as **Appendix A.**

When measured on October 17-18, 2002, groundwater was encountered between 10.57 feet below TOC at VP-7 [MW-3] and 20.88 feet below TOC at MW-9. Based on DTW and TOC elevations, groundwater surface elevations at each monitoring well were calculated, and ranged between 89.38 feet at VP-7 [MW-3] and 101.69 feet at MW-10, resulting in a westerly groundwater flow at a gradient of between 0.05 and 0.09 feet/foot.

On November 14, 2002 GRI's field technician returned to the site following placement of no parking signs along 1st Avenue W. and measured DTW in wells MW-14 through MW-17. DTW from that event was not available in time to include in this report, however the next GRI Groundwater Monitoring and Sampling Report will contain this data.

Groundwater Sampling Results

Following measurement of depth to groundwater/product on October 17-18, 2002, groundwater samples were collected from thirteen monitoring wells (VP-1, VP-5 [MW-5], VP-7 [MW-3], VP-8 [MW-7], VP-9, MW-4, MW-9, MW-10, MW-11, MW-12, RW-2, RW-4 and RW-5). SPH was

present in wells VP-4, VP-6 and MW-6 at the time of sampling; therefore no groundwater samples were collected from these wells. On November 14, 2002 GRI's field technician returned to the site and collected groundwater samples from wells MW-14 through MW-17. Groundwater analytical results from the Fourth quarter 2002 samplings are provided in **Table 1**. Laboratory Analytical reports, including chain-of-custody documents and QA/QC results, are contained in **Appendix F.** Results from the October 17-18 and November 14, 2002 groundwater sampling events are summarized below:

TPH-G was present in fourteen of the seventeen wells sampled at concentrations ranging from 490 to 110,000 ug/l. The highest concentration of TPH-G (110,000 ug/l) was detected in groundwater from well MW-4 on the Monterey Apartments property. Groundwater samples from wells MW-11, MW-12 and MW-16 did not contain TPH-G at or above the 50.0 ug/l laboratory reporting limit.

TPH-D was present in thirteen of the seventeen wells sampled at concentrations ranging from 667 to 84,900 ug/l. The highest concentration of TPH-D (84,900 ug/l) was detected in groundwater from well RW-5 on the northeast corner of the Monterey Apartments property. Groundwater samples from wells MW-11, MW-12, MW-16 and MW-17 did not contain TPH-D at or above the 250.0 ug/l laboratory reporting limit.

TPH-O was present in five of the seventeen wells sampled at concentrations ranging from 510 to 3,650 ug/l. The highest concentration of TPH-O (3,650 ug/l) was detected in groundwater from well RW-5 on the northeast corner of the Monterey Apartments property. Groundwater samples from wells VP-5 [MW-5], VP-8 [MW-7], VP-9, MW-4, MW-10, MW-11, MW-12, MW-14 through MW-17 and RW-2 did not contain TPH-O at or above the 250.0 ug/l laboratory reporting limit.

Fifteen of the seventeen groundwater samples collected contained one or more of the BTEX compounds. Benzene (when present) ranged in concentration from 0.516 to 14,500 ug/l. The greatest concentration of Benzene (14,500 ug/l) was detected in groundwater from well MW-4 on the Monterey Apartments property.

Groundwater samples from two wells (MW-14 and MW-15) were analyzed for dissolved (RCRA listed) metals. Concentrations of arsenic, barium, lead and selenium above the method detection limits were present in groundwater from MW-14. Concentrations of arsenic and lead above the method detection limits were present in groundwater from MW-15. In addition to the wells sampled for RCRA metals analyses, groundwater samples from fourteen wells (VP-1, VP-5 [MW-5], VP-7 [MW-3], VP-8 [MW-7], VP-9, MW-4, MW-9, MW-10, MW-11, MW-16, MW-17, RW-2, RW-4 and RW-5) were collected and analyzed for dissolved lead. Dissolved lead was detected in nine of these fourteen wells sampled at concentrations ranging from 1.23 to 10.7 ug/l.

A groundwater sample from well MW-12 was collected and analyzed for VOCs. Groundwater from this well contained benzene, toluene, tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, chloroform and 1,2-dichloroethene at concentrations at or above the laboratory reporting limits.

Groundwater samples from three wells (MW-12, MW-14 and MW-15) were analyzed for SVOCs. Six SVOCs (2-methylnaphthalene and naphthalene, 2,4-dimethylphenol, 2- and 4-methylphenol and phenol) were present at or above the method detection limits in groundwater from well MW-12. One SVOC (phenol) was present in groundwater from well MW-15, and none of the compounds detected by this analytical method were present at or above the laboratory reporting limits in the sample from MW-12.

8.3 Soil Vapor Analytical Results

Two soil vapor samples from beneath the basement of the Monterey Apartments were collected into summa canisters on October 3, 2002 and shipped under chain of custody control to Lancaster Laboratories (Lancaster) in Lancaster, PA for analysis. Summa canister 0101 was filled with soil gas from vapor probe DVP-1 located at the east end of the basement level of the apartment building, while summa canister 0132 was filled with soil gas from vapor probe DVP-2 located at the west end of the apartment building. Each canister was analyzed for methane (C1) and hydrocarbons (C4 – C10) using EPA Test Methods 18 and 25 (modified), and for VOCs by EPA Test Method TO-14. Results for these analyses are presented in **Table 8**. The laboratory report and associated chain of custody are included as **Appendix E**. Results from these analyses are summarized below:

Methane was present in both of the samples collected. Methane was present from the sample collected from DVP-1 at 350 parts per million by volume (ppmv) and at 25,000 ppmv from the sample collected at DVP-2. Hydrocarbons (C4-C10) were present in the sample collected from DVP-1 at 3,800 ppmv and at 8,600 ppmv from the sample collected at DVP-2. Each of the BTEX compounds in addition to tetrachloroethene, 4-ethyltoluene, and both 1,3,5- and 1,2,4-trimethylbenzene were detected in each of these samples. Benzene was present in the sample from DVP-1 at 6 ppmv and at 13,000 ppmv from the sample collected from DVP-2.

Prior to collecting soil vapor samples at DVP-1 and DVP-2, an magnahelic gauge calibrated in inches of water and with a range of 0.0 to 1.00-inches water column was connected to each vapor probe and allowed to equilibrate for 10-15-minutes. Following equilibration the resulting pressure differential was recorded. No differential pressure (as indicated by the gauge) was present at either probe location.

9.0 DISCUSSION

9.1 Subsurface Soils

TPH-G and BTEX impacts in soil appear to be most extensive in the south central and southwest portions of the Manhattan Express property and extend southwesterly on to the Monterey Apartments property. TPH-G and BTEX impacts on the Monterey Apartments property appear to be generally located beneath the footprint of the apartment building and adjacent to the eastern and south central areas of the building. Soil samples collected by geoprobe, hollow-stem auger and by hand auger for TPH-G analysis ranged in concentration between non-detectable (less than 5.00 mg/kg) to 10,200 mg/kg in a sample collected from DB-5 (adjacent to and south of the Monterey Apartments building) at 13.0 feet bg or approximately 7-8 feet below the basement floor of the apartment building. Soil samples collected for benzene analysis ranged in concentration from non-detectable (less than 0.03 mg/kg) to 33.0 mg/kg in a sample collected from DP-6 (on the southwest corner of the Manhattan Express property) at 22.0 feet bg.

TPH-D impacts in soil appear to be most extensive in the south central and southwest portions of the Manhattan Express property and extend southwesterly on to the Monterey Apartments property. TPH-D impacts on the Monterey Apartments property appear to be generally located beneath the apartment building and adjacent to the eastern and south central areas of the building. TPH-D in soil ranged in concentration between non-detectable (less than 10.00 mg/kg) to 3,060 mg/kg in a sample collected from DB-5 (adjacent to and south of the Monterey Apartments building) at 13.0 feet bg. Two soil samples; one from boring DB-5 at 13 feet bg and a second from hand boring DVP-2 at 6 feet bfs contained TPH-D at concentrations exceeding MTCA Method A CULs.

Only four of the twenty-five soil samples collected for TPH-O analysis contained this constituent at concentrations at or above the laboratory reporting limits. The concentration of TPH-O in soil ranged between non-detectable (less than 25.0 mg/kg) to 89.5 mg/kg in a drummed stockpile sample collected from DB-5. The concentration TPH-O in all of these samples is well below the 2,000 mg/kg MTCA Method A CUL.

Based on the results from soil samples collected during this investigation, the lateral extent of petroleum impacts to soils appear to be bounded in the following areas-

- The east side of the former station as evidenced by soil sample results from borings DB-1 and DB-2 and from soil sample results from probe DP-1.
- West of the east side of 1st Avenue W. as evidenced by soil sample results from borings DB-8, DB-9, DB-10 and DB-11. Note: Elevated PID readings were observed from soil collected at boring DB-6. None of the soil samples collected for analysis from DB-6 contained TPH-G, D, O or BTEX at concentrations at or above the MTCA Method A CUL's.

The vertical extent of petroleum hydrocarbon impacts to soils appear to extend to the Lawton clay layer between the central portion of the former station property and extending southwest toward the corner of the former station as evidenced by the boring logs for probe locations DP-3, DP-5, DP-6 and DP-7. In each of these probes, soil from the clay layer produced both elevated PID readings and gasoline odors. With the exception of soil boring DB-6, none of the

soil borings completed west of the eastern side of 1st Avenue W. encountered samples from the Lawton clay, which contained evidence of petroleum hydrocarbon impacts.

The results from this investigation appear to close three data gaps identified in the Conceptual Site Model, these gaps are-

1) The nature and extent of both petroleum and chlorinated solvent impacts to soils east of the former station,
2) The down gradient i.e. southwesterly extent of petroleum hydrocarbon impacts to soils, and
3) Although not yet fully developed, knowledge related to the nature and extent of petroleum hydrocarbon impacts to the soils beneath the Monterey Apartments has been significantly improved.

Following completion of this investigation, no new data gaps related to petroleum hydrocarbon impacts to soil have been identified, however several data gaps continue to remain un-addressed. These data gaps include-

1) Soils quality north and south of the former station beneath West Roy Street and the Lindberg Apartments respectively.
2) Soil quality beneath the Del Roy and Alvena Vista Apartments.

9.2 Groundwater

TPH-G and BTEX impacts in groundwater appear to originate from the central portion of the Manhattan Express property and extend both westerly and southwesterly beneath the Del Roy Apartments, Monterey Apartments, Alvena Vista Apartments and the northwest corner of the Lindberg Apartments. The downgradient extent of TPH-G and BTEX impacts in groundwater west of 1st Avenue West cannot be fully evaluated based on the data collected to date, but appear to extend beneath the ACT parking lot on the northwest corner of 1st Ave. W. and a second parking lot operated by ACT parking adjacent to and south of the Northgate Apartments, the Northgate Apartments building, the northwest corner of the 18 Mercer Street building and the Bank of America parking lot and building.

The greatest concentrations of TPH-G and BTEX in groundwater were detected in samples collected from wells VP-1, VP-4, VP-7 [MW-3] and MW-4 on the Monterey Apartments property, in MW-6 on the west side of the Manhattan Express and in MW-14 on the east side of 1st Ave. W. adjacent to and west of the Del Roy Apartments. TPH-G and BTEX compounds were either not present or below MTCA Method A CULs in wells MW-12, MW-13 (on the east side of the Manhattan Express), MW-16 on the northwest corner of 1st Ave. W., and in well MW-11 at the southeast end of 1st Ave. W.

The highest concentrations of TPH-D in groundwater were detected in samples from wells VP-4, VP-9, MW-6, MW-9, and RW-5. Based on this data, TPH-D in groundwater appears to originate from the north central or northwest corner of the Manhattan Express property and extend beneath the Del Roy and Monterey Apartments in a southwest direction.

The highest concentration of TPH-D in groundwater (84,900 ug/l) was detected in samples from well RW-5 in the northeast corner of the Monterey Apartments property. Due to the loss of TPH-D and TPH-O data from the groundwater samples collected beneath the apartment building during vapor probe installation, it is not possible to say if impacts beneath the building footprint are present, however, assuming the source of diesel is the same for the TPH-G impacts detected then it is reasonable to expect that TPH-D impacts are also present beneath the apartment building footprint.

Only four of the groundwater samples collected for TPH-O analysis contained this constituent at concentrations at or above the laboratory reporting limits. The concentration of TPH-O in groundwater ranged between non-detectable (less than 25.0 mg/kg) to 3,650 ug/l in groundwater collected from well RW-5.

Based on the results from groundwater samples collected during this investigation, the lateral extent of petroleum impacts to groundwater appear to be bounded in the following areas-

- Well MW-12 on the east side of the former station contained both benzene and toluene at concentrations below the MTCA Method A CULs, no TPH as gasoline, diesel or oil was detected in this well.

- The northwest corner of 1st Avenue W. as evidenced by groundwater samples collected in well MW-16 appears to be free of petroleum hydrocarbons.
- The southeast corner of 1st Avenue W. as evidenced by groundwater samples collected from well MW-11 also appears to be free of petroleum hydrocarbons.

The vertical extent of petroleum hydrocarbon impacts to groundwater continues to represent a data gap. Although the Lawton clay layer which was encountered in most of the soil probes and borings likely acts as an aquitard to the movement of dissolved phase petroleum hydrocarbons to deeper water-bearing layers (if present), further investigation into the presence of a deeper water-bearing unit beneath this site and the quality of the water in such an aquifer remain unresolved.

The results from this investigation appear to close two data gaps identified in the Conceptual Site Model related to groundwater, these gaps include-

1) The potential contribution from up gradient properties of both petroleum and chlorinated solvent impacts to soils east of the former station,
2) The down gradient plume width appears to be bounded by wells MW-11 and MW-16.

Following completion of this investigation, two new data gaps related to groundwater impacts have been identified, and several data gaps continue to remain un-addressed. These data gaps include-

1) The downgradient extent of dissolved phase petroleum hydrocarbons in groundwater west and southwest of the Monterey apartments.
2) The lateral extent of groundwater impacts both north and south of the former station beneath West Roy Street and the Lindberg Apartments respectively.
3) The presence and magnitude of chlorinated solvents in groundwater beneath the former station and the Lindberg apartments.

9.3 Soil Vapor

Both TPH-G and BTEX were detected in the soil gas collected from beneath the basement of the Monterey Apartments. The concentrations of these compounds were significantly greater in the samples collected from DVP-1 then from DVP-2. Based on the concentrations of these same constituents in shallow soils, the increased vapor concentration present at location DVP-1 is likely a result of the proximity of the soil impacts to the vapor probe. The concentration of TPH-G and BTEX in soil gas from DVP-2 is potentially more indicative of the lower flux from deeper soil/groundwater impacts associated with the capillary fringe beneath the probe.

The results from this investigation have provided additional information with respect to the nature and extent of soil vapor and the potential impacts which soil vapor my have on the indoor air quality within the structures adjacent to the former station. Soil physical data collected during this investigation has been used to improve the accuracy of the Johnson & Ettinger indoor air intrusion model and to identify additional data gaps. These newly identified data gaps include-

1) The concentration of petroleum hydrocarbons (specifically benzene) and chlorinated solvents (specifically PCE and its daughter products) in soil vapor beneath the Del Roy, Lindberg and Alvena Vista apartments.
2) Floor crack width, air exchange rates and pressure differentials in both the Monterey apartments and the other apartment buildings adjacent to the former station. These parameters are key to an accurate estimate of indoor air intrusion rates by soil vapor and therefore critical model inputs.

10.0 PRELIMINARY RISK ASSESSMENT

This preliminary risk assessment was constructed using a three step process –

Step 1: Identify Potential Chemicals of Concern (PCOCs) – In this step, historic information regarding site use is used to define an appropriate sampling plan from which data from all potentially impacted media is obtained and evaluated.

Step 2: Based on the nature and extent of the PCOCs present, the physical and chemical properties of these compounds and the media in which they are present, exposure pathways and receptors for each COC are identified.

Step 3: Cleanup levels and or permissible exposure limits for each compound in each affected medium are derived in accordance with all appropriate, relevant and applicable regulations and requirements.

The following sections discuss (in a media specific manner) the PCOCs identified, likely exposure pathways and appropriate cleanup levels for each COC in each impacted media.

10.1 Subsurface Soils

The PCOCs identified for soils at this site include TPH as gasoline and diesel fuel, the BTEX compounds, total naphthalene (including 1- and 2- methylnaphthalene), 1,2,4- and 1,3,5-trimethylbenzene, phenanthrene, phenol and tetrachloroethene. Each of these compounds is present in soils at various locations and depths throughout the site. The most likely exposure pathways from impacted soils at this site are direct contact by site workers, soil leaching to groundwater and soil to soil vapor and then to ambient and indoor air. The second and third pathways will be fully addressed in the next two sections on groundwater and soil vapor respectively, therefore only soil direct exposure will be discussed as a pathway in this section.

Direct dermal contact/ingestion of impacted soils at this site are a concern to site workers and those involved with construction and or subsurface utilities. Superficial soil impacts are only expected to be present beneath the asphalt/concrete surface cap at the former station. Soil impacts further west (downgradient) of the former station have been impacted by separate phase or dissolved petroleum hydrocarbons either on top of or associated with the groundwater table and as such, are located at depths which greatly minimize if not eliminate the potential for direct exposure. Because the site is located in a residential / commercial neighborhood, MTCA Method A or B CULs are appropriate. MTCA Method A CULs for soil are based not only on dermal and ingestion exposure, but also soil leaching to potable groundwater. Since groundwater at this site is not expected to be classified as potable (section 10.2 contains a discussion on the non-potable nature of the groundwater at this site), Method A CULs are not

appropriate. Therefore MTCA Method B CULs based on soil direct contact and ingestion have been selected.

Based on soil data collected from the soil probes, borings and during the installation of the soil vapor probes, and using the BTEX compounds and naphthalene as indicator hazardous substances as defined in WAC 173-340-703 (3) for the purposes this preliminary risk assessment, benzene is the only PCOC present in soil at concentrations which exceed the respective MTCA Method B CUL of 18.3 mg/kg as published in the CLARC II database (version 3.1). Two locations have been identified which contain benzene at or above this CUL. These locations are DP-6 at 22 feet bg and DB-5 at 13 feet bg. None of the other soil samples collected contained any of the PCOCs previously identified at concentrations at or above their respective MTCA Method B CULs.

In addition to the PCOCs previously defined for soil, both TPH as gasoline and as diesel fuel are present in soils at this site. The MTCA Method B worksheets for calculating CULs for TPH based on fractional equivalents as quantified by the VPH and EPH analytical procedures developed by WDOE were used to develop a CUL for TPH. The CUL derived is based only on the direct dermal contact pathway. Soil samples collected from DP-5 at 12 feet bg and DP-7 at 20 feet bg were used to calculated a TPH CUL for soils beneath the former station, and a soil sample collected from DVP-2 at 6 feet bg was used to calculate a TPH CUL for soils on the Monterey apartments property. Two CULs for TPH (one for the former station and a second for the Monterey apartments property were developed due to potential differences in the source and composition of the petroleum hydrocarbons present at each of these locations.

Based on the MTCA Method B worksheet results, a CUL for TPH soil at the former station is 2094 mg/kg (based on dermal contact) and the CUL for soil at the Monterey apartments is 120.0 mg/kg (based on dermal contact). By comparing these two CULs to soil data collected from the soil probes, borings and during the installation of the soil vapor probes, eight locations have been identified which contain TPH at or above the respective MTCA Method B CULs. These locations are DP-3 at 12 feet bg, DP-5 at 14 feet bg, DP-6 at 22 feet bg, DB-4 at 9 feet bg, DB-5 at 13 feet bg, DVP-1 at 1 foot bg, DVP-1 at 6 feet bg and DVP-2 at 6 feet bg. None of the other soil samples collected contained TPH at concentrations at or above these CULs.

10.2 Groundwater

The PCOCs identified for groundwater at this site include TPH as gasoline and diesel fuel, the BTEX compounds, total naphthalene (including 1- and 2- methylnaphthalene), 1,2,4- and 1,3,5-trimethylbenzene, 2- and 4-methylphenol, phenol, tetrachloroethene, trichloroethene and dichloroethene. Many of these compounds are present in groundwater throughout the site. The most likely exposure pathways from impacted groundwater at this site are dermal exposure to site workers, ingestion of impacted groundwater and groundwater volatilizing to soil vapor and then to ambient and/or indoor air. Groundwater ingestion is further discussed below, while groundwater volatilizing to soil vapor and then to ambient and/or indoor air is addressed in the next section on soil vapor.

Section 720 (2) of MTCA (WAC 173-340) outlines the requirements for obtaining a non-potable use designation for groundwater. These requirements include no current use of the groundwater as a source of drinking water and the unlikelihood of the groundwater being used as a future source of drinking water for one or more of the following reasons-

- Insufficient groundwater to sustain a yield of 0.75 (0.50) gallons per minute or greater;
- Natural background concentrations of total solids or other deleterious compounds or microbial organisms such that use of the groundwater as a drinking water supply is not practicable; and
- The groundwater is located at a depth or location, which make recovery for drinking water purposes technically impossible.

As part of the development of the Site Conceptual Model (SCM) a drinking water supply well survey was performed and a record of each groundwater well listed with WDOE within a ½ mile radius of this site was obtained. There are currently no drinking water supply wells at or within a ½ mile radius of this site, thus groundwater at this site is not currently being used as a source of drinking water.

Use of groundwater at or within the potentially affected radius of his site as drinking water is improbable due to the shallow nature of the affected aquifer and the historic land development in this area of Seattle, which has resulted in a widespread deterioration of the groundwater

quality. Both high levels of dissolved solids from infiltration and leaking storm drains and as evidenced by iron fouling in the groundwater treatment system at this site and the presence of enteric coliform bacteria from leaking sewer lines have resulted in 'naturally' impacted groundwater conditions and prohibit the use of groundwater as drinking water. For these reasons, the most beneficial use of the groundwater at this site should not be defined as current or potential potable drinking water but rather as discharge to remote surface water.

Dermal exposure to groundwater at this site is a potential concern to site workers and those involved with construction and or subsurface utilities. Because groundwater occurs at depths between 9 and 18 feet bg, the potential for casual exposure to impacted groundwater is virtually eliminated, but as with soil, because the site is located in a residential / commercial neighborhood, MTCA Method A or B CULs are appropriate.

MTCA Method A CULs for groundwater are based on both dermal exposure and ingestion of potable groundwater. Since groundwater at this site should not be classified as potable, Method A CULs may not be appropriate for each PCOC, therefore a combination of both MTCA Method A and B CULs have been selected. not necessary

Comparing the results from groundwater samples collected at both existing and newly installed monitoring wells with the MTCA Method A CUL of 5 ug/L for benzene, tetrachloroethene and trichloroethene and the MTCA Method B CULs of 1600, 800, 16000, 72 and 160 ug/L for toluene, ethylbenzene, total xylenes, dichloroethene and naphthalene, respectively, 17 of the 24 currently existing monitoring wells contain one or more of the PCOCs identified at concentrations at or above the CULs defined. Note that one well contained SPH during the last groundwater-monitoring event and two wells have been dry since they were installed in September 2002. Therefore, none of these three wells have been sampled.

In addition to the PCOCs previously defined for groundwater, both TPH as gasoline and as diesel fuel are present in groundwater at this site. Because the MTCA Method B worksheets for calculating groundwater CULs for TPH apply only to potable water, MTCA Method A CULs for TPH were used instead. Comparing the MTCA Method A CULs for TPH as gasoline and diesel fuel with results from the latest groundwater monitoring and sampling event, 16 of the 24

currently existing monitoring wells contained concentrations of TPH as gasoline and/or as diesel fuel at or above the respective MTCA Method A CULs.

10.3 Soil Vapor

Volatile PCOCs in soil vapor typically originate from impacts in either soil or groundwater or both. When it has been determined that soil vapor concentrations pose no incremental risk to human health (due to depth, location or other site specific factors) it may be appropriate to base further health risk conclusions on the predicted soil vapor concentrations associated with soil and/or groundwater CUL's. That is not the case with this site. Rather than attempt to model and predict soil vapor concentrations from soil and/or groundwater CULs that would be protective of human health, soil vapor has specifically been chosen as a separate impacted media. The rationale for setting a separate CUL for soil vapor in addition to both soil and groundwater is based on our belief that soil vapor most closely represents the media of concern. It would therefore be more appropriate to sample and monitor soil vapor for protection of the receptor in question (apartment resident) rather than rely on CULs for soil and/or groundwater for the same purpose. Furthermore, continual monitoring of soil and/or groundwater to ensure compliance with CULs that are protective of indoor air is impractical and would not definitively demonstrate that human health is being protected. Setting a separate CUL for soil vapor which can be met through remedial actions and later monitored to demonstrate compliance, is a far more practical approach.

The PCOCs identified for soil vapor at this site include the BTEX compounds, 1,2,4- and 1,3,5-trimethylbenzene, 4-ethyltoluene and tetrachloroethene (PCE). Each of these compounds were detected in soil vapor samples collected from beneath the Monterey apartments building. The greatest potential risk posed by soil vapor at this location would be intrusion to indoor air and subsequent inhalation by apartment residents. Because the apartment building is a residential setting, MTCA Method A or B CULs are appropriate. However, MTCA does not contain published Method A cleanup levels for indoor air. Therefore MTCA Method B CULs have been selected for the PCOCs present with the exception of PCE, for which there is no published Method B indoor air CUL. In the absence of a Method B CUL for PCE, the Acceptable Source Impact Level (ASIL), defined by the Puget Sound Air Pollution Control Agency (PSAPCA) for PCE (1.1 ug/m3) was selected as the CUL for PCE in indoor air.

For the purposes of this preliminary risk assessment, five PCOCs (the BTEX compounds and Tetrachloroethene) present in soil vapor beneath the basement floor of the Monterey apartments were modeled to assess their potential impact to indoor air using the Johnson and Ettinger (J&E) model (Environmental Quality Management 2000). The BTEX compounds were selected because they represent indicator hazardous substances for petroleum hydrocarbon PCOCs present as defined in WAC 173-340-703 (3). PCE was also modeled because it was the only volatile non-petroleum hydrocarbon compound present.

The chemical fate and transport of vapor phase contaminants beneath enclosed spaces is determined by a number of physical and chemical processes. The J&E model used during this evaluation is based on a scenario where, impacted soil vapor is present below the floor of an enclosed building constructed with a basement or constructed slab-on-grade. The source of contamination is typically a volatile contaminant adsorbed on soil or a volatile contaminant dissolved in groundwater. At the top boundary of contamination, molecular diffusion moves the volatilized contaminants towards the soil surface until they reach the zone of influence of the building. Here advective air movement within the soil column transports these vapors through cracks between the foundation and the basement slab. This advective sweep effect is induced by a negative pressure within the structure caused by a combination of wind effects and stack effects due to building heating and mechanical ventilation.

When the source of contamination is below the top of the water table, the contaminant must diffuse through a capillary zone immediately above the water table and through the subsequent unsaturated or vadose zone before advection transports the vapors into the structure. The rate of soil gas entry is solely a function of advection; however, the vapor concentration entering the structure may be limited by either advection or diffusion depending upon the distance between the source and the building. In order to more closely approximate the vapor concentrations expected to enter an enclosed air space, the model incorporated actual soil vapor concentration data. By incorporating these data, the most conservative components of this model (i.e. phase change and solubility components which greatly effect the rate at which soil vapors are generated from soil or groundwater sources) could be eliminated. The model allows for the use of soil gas as the impacted subsurface media and then, based on both soil conditions and building parameters, predicts the potential health risk resulting from intrusion of soil gas.

The drawback with the J&E soil gas model is that it only predicts the incremental risk to human health associated with this exposure scenario and does not allow for the reverse-calculation of a representative soil vapor concentration that would be protective of human health.

Since the model cannot back-calculate soil vapor concentrations that would be protective of human health, a modification to the model was developed which allows indoor air concentrations for each PCOC to be predicted. Soil vapor concentrations protective of human health can then be calculated by comparing iterative downward adjustment of the input soil vapor concentration to both MTCA and EPA published values until the indoor air concentration predicted by the model are less than or equal to concentrations protective of human health.

This modified J&E model is based on a mass balance approach for calculating the ambient indoor air contaminant concentration within the building, which may result from the intrusion of contaminant soil vapors. The model described below was constructed using the Excel spreadsheets provided by the U.S. Environmental Protection Agency for the J&E Model (USEPA 2002). A project-specific worksheet called "Apartment Building Concentration" was then created for use in conjunction with the EPA-provided Excel workbook "SG-ADV.xls". A copy of the "Apartment Building Concentration" worksheet is provided in **Appendix G**.

Q bldg = outgoing building ambient air (m 3 /sec)
C bldg = contaminant concentration in building ambient air (mg/m 3)

C bldg = building ambient air contaminant concentration

Q air = incoming fresh air (m 3/sec)
C air = incoming air contaminant concentration (mg/m 3)

Q soil = incoming contaminated soil vapor (m 3 /sec)
C soil = contaminant concentration in soil vapor (mg/m 3)

The flow rates and corresponding contaminant concentrations are related by mass balance as shown in Equation 1.

Equation 1

$$Q\ bldg \times C\ bldg = (Q\ air \times C\ air) + (Q\ soil \times C\ soil)$$

The mass balance model assumes that conditions are in a steady state and that complete mixing occurs within the basement interior. The outgoing building ambient airflow (Q bldg) is equal to the sum of the two incoming flows, incoming fresh air (Q air) and incoming contaminated soil vapor (Q soil). Therefore, Equation 1 can be rewritten as Equation 2.

Equation 2

$$(Q\ air + Q\ soil) \times C\ bldg = (Q\ air \times C\ air) + (Q\ soil \times C\ soil)$$

Equation 2 can be solved for the contaminant concentration in the building's interior ambient air (C bldg), as shown in Equation 3.

Equation 3

$$C\ bldg = [(Q\ air \times C\ air) + (Q\ soil \times C\ soil)] / (Q\ air + Q\ soil)$$

The variables on the right side of Equation 3 can be measured or estimated to calculate the contaminant concentration in the building's interior ambient air.

The incoming contaminant concentration (C air) is assumed to be zero. There may already be some petroleum hydrocarbon vapors in the background air, but the intent of this model is to evaluate the incremental risk posed by petroleum hydrocarbon vapors solely from subsurface soil vapor entering the building. Q air is the fresh air exchange rate in the building. The higher this variable, the lower the resulting C bldg.

Contaminant concentration in soil vapor (C soil) was measured in soil vapor samples collected from the vapor probes installed beneath the basement floor. The incoming contaminated soil vapor (Q soil) is calculated from equations in the J&E Model.

Parameters that affect Q soil include soil vapor permeability, pressure differential between the soil in contact with the building foundation and the building interior, and effective crack width in the building floor.

MODEL SETUP

The model requires several inputs from the user. Architectural input includes building dimensions, floor-wall seam crack width, fresh air exchange rate, and pressure differential between the building interior and the subgrade soil atmosphere. For these inputs, building dimensions and fresh air exchange rate were measured or estimated. Floor-wall seam crack width and pressure differential were specified using the EPA default values of 0.1 cm and 4 Pascals, respectively (Environmental Quality Management 2000). The concentration of petroleum hydrocarbons in the soil vapor from beneath the apartment building was determined by previous sampling. Soil vapor samples collected from sampling location DVP-1 were used for the modeled input.

The J&E Model uses either the Soil Conservation Service (SCS) soil classification system to specify the physical characteristics of the underlying soils or user provided site-specific soil physical properties as model inputs. The soil in contact with the basement floor is the most critical soil type because its soil vapor permeability has a substantial effect on the amount of soil vapor that can enter the building. Selection of the appropriate SCS soil type or the collection and analysis of soil representative of this soil type is a critical and sensitive model input. Soils with higher permeability will allow greater amounts of contaminant to enter the building. For the purposes of this modeling activity, soil samples were collected from borings completed adjacent to the apartment building at depths equivalent to below the basement floor. These soil samples were submitted to ROSA environmental and Geo-technical Laboratories in Seattle, Washington for soil vapor permeability analysis using methods specified in SSSA 48 and ASTM D-4525 the results from which were then used as site-specific inputs to the modified J&E model.

Ave? 95% UCL -

Calc. using range min-max.

MODEL RESULTS

The predicted indoor air concentration of each of the compounds modeled is presented in the following table. **Appendix G** contains all of the J&E Model input parameters.

Compound	Soil Vapor Concentration ppbv	Predicted Conc. ug/M^3	ASIL ug/M^3	MTCA Method B CUL ug/M^3
Benzene	13000	5.71	0.12	0.321
Toluene	110000	57.04	400	183
Ethlybenzene	55000	32.86	1000	4570
M/P Xylene	360000	215.08	1500	320
O-Xylene	140000	83.64	1500	320
Tetrachloroethene	6200	5.79	1.1	None Established

Based on the modeling results, both benzene and tetrachloroethene appear to be present in soil vapor at concentrations, which, may result in exceedences of either the ASIL (for PCE) and/or the MTCA Method B cleanup level (for benzene).

Using the modified J&E model, soil vapor concentrations were adjusted downward in an iterative manner until the predicted concentration within the basement of the Monterey apartments building was at or below either the ASIL and/or the Method B cleanup levels. Based on these iterative downward adjustments, soil vapor concentrations, which result in compliance with these CUL's, are -

Benzene = 275 ppbv – meets both the ASIL and the MTCA Method B CUL for Air

Tetrachloroethene = 1200 ppbv – meets ASIL (no MTCA Method B CUL established)

To be applied thruout entire site? From ▼ to ground surface?

establish ¼ levels for TCE, DCE, VC

11.0 FUTURE REMEDIATION AND SITE ASSESSMENT

As a result of the air intrusion modeling, and based on discussions with the WDOE and the adjacent property owners, Delta on behalf of ChevronTexaco will restart the existing Soil Vapor Extraction (SVE) system and focus the full vapor recovery capacity of this system on the extraction wells surrounding the Monterey apartments building. In addition, based on the data gaps identified in this report, Delta recommends that further site investigation efforts be performed to better define the extent of impacts to soil, groundwater and soil vapor. Further investigations should include:

1) Installation of additional soil vapor probes and collection of soil and soil vapor samples from beneath the Monterey, Lindberg, Del Roy and Alvena Vista Apartments.
2) Installation of additional groundwater monitoring wells west of monitoring wells MW-14, MW-15 and MW-17 to further define the extent of down gradient groundwater impacts.
3) Installation of additional groundwater monitoring wells north of monitoring wells MW-9 and MW-10 to further define the lateral spread of groundwater impacts adjacent to the former station.

FIGURES

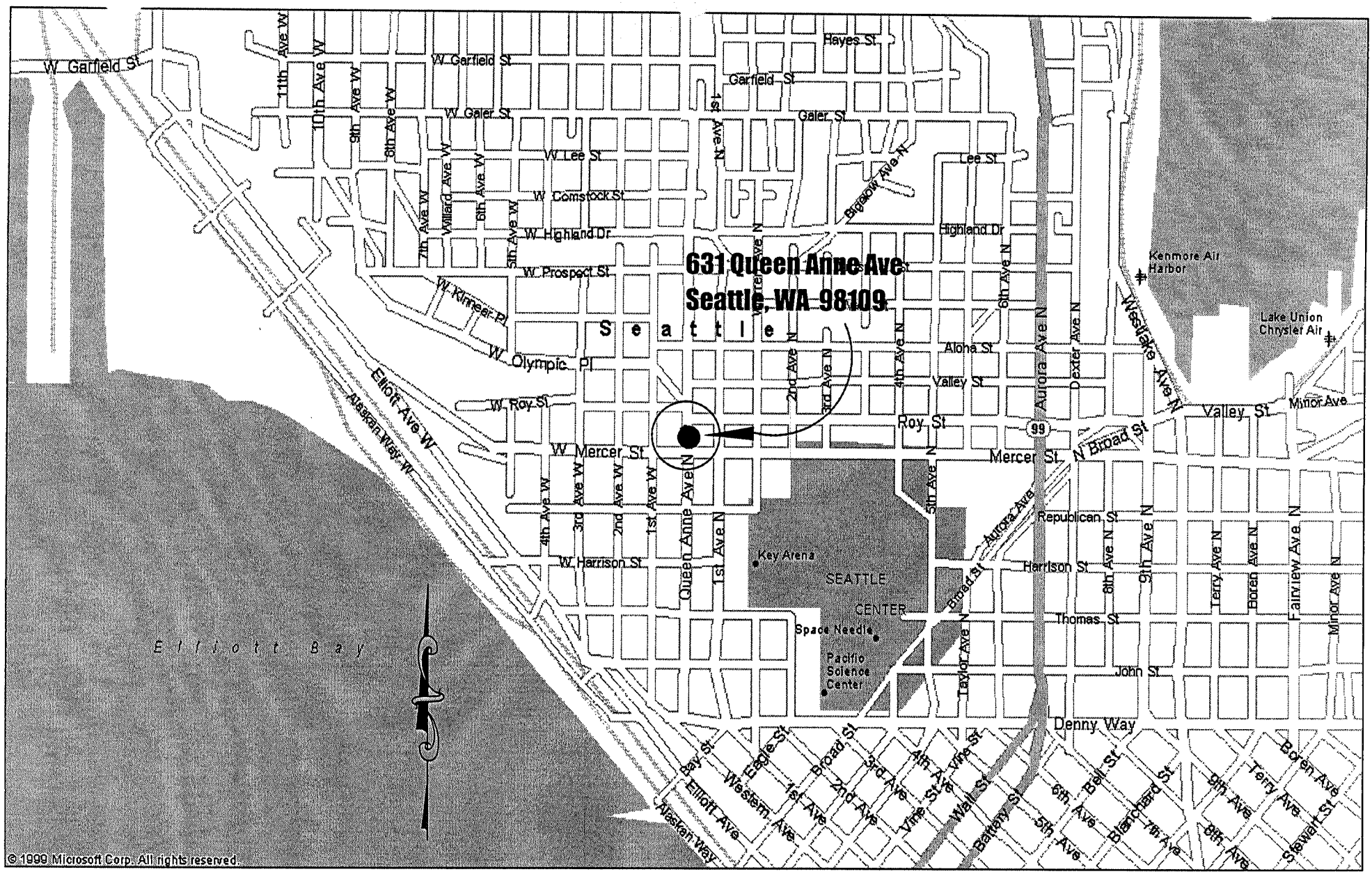


Figure 1

FORMER TEXACO STATION, NO. 21577
SEATTLE, WASHINGTON

PROPERTY LOCATION MAP

Delta Environmental Consultants, Inc.

DESIGNED BY:	CHECKED BY:	PROJECT #	FIGURE #
S. MADISON	S. MADISON	TW21577	1
DRAWN BY:	PROJECT MANAGER:	DATE:	SCALE:
S. MADISON	P.CATTERALL	5/17/2	NTS

ACT THEATER

OFFICES/COMMERCIAL RETAIL

WEST ROY STREET

FORMER UNOCAL

ACT PARKING LOT

DEL ROY APARTMENTS

FORMER TEXACO STATION No. 211577

EXRESS

Remediation System

WEST ROY STREET

NORTHGATE APARTMENTS

MONTEREY APARTMENTS

LINDBERG APARTMENTS

1ST AVENUE WEST

QUEEN ANNE AVENUE NORTH

MARQUEEN HOTEL

CHURCH

BANK OF AMERICA PARKING LOT

ALVENA VISTA APARTMENTS

18 MERCER STREET BUILDING

BANK OF AMERICA

N

0 60 FT

SCALE

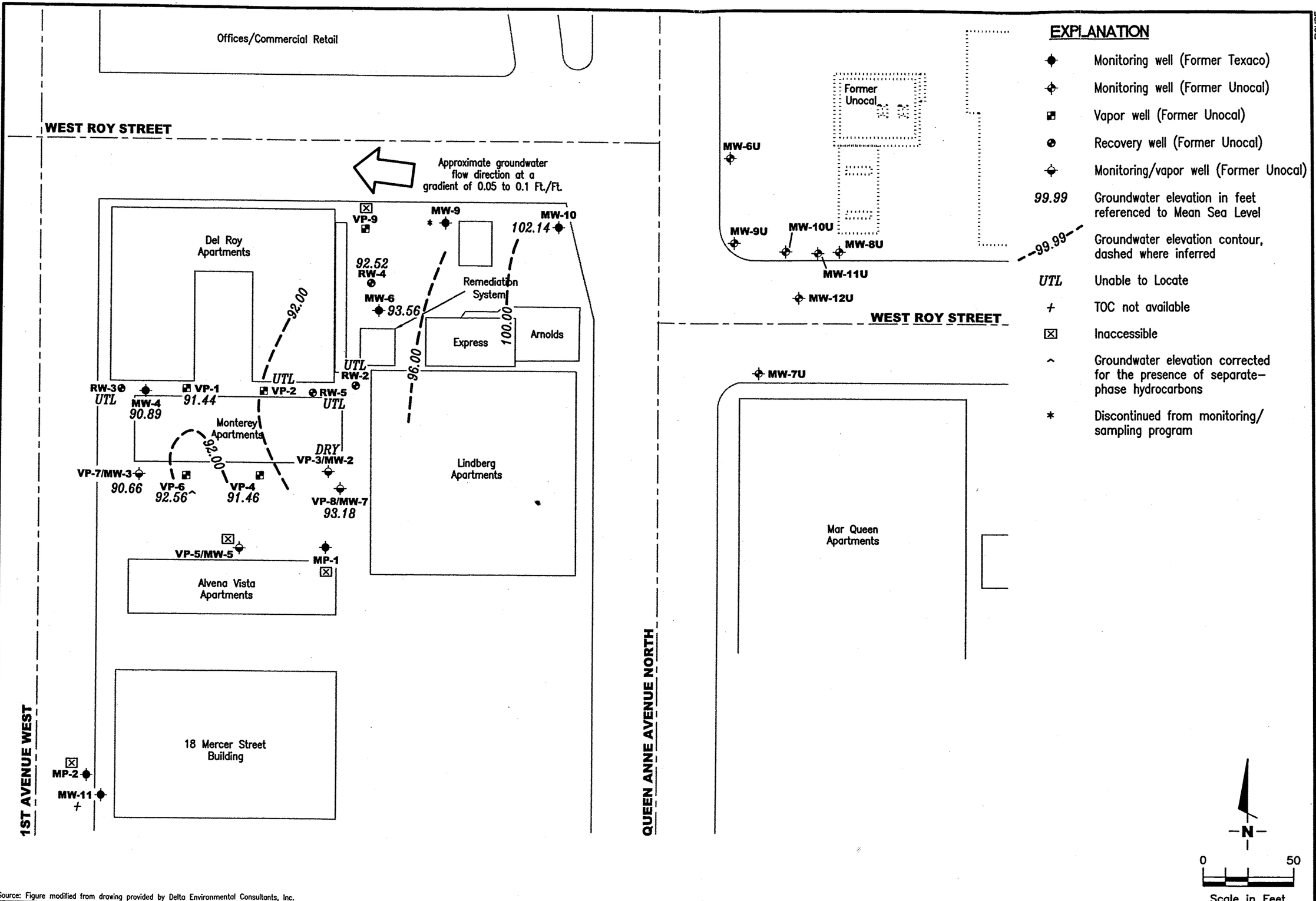
LEGEND:

STREET CENTER LINE

FIGURE 2
SITE VICINITY MAP
QUEEN ANNE TEXACO
631 QUEEN ANNE NORTH SEATTLE, WASHINGTON

PROJECT NO. TW21-577	DRAWN BY M.S.M. 5/15/2
FILE NO. 21577	PREPARED BY M.S.M.
REVISION NO. 1	REVIEWED BY M.S.M.

Delta Environmental Consultants, Inc.



Source: Figure modified from drawing provided by Delta Environmental Consultants, Inc.

FIGURE 1

POTENTIOMETRIC MAP
Former Texaco Service Station
631 Queen Anne North
Seattle, Washington (Site #211577)

REVISED DATE

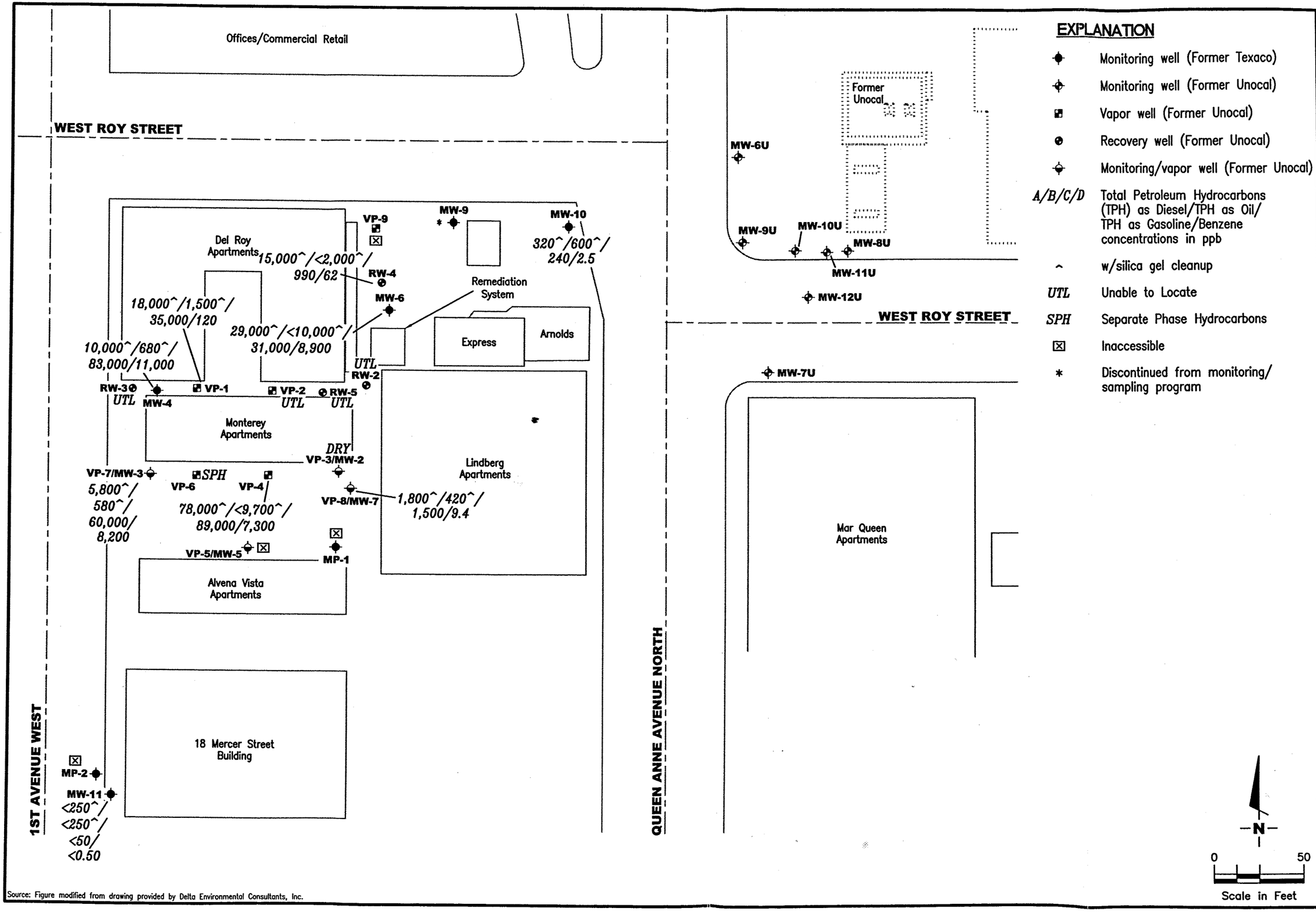
DATE
July 24, 2002

REVIEWED BY

PROJECT NUMBER
386765

FILE NAME: P:\ENVIRO\TEXACO\211577\Q02-211577.DWG | Layout Tab: Pot3

GETTLER-RYAN INC.
6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555



Source: Figure modified from drawing provided by Delta Environmental Consultants, Inc.

FIGURE 2

CONCENTRATION MAP
Former Texaco Service Station
631 Queen Anne North
Seattle, Washington (Site #211577)

REVISED DATE

DATE July 24, 2002

GETTLER-RYAN INC.
6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555

PROJECT NUMBER 386765

REVIEWED BY

FILE NAME: P:\ENVIRO\TEXACO\211577\Q02-211577.DWG | Layout Tab: Con3

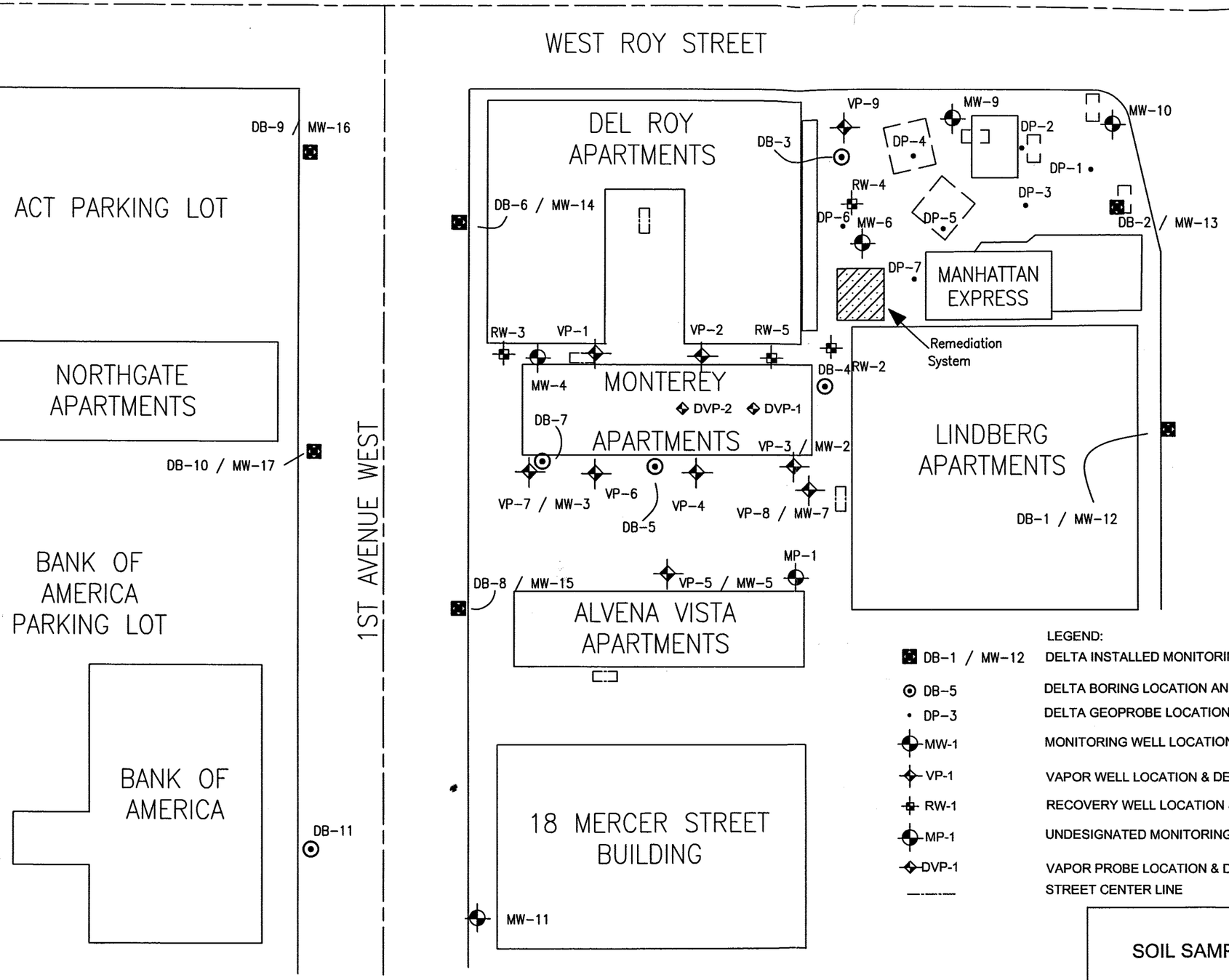
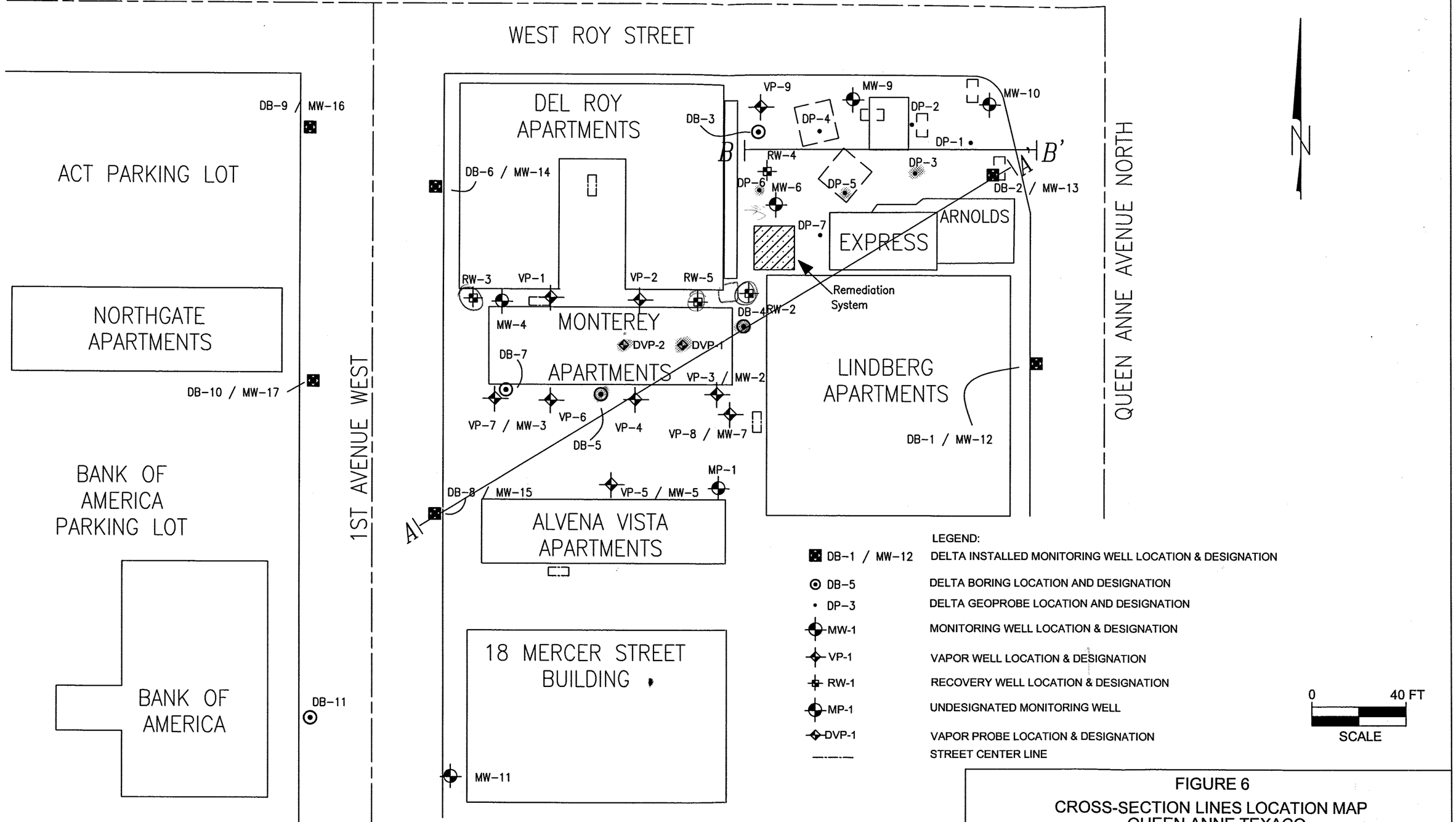


FIGURE 5
SOIL SAMPLING, VAPOR PROBE & WELL LOCATIONS
QUEEN ANNE TEXACO
631 QUEEN ANNE NORTH SEATTLE, WASHINGTON

PROJECT NO. TW21-577	DRAWN BY M.S.M. 10/07/02
FILE NO. 21577	PREPARED BY M.S.M.
REVISION NO. 2	REVIEWED BY P.H. CATTERALL

Delta Environmental Consultants, Inc.



LEGEND:

DB-1 / MW-12	DELTA INSTALLED MONITORING WELL LOCATION & DESIGNATION
DB-5	DELTA BORING LOCATION AND DESIGNATION
DP-3	DELTA GEOPROBE LOCATION AND DESIGNATION
MW-1	MONITORING WELL LOCATION & DESIGNATION
VP-1	VAPOR WELL LOCATION & DESIGNATION
RW-1	RECOVERY WELL LOCATION & DESIGNATION
MP-1	UNDESIGNATED MONITORING WELL
DVP-1	VAPOR PROBE LOCATION & DESIGNATION
	STREET CENTER LINE

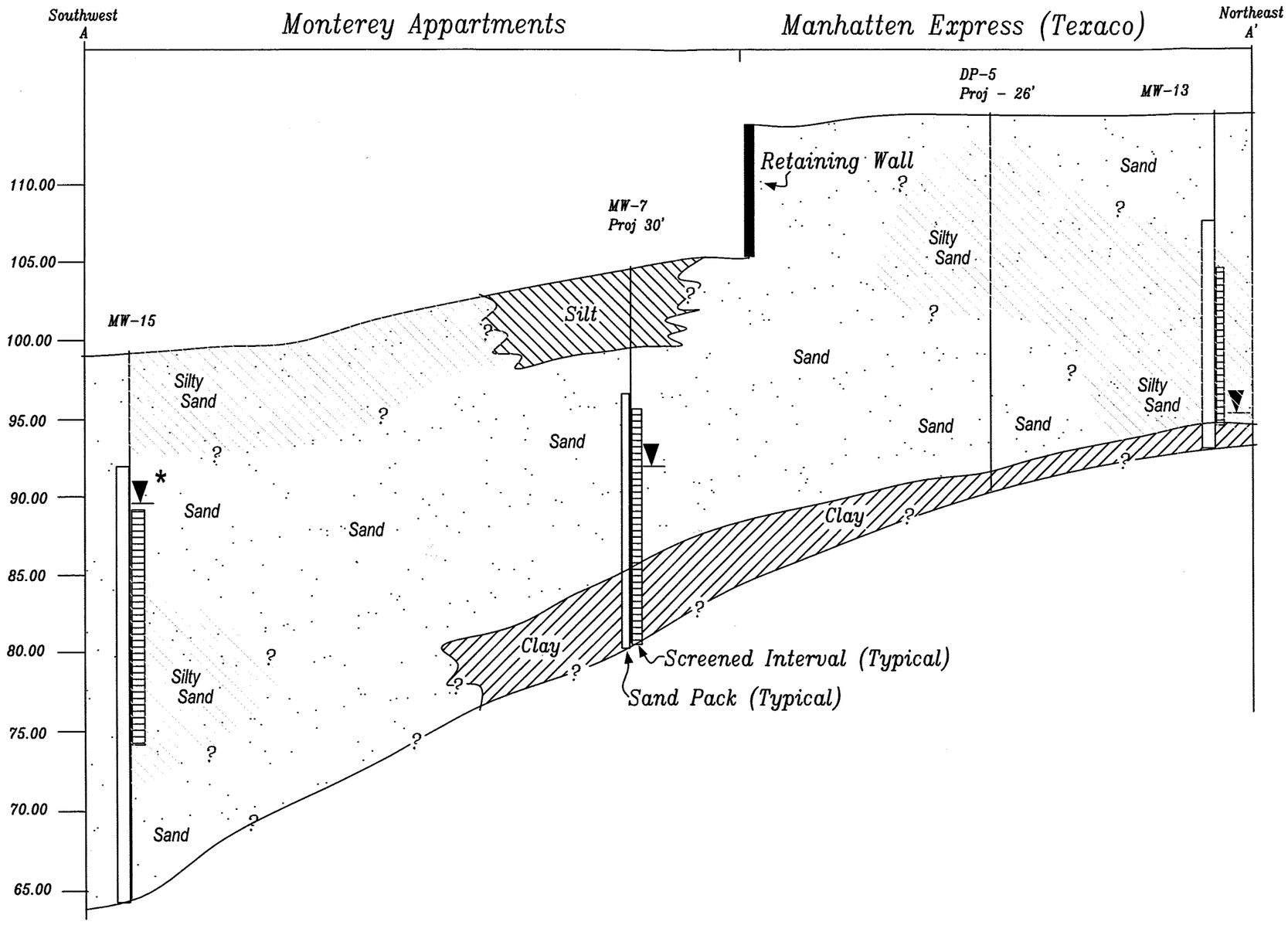
0 40 FT
SCALE

FIGURE 6

CROSS-SECTION LINES LOCATION MAP
QUEEN ANNE TEXACO
631 QUEEN ANNE NORTH SEATTLE, WASHINGTON

PROJECT NO. TW21-577	DRAWN BY M.S.M. 10/07/02
FILE NO. 21577	PREPARED BY M.S.M.
REVISION NO. 2	REVIEWED BY P.H. CATTERALL

Delta Environmental Consultants, Inc.



▼ DEPTH TO GROUNDWATER ON 10/17-18/02

* DEPTH TO GROUNDWATER ON 11/14/02

Proj 30' – PROJECTED 30 FEET NORTHWEST ONTO LINE OF X-SECTION

Scale in Feet

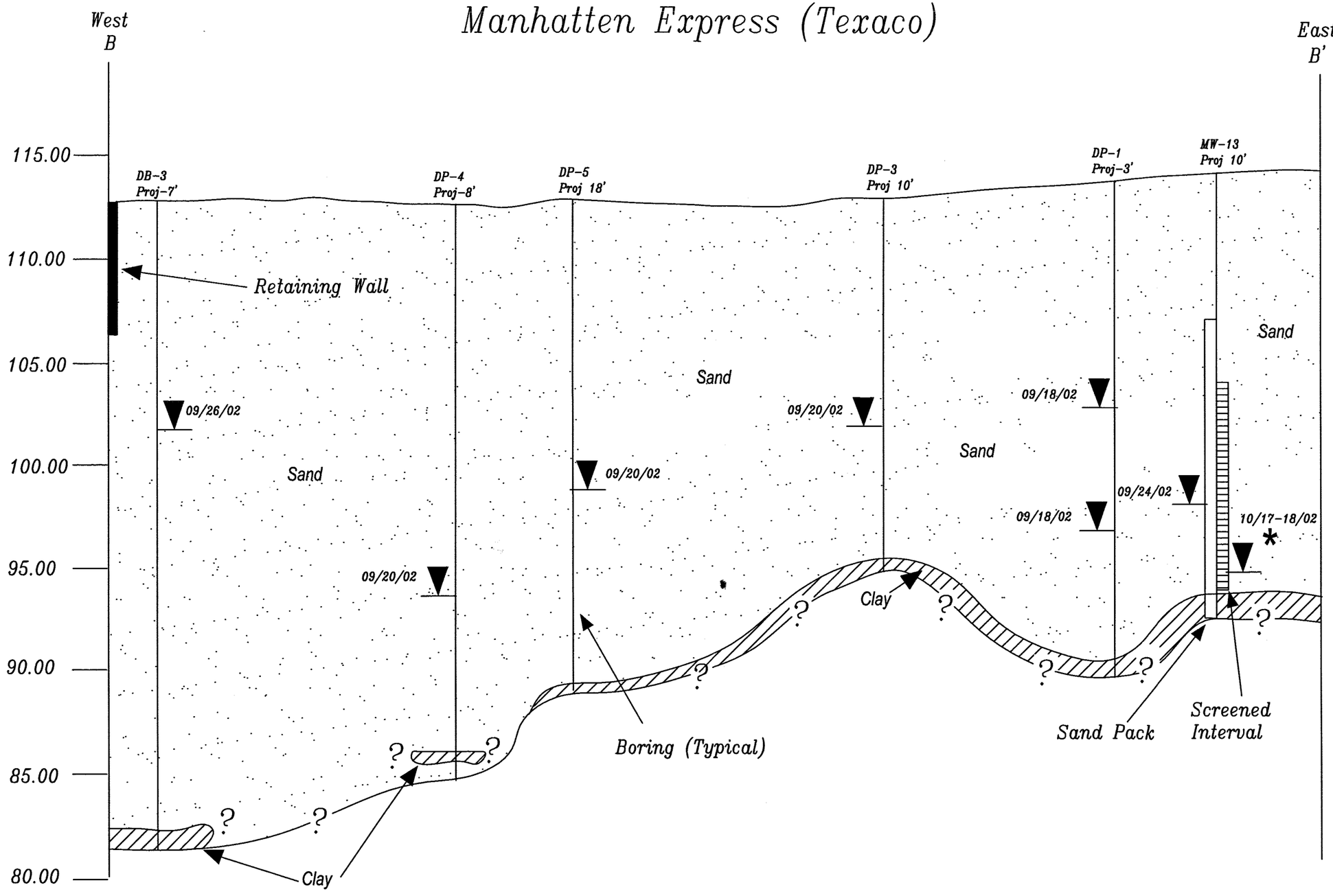
7.5
3.75
0
15
30

FORMER TEXACO STATION 211577
631 QUEEN ANNE AVE N, SEATTLE, WASHINGTON
CROSS-SECTION A-A'

Delta Environmental Consultants, Inc.

DESIGNED BY:	CHECKED BY:	PROJECT #	FIGURE #
SHAWN M	SHAWN M	TW21-577	7
DRAWN BY:	**PROJECT MANAGER:**	**DATE:**	**SCALE:**
SHAWN M	P. CATTERALL	12/10/02	AS SHOWN

Manhatten Express (Texaco)



▼ FIRST ENCOUNTERED DEPTH TO GROUNDWATER AND DATE

* DEPTH TO STATIC GROUNDWATER

Proj 18' – PROJECTED 18 FEET NORTH ONTO LINE OF X-SECTION

Scale in Feet

5
2.5
0
5
10

FORMER TEXACO STATION 211577
631 QUEEN ANNE AVE N, SEATTLE, WASHINGTON

Delta Environmental Consultants, Inc.

CROSS-SECTION B-B'

DESIGNED BY:	CHECKED BY:	PROJECT #	FIGURE #
SHAWN M	SHAWN M	TW21-577	8
DRAWN BY:	**PROJECT MANAGER:**	**DATE:**	**SCALE:**
SHAWN M	P. CATTERALL	12/10/02	AS SHOWN

TABLES

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
TPH-G, D, O AND BTEX COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	TPH-G (µg/l)	TPH-D (µg/l)	TPH-O (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	m,p- xylenes (mg/l)	o-xylenes (mg/l)
VP-1										
	Mar-91	NA	--	--	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--	--	--	--
	Dec-99	--	--	--	--	--	--	--	--	--
	Jun-00	5,000	75,600	1,100U	21.60	14.4	32.8	435	--	--
	Jul-02	35,000	18,000	1,500	120	820	280	4,600	--	--
	Oct-02	27,300	7,500	598	170	756	334	4,820	--	--
VP-2										
	Mar-91	--	--	--	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--	--	--	--
	Dec-99	5,980	29,900	2,500U	935	345	43.80	305	--	--
	Jun-00	2,030	2,810	1,100U	45.90	16.2	3,000U	196	--	--
	Jul-02				UTL					
	Oct-02				UTA					
VP-3										
	Jul-02				DRY					
	Oct-02				DRY					

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
TPH-G, D, O AND BTEX COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	TPH-G (µg/l)	TPH-D (µg/l)	TPH-O (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	m,p- xylenes (mg/l)	o-xylenes (mg/l)
VP-4										
	Mar-91	--	--	--	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--	--	--	--
	Dec-99	--	--	--	--	--	--	--	--	--
	Jun-00	26,400	1,850	1,100U	1,020	3,270	890	6,160	--	--
	Jul-02	89,000	78,000	9,700U	7,300	7,500	1,900	13,000	--	--
	Oct-02				UTA					
VP-5 (MW-5)										
	Mar-91	--	1,850	ND	5,300	1,300	900	4,600	--	--
	Oct-95	--	--	--	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--	--	--	--
	Dec-99	23,400	2,490	5,000U	841	191	1,480	7,720	--	--
	Jun-00	25,600	1,340	1,120U	793	155	1,380	5,690	--	--
	Jul-02				UTL					
	Oct-02	15,900	3,900	500U	318	49.3	880	1,870	--	--
VP-6										
	Jul-02				SPH					
	Oct-02				SPH					

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
TPH-G, D, O AND BTEX COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	TPH-G (µg/l)	TPH-D (µg/l)	TPH-O (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	m,p- xylenes (mg/l)	o-xylenes (mg/l)
VP-7 (MW-3)										
	Mar-91	0.03						3,500	--	--
	Oct-95	33,000	--	--	11,700	2,230	1,070	4,130	--	--
	Jan-97	51,000	--	--	12,400	5,200	990	RA	3,700	1,500
	Apr-97	53,000	--	--	11,100	4,800	1,400	RA	5,400	2,200
	Jul-97	37,000	--	--	11,000	3,700	1,500	RA	5,200	1,900
	Nov-97	34,000	--	--	15,900	3,600	1,500	RA	4,800	1,800
	Dec-99	73,400	3,310	5,000U	16,800	9,670	1,890	10,500	--	--
	Jun-00	54,400	931	1,460U	10,000	8,230	1,380	7,470	--	--
	Jul-02	60,000	5,800	580	8,200	7,000	1,500	8,300	--	--
	Oct-02	71,600	5,160	510	11,100	5,880	1,940	10,800	--	--
VP-8 (MW-7)										
	Mar-91	0.01						1,100	--	--
	Oct-95	3,100	--	--	2.50	1.20	3.00	16.0	--	--
	Jan-97	8,000	--	--	816	824	26.0	RA	412	182
	Apr-97	18,000	--	--	605	786	119	RA	1,260	514
	Jul-97	9,100J	--	--	96.0	246	52.0	RA	706	274
	Nov-97	830J	--	--	5.60	7.00	11.0	RA	23.0	9.60
	Dec-99	7,640	2,780	5,000U	540	927	201	1,430	--	--
	Jun-00	233	2,280	1,100U	1.10	1.81	1.95	7.99	--	--
	Jul-02	1,500	1,800	420	9.40	9.20	34.0	50.0	--	--
	Oct-02	552	1,830	500U	9.75	1.45	4.25	5.73	--	--

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
TPH-G, D, O AND BTEX COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	TPH-G (µg/l)	TPH-D (µg/l)	TPH-O (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	m,p- xylenes (mg/l)	o-xylenes (mg/l)
VP-9										
	Mar-91	--	--	--	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--	--	--	--
	Dec-99	118	2,500U	5,000U	0.50U	0.50U	0.50U	0.50U	--	--
	Jun-00	474	1,420	1,130U	4.97	ND	55.6	4.80	--	--
	Jul-02				UTL					
	Oct-02	1,910	13,200	500U	11.3	2.62	8.86	14.7	--	--
MW-4										
102.07	Mar-91	--	--	--	10,000	12,000	500	9,800	--	--
	Oct-95	95,000	--	--	19,600E	12,000	2,070	10,800	--	--
	Jan-97	88,000	--	--	12,900	12,400	1,400	RA	7,500	3,100
	Apr-97	100,000	--	--	14,300	14,500	1,700	RA	7.80	3,200
	Jul-97	120,000	--	--	19,600	19,700	2,100	RA	9,300	3,800
	Nov-97	89,000	--	--	17,500	16,000	1,900	RA	8,800	3,400
	Dec-99	73,300	3,340	5,000U	13,700	13,500	1,830	11,000	--	--
	Jun-00	74,400	3,390	1,240U	14,400	9,440	1,840	10,800	--	--
	Jul-02	83,000	10,000	680	11,000	9,900	1,800	11,000	--	--
	Oct-02	110,000	9.86	0.697	14,500	11,600	2,630	15,200	--	--
DUP	Oct-02	92,400	7,100	500U	12,400	9,980	2,090	12,200	--	--

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
TPH-G, D, O AND BTEX COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	TPH-G (µg/l)	TPH-D (µg/l)	TPH-O (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	m,p- xylenes (mg/l)	o-xylenes (mg/l)
MW-6										
	Mar-91	--	--	--	25,000	29,000	2,500	19,000	--	--
	Oct-95	--	--	--	12,000E	13,800E	920	5,680	4,170	1,520
	Jan-97	--	--	--	7,290	12,400	2,340	--	14,200	5,600
	Apr-97	--	--	--	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--	--	--	--
	Dec-99	--	--	--	--	--	--	--	--	--
	Jun-00	--	--	--	--	--	--	--	--	--
	Jul-02	31,000	29,000	10,000U	8,900	1,600	820	4,200	ANR	ANR
	Oct-02				UTA					
MW-9										
	Mar-91	--	--	--	1,600	2,900	250	3,100	--	--
	Oct-95	3,400	--	--	3,520	70J	200U	10,800	--	--
	Jan-97	4,400	--	--	2,600	53.0	310	RA	7,500	3,100
	Apr-97	9,100	--	--	2,980	173	413	RA	7,800	3,200
	Jul-97	2,200J	--	--	2,680	127	460	RA	9,300	3,800
	Nov-97	5,000	--	--	2,010	80.0	334	RA	8,800	3,400
	Dec-99	4,460	8,510	5,000U	831	22.4	274	138	--	--
	Jun-00	4,740	6,070	500U	786	26.0	274	156	--	--
	Oct-02	6,380	43,600	671	493	13.0	230	107	--	--

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
TPH-G, D, O AND BTEX COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	TPH-G (µg/l)	TPH-D (µg/l)	TPH-O (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	m,p- xylenes (mg/l)	o-xylenes (mg/l)
MW-10										
	Mar-91	--	--	--	5.00U	5.00U	5.00U	5.00U	--	--
	Oct-95	780	--	--	1.80	2.90J	0.82J	5.60	--	--
	Jan-97	180	--	--	1.50	1.00U	1.00U	RA	2.00U	1.00U
	Apr-97	420	--	--	5.10	1.00	1.00U	RA	2.00J	1.40U
	Jul-97	1,100	--	--	10.0	2.10	2.40	RA	3.80	0.54J
	Nov-97	1,000	--	--	4.20	2.00	4.80	RA	1.60	0.60J
	Dec-99	618	353	5,000U	7.02	0.91U	0.85U	4.22U	--	--
	Jun-00	99.2	2,500U	500U	1.56	ND	ND	ND	--	--
	Jul-02	240	320	600	2.50	0.500U	1.00U	1.50U	--	--
	Oct-02	490	667	500U	3.42	0.500U	1.34	5.00	--	--
MW-11										
	Jul-02	50.0U	250U	250U	0.500U	0.500U	0.500U	1.50U	--	--
	Oct-02	50.0U	250U	500U	0.500U	0.500U	0.500U	1.00U	--	--
MW-12										
	Oct-02	50.0U	250U	500U	0.516	0.869	0.500U	1.00U	--	--
MW-13										
	Oct-02				DRY					
MW-14										
	Oct-02				UTA					
	Nov-02	43,100	4,710	500U	9,900	4,930	1,540	6,020		
MW-15										
	Oct-02				UTA					
	Nov-02	3,280	780	500U	1,640	5.23	5.06	10.0U		

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
TPH-G, D, O AND BTEX COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	TPH-G (µg/l)	TPH-D (µg/l)	TPH-O (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	m,p- xylenes (mg/l)	o-xylenes (mg/l)
MW-16										
	Oct-02				UTA					
	Nov-02	50.0U	250U	500U	0.500U	0.500U	0.500U	1.00U		
MW-17										
	Oct-02				UTA					
	Nov-02	2,780	250U	500U	569	31.0	91.1	250		
RW-2										
	Mar-91	--	--	--	19,000	46,000	2,500	120,000	--	--
	Oct-95	--	--	--	--	--	--	--	--	--
	Jan-97	390	--	--	31.0	14.0	6.00	RA	31.0	18.0
	Apr-97	11,000	--	--	189	243	99.0	RA	540	203
	Jul-97	24,000	--	--	4,230	2,490	389	RA	1,960	772
	Nov-97	4,400	--	--	3,140	1,200	338	RA	1,670	595
	Dec-99	--	--	--	--	--	--	--	--	--
	Jun-00	--	--	--	--	--	--	--	--	--
	Jul-02				UTL					
	Oct-02	1,380	988	500U	90.5	8.05	29.2	31.5	--	--
RW-3										
	Jul-02				UTA					
	Oct-02				UTA					
RW-4										
	Jul-02	990	15,000	2,000U	62.0	1.30	32.0	7.00	--	--
	Oct-02	3,160	8,930	939	59.8	2.50	40.4	15.6	--	--

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
TPH-G, D, O AND BTEX COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	TPH-G (µg/l)	TPH-D (µg/l)	TPH-O (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	m,p- xylenes (mg/l)	o-xylenes (mg/l)
RW-5										
	Jul-02				UTL					
	Oct-02	3,370	84,900	3,650	696	67.2	63.0	408	--	--
Trip Blank LB										
	Oct-02	50.0U			0.500U	0.500U	0.500U	1.00U	--	--
	Nov-02	50.0U			0.500U	0.500U	0.500U	1.00U		

1 - Well designations have historically varied. The designations used here are consistent with the designations shown on Figure 5.
2 - Date groundwater samples were collected. Mar-91 from Ecology and Environment, Oct-95 through Nov-97 from Ecology, Dec-99 - Jun-00 from Farallon.
(--) - Sample not analyzed.
ANR- Analyte not reported or reported as total value
DRY - Insufficient groundwater to sample
DUP - Duplicate samples
E - The analyte was detected at a concentration above the linear response range of the instrument, value reported is an estimate.
ND - Not detected at or above laboratory detection limits. Laboratory detection limits not available or reported.
P - The analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
RA - Reported as m,p and o-xylene, total xylene not reported.
SPH - No sample collected due to the presence of separate phase hydrocarbons
U - The analyte was not detected at or above the reported value.
UTA- No sample collected, unable to access well due to parked vehicle.
UTL - No sample collected, unable to locate well

GROUNDWATER ANALYTICAL RESULTS
RCRA METALS

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Silver (µg/l)	Arsenic (µg/l)	Barium (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Mercury (µg/l)	Lead (µg/l)	Selenium (µg/l)
VP-1									
	Jul-02	--		--	--	--	--	22.9	--
	Oct-02	--		--	--	--		1.80	
VP-2									
	Jul-02			UTL					
	Oct-02			UTA					
VP-3									
	Jul-02			DRY					
	Oct-02			DRY					
VP-4									
	Jul-02	--		--	--	--	--	28.0	--
	Oct-02			UTA					
VP-5 (MW-5)									
	Jul-02			UTL					
	Oct-02	--		--	--	--		2.29	--
VP-6									
	Jul-02			SPH					
	Oct-02			SPH					
VP-7 (MW-3)									
	Jul-02	0.068	97.2	33.6	0.080U	2.20	0.079U	25.0	1.10U
	Oct-02	--		--	--	--		2.40	--

TA' 1

GROUNDWATER ANALYTICAL RESULTS
RCRA METALS

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Silver (µg/l)	Arsenic (µg/l)	Barium (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Mercury (µg/l)	Lead (µg/l)	Selenium (µg/l)
VP-8 (MW-7)									
	Jul-02	0.050U	2.1	49.5	0.13	0.82	0.079U	11.4	3.10U
	Oct-02	--		--	--	--		1.93	--
VP-9									
	Jul-02								
	Oct-02	--	--	--	--	--	--	1.00U	--
MW-4									
	Jul-02	0.050U	31.0	63.8	0.080U	0.28U	0.079U	15.5	1.10U
	Oct-02	--		--	--	--	--	10.7	--
DUP	Oct-02	--		--	--	--	--	9.61	--
MW-6									
	Jul-02	--	--	--	--	--	--	5.10	--
	Oct-02			UTA					
MW-9									
	Oct-02	--	--	--	--	--	--	2.66	--
MW-10									
	Jul-02	0.050U	4.1	52.1	0.17	0.38	0.079U	1.30	1.10U
	Oct-02	--		--	--	--		1.00U	--

GROUNDWATER ANALYTICAL RESULTS
RCRA METALS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Silver (µg/l)	Arsenic (µg/l)	Barium (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Mercury (µg/l)	Lead (µg/l)	Selenium (µg/l)
MW-11									
	Jul-02	--	--	--	--	--	--	1.20U	--
	Oct-02	--		--	--	--	--	1.00U	--
MW-12									
	Oct-02	--	--	--	--	--	--	--	--
MW-13									
	Oct-02			DRY					
MW-14									
	Oct-02			UTA					
	Nov-02	1.00U	17.0	18.4	1.00U	1.00U	1.00U	1.82	1.48
MW-15									
	Oct-02			UTA					
	Nov-02	1.00U	1.33	1.00U	1.00U	1.00U	1.00U	1.04	1.00U
MW-16									
	Oct-02			UTA					
	Nov-02	--	--	--	--	--	--	1.00U	--
MW-17									
	Oct-02			UTA					
	Nov-02	--	--	--	--	--	--	1.00U	
RW-2									
	Jul-02								
	Oct-02	--		--	--	--	--	2.23	--

GROUNDWATER ANALYTICAL RESULTS
RCRA METALS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Silver (µg/l)	Arsenic (µg/l)	Barium (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Mercury (µg/l)	Lead (µg/l)	Selenium (µg/l)
RW-3									
	Jul-02			UTA					
	Oct-02			UTA					
RW-4									
	Jul-02	0.050U	6.10	66.9	0.080U	1.20	0.079	3.30	1.10
	Oct-02	--	--	--	--	--		1.23	--
RW-5									
	Jul-02			UTL					
	Oct-02	--		--	--	--		3.91	--

1 - Well designations have historically varied. The designations used here are consistent with the designations shown on Figure 5.
(--) - Sample not analyzed.
J - Anatyle was positively identified. The associated numerical result is an estimate.
ND - Not detected and reporting limit not available.
P - The analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
U - The analyte was not detected at or above the reported value.
UTA- No sample collected, unable to access well due to parked vehicle.
UTL - No sample collected, unable to locate well
DRY - Insufficient groundwater to sample
SPH - No sample collected due to the presence of separate phase hydrocarbons
* - Metals results for dissolved metals (filtered).

GROUNDWATER ANALYTICAL RESULTS
DISSOLVED METALS DATA PRIOR TO 7/02

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Lead (total) (µg/l)	Lead (dissolved) (µg/l)	Maganese (mg/l)	Ferrous Iron(mg/l)	Nitrate-Nitrogen (mg/l as N)	Sulfate (mg/l)
VP-1							
	Mar-91	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--
	Dec-99	--	--	--	--	--	--
	Jun-00	33.4	33.9	--	--	--	--
VP-2							
	Mar-91	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--
	Dec-99	262	61.7	--	--	--	--
	Jun-00	37.8	9.87	--	--	--	--
VP-4							
	Mar-91	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--
	Dec-99	--	--	--	--	--	--
	Jun-00	9.12	4.66	--	--	--	--

GROUNDWATER ANALYTICAL RESULTS
DISSOLVED METALS DATA PRIOR TO 7/02

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Lead (total) (µg/l)	Lead (dissolved) (µg/l)	Maganese (mg/l)	Ferrous Iron(mg/l)	Nitrate-Nitrogen (mg/l as N)	Sulfate (mg/l)
VP-5 (MW-5)							
	Mar-91	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--
	Dec-99	6.76	2.57	--	--	--	--
	Jun-00	3.75	2.66	--	--	--	--
VP-7 (MW-3)							
	Mar-91	--	--	--	--	--	--
	Oct-95	5.60P	--	--	--	--	--
	Jan-97	9.90	--	--	--	--	--
	Apr-97	3.40	--	--	--	--	--
	Jul-97	4.30J	--	--	--	--	--
	Nov-97	5.00	--	--	--	--	--
	Dec-99	5.91	2.11	7.76	11.7	0.10U	13.4
	Jun-00	--	2.13	--	--	--	--
VP-8 (MW-7)							
	Mar-91	--	--	--	--	--	--
	Oct-95	3.40P	--	--	--	--	--
	Jan-97	3.70	--	--	--	--	--
	Apr-97	24.6	--	--	--	--	--
	Jul-97	2.30	--	--	--	--	--
	Nov-97	12.7	--	--	--	--	--
	Dec-99	40.6	5.02	--	--	--	--
	Jun-00	17.7	7.95	--	--	--	--

GROUNDWATER ANALYTICAL RESULTS
DISSOLVED METALS DATA PRIOR TO 7/02

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Lead (total) (µg/l)	Lead (dissolved) (µg/l)	Maganese (mg/l)	Ferrous Iron(mg/l)	Nitrate-Nitrogen (mg/l as N)	Sulfate (mg/l)
VP-9							
	Mar-91	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--
	Dec-99	15.0	1.00U	420	9400	9200	34000
	Jun-00	15.2	1.00U	--	--	--	--
MW-4							
	Mar-91	--	--	--	--	--	--
	Oct-95	30.6	--	--	--	--	--
	Jan-97	36.5	--	--	--	--	--
	Apr-97	20.7	--	--	--	--	--
	Jul-97	19.5	--	--	--	--	--
	Nov-97	16.2	--	--	--	--	--
	Dec-99	19.8	9.86	10.5	6.15	0.10U	0.20U
	Jun-00	21.4	9.72	--	--	--	--

GROUNDWATER ANALYTICAL RESULTS
DISSOLVED METALS DATA PRIOR TO 7/02

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Lead (total) (µg/l)	Lead (dissolved) (µg/l)	Maganese (mg/l)	Ferrous Iron(mg/l)	Nitrate-Nitrogen (mg/l as N)	Sulfate (mg/l)
MW-6							
	Mar-91	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--
	Dec-99	--	--	--	--	--	--
	Jun-00	--	--	--	--	--	--
MW-9							
	Mar-91	--	--	--	--	--	--
	Oct-95	4.60P	--	--	--	--	--
	Jan-97	--	--	--	--	--	--
	Apr-97	6.80	--	--	--	--	--
	Jul-97	8.60J	--	--	--	--	--
	Nov-97	3.30	--	--	--	--	--
	Dec-99	15.0	1.03	10.5	6.15	--	--
	Jun-00	7.86	1.59	--	--	--	--
MW-10							
	Mar-91	--	--	--	--	--	--
	Oct-95	1.00U	--	--	--	--	--
	Jan-97	--	--	--	--	--	--
	Apr-97	1.00U	--	--	--	--	--
	Jul-97	1.20J	--	--	--	--	--
	Nov-97	4.90	--	--	--	--	--
	Dec-99	1.00U	1.00U	5.12	2.00U	0.72	70.6
	Jun-00	ND	ND	--	--	--	--

GROUNDWATER ANALYTICAL RESULTS
DISSOLVED METALS DATA PRIOR TO 7/02

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Lead (total) (µg/l)	Lead (dissolved) (µg/l)	Maganese (mg/l)	Ferrous Iron(mg/l)	Nitrate-Nitrogen (mg/l as N)	Sulfate (mg/l)
RW-2							
	Mar-91	--	--	--	--	--	--
	Oct-95	--	--	--	--	--	--
	Jan-97	--	--	--	--	--	--
	Apr-97	--	--	--	--	--	--
	Jul-97	--	--	--	--	--	--
	Nov-97	--	--	--	--	--	--
	Dec-99	--	--	--	--	--	--
	Jun-00	--	--	--	--	--	--

1 - Well designations have historically varied. The designations used here are consistent with the designations shown on Figure 5.
(--) - Sample not analyzed.
J - Anatyle was positively identified. The associated numerical result is an estimate.
ND - Not detected and reporting limit not available.
P - The analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
U - The analyte was not detected at or above the reported value.
UTA- No sample collected, unable to access well due to parked vehicle.
UTL - No sample collected, unable to locate well
DRY - Insufficient groundwater to sample
SPH - No sample collected due to the presence of separate phase hydrocarbons

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[(1)]	Date	Isopropyl-benzene (ug/l)	n- Propylbenzene (ug/l)	1,3,5- Trimethylbenzene (ug/l)	1,2,4- Trimethylbenzene (ug/l)	p-Isopropyltoluene (ug/l)	n- butylbenzene (ug/l)	Naphthalene (ug/l)	Tetra-chloroethene (ug/l)	Tri- chloroethene (ug/l)	1,2- Dichloroethene (ug/l)	Chloroform (ug/l)	cis-1,2- Dichloroethene (ug/l)	sec-Butylbenzene (ug/l)
VP-1														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
VP-2														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
VP-3														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
VP-4														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
VP-5 (MW-5)														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Isopropyl-benzene (ug/l)	n- Propylbenzene (ug/l)	1,3,5- Trimethylbenzene (ug/l)	1,2,4- Trimethylbenzene (ug/l)	p-Isopropyltoluene (ug/l)	n- butylbenzene (ug/l)	Naphthalene (ug/l)	Tetra-chloroethene (ug/l)	Tri- chloroethene (ug/l)	1,2- Dichloroethene (ug/l)	Chloroform (ug/l)	cis-1,2- Dichloroethene (ug/l)	sec-Butylbenzene (ug/l)
VP-6														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
VP-7 (MW-3)														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
VP-8 (MW-7)														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
VP-9														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4														
	Jul-02	46.0	140	500	1,800	10.0U	23.0	360	8.00U	10.0U	5.00U	8.00U	8.00U	10.0U
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Isopropyl-benzene (ug/l)	n- Propylbenzene (ug/l)	1,3,5- Trimethylbenzene (ug/l)	1,2,4- Trimethylbenzene (ug/l)	p-Isopropyltoluene (ug/l)	n- butylbenzene (ug/l)	Naphthalene (ug/l)	Tetra-chloroethene (ug/l)	Tri- chloroethene (ug/l)	1,2- Dichloroethene (ug/l)	Chloroform (ug/l)	cis-1,2- Dichloroethene (ug/l)	sec-Butylbenzene (ug/l)
MW-6														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-9														
	Jun-00	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-10														
	Jul-02	2.00U	1.00U	1.00U	1.00U	1.00U	1.00U	2.00U	1.00U	1.00U	1.00U	1.00U	15.0	1.00
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-11														
	Jul-02	2.00U	1.00U	1.00U	1.00U	1.00U	1.00U	2.00U	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-12														
	Oct-02	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U	9.58	2.75	1.00	1.68	9.07	1.00U

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[(1)]	Date	Isopropyl-benzene (ug/l)	n- Propylbenzene (ug/l)	1,3,5- Trimethylbenzene (ug/l)	1,2,4- Trimethylbenzene (ug/l)	p-Isopropyltoluene (ug/l)	n- butylbenzene (ug/l)	Naphthalene (ug/l)	Tetra-chloroethene (ug/l)	Tri- chloroethene (ug/l)	1,2- Dichloroethene (ug/l)	Chloroform (ug/l)	cis-1,2- Dichloroethene (ug/l)	sec-Butylbenzene (ug/l)
MW-13														
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-14														
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-15														
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-16														
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-17														
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-2														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-3														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.[1]	Date	Isopropyl-benzene (ug/l)	n- Propylbenzene (ug/l)	1,3,5- Trimethylbenzene (ug/l)	1,2,4- Trimethylbenzene (ug/l)	p-Isopropyltoluene (ug/l)	n- butylbenzene (ug/l)	Naphthalene (ug/l)	Tetra-chloroethene (ug/l)	Tri- chloroethene (ug/l)	1,2- Dichloroethene (ug/l)	Chloroform (ug/l)	cis-1,2- Dichloroethene (ug/l)	sec-Butylbenzene (ug/l)
RW-4														
	Jul-02	2.00U	3.00	1.00U	20.0	2.00	1.00	5.00	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-5														
	Jul-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--
Trip Blank LB														
	Oct-02	--	--	--	--	--	--	--	--	--	--	--	--	--

1 - Well designations have historically varied. The designations used here are consistent with the designations shown on Figure 5.
(--) - Sample not analyzed.
DRY - Insufficient groundwater to sample
DUP - Duplicate samples
RA - Reported as o-xylene, total xylene not reported.
SPH - No sample collected due to the presence of separate phase hydrocarbons
U - The analyte was not detected at or above the reported value.
UTA- No sample collected, unable to access well due to parked vehicle.
UTL - No sample collected, unable to locate well
Note: Only those analytes detected in the samples listed at or above the laboratory reporting limits have been included in this table, complete analytical laboratory reports are included as Appendix F.

TABLE 1

GROUNDWATER ANALYTICAL RESULTS
SEMIVOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	2-Methylnaphthalene (µg/l)	2,4-Dichlorophenol (µg/l)	2,4-Dimethylphenol (µg/l)	Naphthalene (µg/l)	2-Methylphenol (µg/l)	4-Methylphenol (µg/l)	Bis(2-ethylhexyl)phthalate (µg/l)	Benzoic Acid (µg/l)	Phenol (µg/l)
VP-1	7/24/02	84.0	5.0U	80.0	160	13.0	18.0	31.0	10.0U	5.0U
VP-7	7/24/02	69.0	5.0U	28.0	420	5.0U	6.0	10.0U	34.0	5.0U
VP-8	7/24/02	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
MW-4	7/24/02	160	5.0U	24.0	500	6.0	9.0	10.0U	10.0U	5.0U
MW-10	7/24/02	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	13.0	10.0U	5.0U
MW-11	7/24/02	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U
MW-12	10/18/02	10.0U	10.0U	10.0U	10.0U	10.0U	10.0U	50.0U	20.0U	10.0U
MW-14	11/14/02	52.2	10.0U	13.4	242	11.0	24.8	50.0U	20.0U	34.5
MW-15	11/14/02	10.0U	10.0U	10.0U	10.0U	10.0U	10.0U	50.0U	20.0U	37.0
RW-4	7/24/02	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	10.0U	10.0U	5.0U

Note: Well designations have historically varied. The designations used here are consistent with the designations shown on Figure 5.
U - Analyte was not detected at or above the reported value.
Note: Only those analytes detected in the samples listed at or above the laboratory reporting limits have been included in this table, complete analytical laboratory reports are included as Appendix ___.
Note: Only those analytes detected in the samples listed at or above the laboratory reporting limits have been included in this table, complete analytical laboratory reports are included as Appendix F.

SOIL ANALYTICAL RESULTS
TPH-G, D, O, BTEX AND HYDRCARBON FRACTIONS

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	TPH-G (mg/kg)	TPH-D (mg/kg)	TPH-O (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total VPH [1] (mg/kg)	Total EPH [2] (mg/kg)
DVP-1-1	9/12/02	1,640	333	ND	0.554	ND	13.3	49.7	1,020	382
DVP-1-6	9/12/02	4,600	1,360	31.8	7.72	84.6	41.9	175	NA	NA
DVP-2-1	9/12/02	5.00U	10.0U	25.0U	0.300U	0.500U	0.500U	0.100U	5.00U	5.00U
DVP-2-6	9/12/02	8,850	2,030	52.4	14.0	157	112	523	4,980	1,950
DVP-4-6*	9/12/02	5,860	2,170	65.0	10.7	101	75.4	370	4,590	2,200
Source Blank [3]	9/12/02	50.00U	--	--	0.500U	0.500U	0.500U	1.00I	--	--
Rinsate Blank [3]	9/12/02	50.00U	--	--	0.500U	0.500U	0.500U	1.00U	--	--
Field Blank [3]	9/12/02	50.00U	--	--	0.500U	0.500U	0.500U	1.00U	--	--
Trip Blank [3]	9/12/02	50.00U	--	--	0.586	0.500U	0.500U	1.00U	--	--

(--) - sample not analyzed.
1 - Total Volatile Petroleum Hydrocarbons (VPH) by WDOE policy method VPH reported is total for C5 through C13 Aliphatics and Aromatics.
2 - Total Extractable Petroleum Hydrocarbons (EPH) by WDOE policy method EPH reported is total for C8 through C34 Aliphatics and Aromatics.
3 - Results are for water and reported as ug/L
U - The analyte was not detected at or above the reported value.
* - DVP-4 samples were duplicate of DVP-2

SOIL ANALYTICAL RESULTS
TOTAL METALS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Silver (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Mercury (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)
DVP-1-1	9/12/02	0.658U	3.72	88.6	0.658U	41.1	0.200U	6.00	0.658U
DVP-2-1	9/12/02	0.500U	2.28	81.60	0.500U	37.50	0.200U	2.91	0.500U
DVP-2-6	9/12/02	0.694U	2.46	46.1	0.694U	27.1	0.200U	5.04	0.694U
DVP-4-6*	9/12/02	0.500U	2.45	47.8	0.500U	31.6	0.200U	4.35	0.500U

U - The analyte was not detected at or above the reported value.
* - DVP-4 samples were duplicate of DVP-2

SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	DVP-1-1 (B210261-01)	DVP-1-1 (B210261-01RE1)	DVP-1-1 (B210261-01RE2)	DVP-2-1 (B210261-03)
Date Sampled	9/12/02	9/12/02	9/12/02	9/12/02
Reporting Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
n-Butylbenzene	33.7	23.7	36.8	0.0050U
sec-Butylbenzene	5.74	4.53	10.0U	0.0050U
Ethylbenzene	50.6	41.3	58.0	0.0040U
Isopropylbenzene	7.60	6.06	10.0U	0.0050U
p-Isopropyltoluene	14.3	8.94	13.1	0.0050U
Naphthalene	23.0	16.7	26.8	0.0050U
n-Propylbenzene	47.1	29.9	42.1	0.0050U
Toluene	2.42	2.00U	10.0U	0.00176
1,2,4-Trimethylbenzene	149	189	276	0.0050U
1,3,5-Trimethylbenzene	64.2	58.3	79.2	0.0050U
Total Xylenes	211	229	330	0.100U

U - The analyte was not detected at or above the reported value.
Note: Only those analytes detected in the samples listed at or above the laboratory reporting limits have been included in this table, complete analytical laboratory reports are included as Appendix ___.

SOIL ANALYTICAL RESULTS
SEMIVOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	2-Methylnaphthalene (mg/kg)	Naphthalene (mg/kg)
DVP-1-1 (B210261-01)	09/12/02	2.94	1.53

U - The analyte was not detected at or above the reported value.
Note: Only those analytes detected in the samples listed at or above the laboratory reporting limits have been included in this table, complete analytical laboratory reports are included as Appendix ___.

SOIL ANALYTICAL RESULTS
POLYNUCLEAR AROMATIC HYDROCARBONS

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	DVP-1-1 (B210261-01)	DVP-2-1 (B210261-01)
Date Sampled	9/12/2002	9/12/2002
Reporting Units	mg/kg	mg/kg
Benzo (a) anthracene	0.010U	0.010U
Benzo (a) pyrene	0.010U	0.010U
Benzo (b) fluoranthene	0.010U	0.010U
Benzo (k) fluoranthene	0.010U	0.010U
Chrysene	0.010U	0.010U
Dibenz (a,h) anthracene	0.010U	0.010U
Indeno (1,2,3-cd) pyrene	0.010U	0.010U
1- Methylnaphthalene	1.92	0.010U
2- Methylnaphthalene	3.86	0.010U
Naphthalene	1.82	0.010U

U - The analyte was not detected at or above the reported value.

GROUNDWATER ANALYTICAL RESULTS

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	TPH-G (µg/l)	TPH-D (µg/l)	TPH-O (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Total Xylenes (µg/l)
DVP-1	9/12/02	98,100	--	--	7,640	18,600	2,660	15,000
DVP-2	9/12/02	107,000	--	--	13,500	19,100	2,140	12,400
DVP-4*	9/12/02	102,000	--	--	12,300	17,400	1,980	11,500

(--) - Analytical data unavailable due to laboratory processing error.
U - The analyte was not detected at or above the reported value.
* - DVP-4 samples were duplicate of DVP-2

TABLE 4

SOIL ANALYTICAL RESULTS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	TPH-G (mg/kg)	TPH-D (mg/kg)	TPH-O (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total VPH [1] (mg/kg)	Total EPH [2] (mg/kg)
DP-1-16	9/18/02	5.00U	10.0U	25.0U	0.0300U	0.0500U	0.0568	0.121	5.00U	8.64
DP-2-14	9/18/02	5.00U	10.0U	25.0U	0.0571	0.0500U	0.0500U	0.100U	5.00U	5.00U
DP-2-20	9/18/02	--	--	--	--	--	--	--	5.00U	5.00U
DP-3-12	9/20/02	1,140	1,060	25.0U	2.39	2.01	10.3	20.3	1,410	685
DP-4-20	9/20/02	90.9	18.4	25.0U	0.131	0.248	0.851	3.34	60.6	5.00U
DP-5-14	9/20/02	8,160	1,200	25.0U	17.4	98.2	97.2	569	3,440	355
DP-6-22	9/20/02	7,750	88.7	25.0U	33.0	242	83.7	369	2,050	259
DP-7-20	9/20/02	329	788	25.0U	0.844	4.25	2.61	10.3	326	1,890
Tip Blank[3]	9/18/02	50.00U	--	--	0.500U	0.500U	0.500U	1.00U	--	--

(--) - sample not analyzed.
1 - Total Volatile Petroleum Hydrocarbons (VPH) by WDOE policy method VPH reported is total for C5 through C13 Aliphatics and Aromatics.
2 - Total Extractable Petroleum Hydrocarbons (EPH) by WDOE policy method EPH reported is total for C8 through C34 Aliphatics and Aromatics.
ND - not detected above laboratory detection limits. Laboratory detection limits not available or reported.
U - The analyte was not detected at or above the reported value.

TABLE 4

SOIL ANALYTICAL RESULTS
TOTAL METALS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Silver (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Mercury (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Lead [(1)] (mg/kg)
DP-1-16	9/18/02	0.500U	2.33	57.1	0.500U	30.5	0.200U	1.92	0.500U	-
DP-2-14	9/18/02	0.500U	3.58	83.9	0.500U	36.2	0.200U	2.39	0.500U	-
DP-2-20	9/20/02	-	-	-	-	-	-	-	-	1.85
DP-3-12	9/20/02	0.500U	2.66	79.0	0.572	29.5	0.200U	4.15	0.500U	-
DP-4-18	9/20/02	-	-	-	-	-	-	-	-	3.36
DP-4-20	9/20/02	0.500U	1.69	29.0	0.500U	12.0	0.200U	1.78	0.500U	-
DP-5-14	9/20/02	-	-	-	-	-	-	-	-	3.53
DP-6-14	9/20/02	-	-	-	-	-	-	-	-	5.13
DP-6-22	9/20/02	0.500U	1.65	60.4	0.873	22.6	0.200U	4.74	0.500U	-
DP-7-10	9/20/02	-	-	-	-	-	-	-	-	5.40
DP-7-20	9/20/02	0.500U	2.14	74.9	0.500U	29.6	0.200U	9.48	0.500U	-

[(1)] From analysis of total lead in soil separate of RCRA metals by EPA 6000/7000 series methods

TABLE 4

SOIL ANALYTICAL RESULTS
POLYNUCLEAR AROMATIC HYDROCARBONS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Benzo (a) anthracene (mg/kg)	Benzo (a) pyrene (mg/kg)	Benzo (b) fluoranthene (mg/kg)	Benzo (k) fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenz (a,h) anthracene (mg/kg)	Indeno (1,2,3-cd) pyrene (mg/kg)	1-Methylnaphthalene (mg/kg)	2-Methylnaphthalene (mg/kg)	Naphthalene (mg/kg)
DP-1-16	9/18/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U
DP-2-14	9/18/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U
DP-3-12	9/20/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	1.96	3.20	0.207
DP-4-20	9/20/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0354	0.0680	0.0231
DP-5-14	9/20/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.744	1.28	0.210
DP-6-22	9/20/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	1.86	3.70	0.863
DP-7-20	9/20/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	7.50	14.1	4.99

TABLE 4

SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Benzene	n-Butylbenzene	sec-Butylbenzene	Ethylbenzene	Isopropylbenzene	p-Isopropyltoluene	Naphthalene	n-Propylbenzene	Toluene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Total Xylenes [1]
DP-1-16	9/18/02	0.00336	0.00500U	0.00500U	0.00400U	0.00500U	0.00500U	0.00500U	0.00500U	0.00150U	0.00500U	0.00500U	0.0100U
DP-2-14	9/18/02	0.100U	0.100U	0.100U	0.100U	0.100U	0.100U	0.100U	0.100U	0.100U	0.100U	0.100U	0.0100U
DP-3-12	9/20/02	0.100U	0.170	0.100U	0.100U	0.100U	0.100U	0.100U	0.100U	0.100U	0.587	0.184	0.193
DP-4-20	9/20/02	0.100U	0.813	0.100U	0.233	0.100U	0.281	0.421	0.395	0.100U	3.09	0.947	1.17
DP-5-14	9/20/02	5.35	14.5	3.35	32.3	3.86	6.74	13.4	22.0	59.5	65.2	27.9	137
DP-5-14 RE	9/20/02	5.23	13.3	4.00U	34.6	4.00U	5.33	13.7	17.6	69.1	94.6	28.5	214
DP-6-22	9/20/02	52.2	28.7	1.00U	112	8.03	9.96	40.2	39.0	423	214	68.0	568
DP-6-22 RE	9/20/02	51.8	30.4	20.0U	110	20.0U	20.0U	42.7	37.7	448	236	60.9	629
DP-7-20	9/20/02	1.39	2.75	0.100U	4.83	0.503	0.985	2.81	2.64	9.49	15.4	4.57	26.8
DP-7-20 RE	9/20/02	2.00U	2.82	2.00U	4.77	2.00U	2.00U	2.88	2.49	8.67	16.1	4.92	27.9
Tip Blank [1]	9/18/02	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U	1.00U	2.00U

NOTE: Results are for soil and reported as mg/kg

Only those analytes detected in the samples listed at or above the laboratory reporting limits have been included in this table, complete analytical laboratory reports are included as Appendix B.

1 - Results are for sum of m, p and o - Xylene isomers

TABLE 4

SOIL ANALYTICAL RESULTS
SEMIVOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Benzoic Acid (mg/kg)	Fluorene (mg/kg)	Isophorone (mg/kg)	Di-n-octyl phthalate (mg/kg)	2-Methylnaphthalene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Phenol (mg/kg)
DP-1-16	9/18/02	1.00U	0.330U	0.330U	0.330U	0.330U	0.330U	0.330U	0.515
DP-2-14	9/18/02	1.01	0.330U	0.330U	0.330U	0.330U	0.330U	0.330U	1.05
DP-3-12	9/20/02	1.00U	0.330U	0.330U	0.575	9.54	3.05	2.56	2.15
DP-4-20	9/20/02	1.00U	0.330U	0.330U	0.330U	0.330U	0.330U	0.330U	0.330U
DP-5-14	9/20/02	1.00U	1.80	0.666	0.330U	20.1	11.5	2.92	0.330U
DP-6-22	9/20/02	1.00U	0.330U	0.330U	0.339	20.0	17.6	1.37	0.653
DP-7-20	9/20/02	1.00U	0.330U	0.330U	0.330U	4.27	1.85	0.827	1.41

Note: Only those analytes detected in the samples listed at or above the laboratory reporting limits have been included in this table, complete analytical laboratory reports are included as Appendix B.

TABLE 5

SOIL ANALYTICAL RESULTS
TPH-G, D, O, BTEX AND HYDROCARBON FRACTIONS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	TPH-G (mg/kg)	TPH-D (mg/kg)	TPH-O (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total VPH [1] (mg/kg)	Total EPH [2] (mg/kg)
DB-1-16.0	9/26/02	5.00U	10.0U	25.0U	0.030U	0.050U	0.050U	0.100U	--	--
DB-2-14.0	9/24/02	5.00U	10.0U	25.0U	0.030U	0.050U	0.050U	0.100U	5.00U	5.00U
DB-3-11.0	9/26/02	8.30	10.5	25.0U	0.030U	0.050U	0.0602	0.176	--	--
DB-3-31.5	9/26/02	5.74	10.0U	25.0U	0.0544	0.309	0.160	0.840	--	--
DB-4-9.0	9/25/02	1,740	802	125U	0.300U	2.56	10.2	20.4	--	--
DB-4-11.5	9/25/02	728	100	25.0U	0.300U	1.31	11.0	56.3	--	--
DB-4-21.5	9/25/02	5.00U	42.6	25.0U	0.820	0.0674	0.500U	0.100U	--	--
DB-5-13.0	9/23/02	10,200	3,060	500U	23.0	145	105	445	--	--
DB-5-24.0	9/23/02	5.00U	10.0U	25.0U	0.0300U	0.0500U	0.500U	0.100U	--	--
DB-6-16.5	9/25/02	5.00U	10.0U	25.0U	0.0300U	0.0500U	0.0516	0.216	--	--
DB-6-26.5	9/25/02	5.00U	10.0U	25.0U	0.0300U	0.0500U	0.0500U	0.100U	--	--
DB-7-11.5	9/24/02	5.00U	10.0U	25.0U	0.0300U	0.0500U	0.0500U	0.100U	5.00U	5.00U
DB-7-33.5	9/24/02	5.00U	10.0U	25.0U	0.117	0.0500U	0.0500U	0.100U	--	--

TABLE 5

SOIL ANALYTICAL RESULTS
TPH-G, D, O, BTEX AND HYDROCARBON FRACTIONS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	TPH-G (mg/kg)	TPH-D (mg/kg)	TPH-O (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total VPH [1] (mg/kg)	Total EPH [2] (mg/kg)
DB-8-16.5	9/25/02	5.00U	10.0U	25.0U	0.0300U	0.0500U	0.0500U	0.100U	5.00U	5.00U
DB-9-16.0	9/24/02	5.00U	10.0U	25.0U	0.0300U	0.0500U	0.0500U	0.100U	--	--
DB-10-11.0	9/23/02	5.00U	10.0U	25.0U	0.0300U	0.0500U	0.0500U	0.100U	--	--
DB-11-10.5	9/26/02	5.00U	18.4	41.4	0.0300U	0.0500U	0.0500U	0.100U	--	--
Drum DB-5	9/23/02	381	128	89.5	0.721	4.62	3.72	16.9	--	--
Blank #1[3]	9/24/02	50.0U	0.250U	0.500U	0.500U	0.500U	0.500U	1.00U	--	--
Blank #2[3]	9/24/02	50.0U	0.250U	0.500U	0.500U	0.500U	0.500U	1.00U	--	--
Blank #3[3]	9/26/02	50.0U	0.250U	0.500U	0.500U	0.500U	0.500U	1.00U	--	--
Blank #4[3]	9/26/02	50.0U	0.250U	0.500U	0.500U	0.500U	0.500U	1.00U	--	--
Tip Blank #1[3]	9/23/02	50.0U	--	--	0.500U	0.500U	0.500U	1.00U	--	--
Tip Blank #2[3]	9/25/02	50.0U	--	--	0.500U	0.500U	0.500U	1.00U	--	--
Tip Blank #3[3]	9/24/02	50.0U	--	--	0.500U	0.500U	0.500U	1.00U	--	--
Tip Blank #4[3]	9/24/02	50.0U	--	--	0.500U	0.500U	0.500U	1.00U	--	--
Tip Blank #5[3]	9/26/02	50.0U	--	--	0.500U	0.500U	0.500U	1.00U	--	--
Tip Blank #6[3]	9/26/02	50.0U	--	--	0.500U	0.500U	0.500U	1.00U	--	--
Tip Blank #7[3]	9/26/02	50.0U	--	--	0.500U	0.500U	0.500U	1.00U	--	--

(--) - sample not analyzed.
1 - Total Volatile Petroleum Hydrocarbons (VPH) by WDOE policy method VPH reported is total for C5 through C13 Aliphatics and Aromatics.
2 - Total Extractable Petroleum Hydrocarbons (EPH) by WDOE policy method EPH reported is total for C8 through C34 Aliphatics and Aromatics.
3 - Results are for water and reports as ug/L
U - Analyte was not detected at or above the reported value.

TABLE 5

SOIL ANALYTICAL RESULTS
TOTAL RCRA METALS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Silver (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Mercury (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Lead [(1)] (mg/kg)
DB-2-14	9/24/02	0.500U	4.53	80.2	0.500U	48.6	0.200U	2.61	0.935	--
DB-2-16.5	9/24/02	--	--	--	--	--	--	--	--	2.56
DB-3-11	9/26/02	0.500U	2.27	49.6	0.500U	29.2	0.200U	6.89	0.500U	--
DB-3-31.5	9/26/02	--	--	--	--	--	--	--	--	6.46
DB-4-11.5	9/25/02	0.500U	3.18	82.1	0.500U	33.1	0.200U	3.78	0.500U	--
DB-4-21.5	9/25/02	--	--	--	--	--	--	--	--	2.00
DB-5-13	9/23/02	0.500U	1.73	49.9	0.500U	30.4	0.200U	8.72	0.500U	--
DB-5-24	9/23/02	--	--	--	--	--	--	--	--	1.29
DB-6-16.5	9/25/02	0.500U	1.87	52.0	0.500U	25.7	0.200U	2.44	0.500U	--
DB-6-26.5	9/25/02	--	--	--	--	--	--	--	--	3.32
DB-7-11.5	9/24/02	0.500U	3.18	58.4	0.500U	25.8	0.200U	2.04	0.500U	--
DB-7-33.5	9/24/02	--	--	--	--	--	--	--	--	10.5
DB-8-16.5	9/25/02	0.500U	1.19	33.6	0.500U	22.8	0.200U	1.62	0.500U	--
DB-9-16	9/24/02	--	--	--	--	--	--	--	--	1.82
DB-10-11	9/23/02	--	--	--	--	--	--	--	--	3.41
Drum DB-5	9/23/02	--	--	--	--	--	--	--	--	1.87

TABLE 5

SOIL ANALYTICAL RESULTS
TOTAL RCRA METALS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Silver (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Mercury (mg/kg)	Lead (mg/kg)	Selenium (mg/kg)	Lead [1] (mg/kg)
Blank #1[2]	9/24/02	0.0010U	0.0010U	0.010U	0.0010U	0.0010U	0.0010U	0.0010U	0.0010U	0.0010U
Blank #2[2]	9/24/02	0.0010U	0.0010U	0.010U	0.0010U	0.0010U	0.0010U	0.0010U	0.0010U	0.0010U
Blank #3[2]	9/26/02	0.0010U	0.0010U	0.010U	0.0010U	0.0010U	0.0010U	0.0010U	0.0010U	0.0010U
Blank #4[2]	9/26/02	0.0010U	0.0010U	0.010U	0.0010U	0.0010U	0.0010U	0.0010U	0.0010U	0.0010U

[1] From analysis of total lead in soil separate of RCRA metals by EPA 6000/7000 series methods

[2] Results are for water, and reported as ug/L.

U - Analyte was not detected at or above the reported value.

TABLE 5

SOIL ANALYTICAL RESULTS
POLYNUCLEAR AROMATIC HYDROCARBONS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Benzo (a) anthracene (mg/kg)	Benzo (a) pyrene (mg/kg)	Benzo (b) fluoranthene (mg/kg)	Benzo (k) fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenz (a,h) anthracene (mg/kg)	Indeno (1,2,3-cd) pyrene (mg/kg)	1-Methylnaphthalene (mg/kg)	2-Methylnaphthalene (mg/kg)	Naphthalene (mg/kg)
DB-2-14	9/24/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0106
DB-3-11	9/26/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0206	0.0100U	0.0100U
DB-4-9	9/25/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	2.53	6.03	2.42
DB-5-13	9/23/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	16.3	31.5	25.9
DB-6-16.5	9/25/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0106	0.0179
DB-7-11.5	9/24/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U
DB-8-16.5	9/25/02	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U	0.0100U

U - Analyte was not detected at or above the reported value.

TABLE 5

SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Acetone	Benzene	n-Butylbenzene	Ethylbenzene	Isopropylbenzene	p-Isopropyltoluene	Methylene chloride	Naphthalene	n-Propylbenzene	Toluene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	m,p- Xylenes	o-Xylenes	Total Xylenes
DB-2-14.0	9/24/02	0.0507	0.0015U	0.005U	0.004U	0.005U	0.005U	0.00469	0.005U	0.005U	0.0015U	0.00879	0.005U	ANR	ANR	0.010U
DB-3-11.0	9/26/02	0.030U	0.0015U	0.005U	0.004U	0.005U	0.005U	0.0035U	0.005U	0.005U	0.0015U	0.005U	0.005U	ANR	ANR	0.010U
DB-4-9.0	9/25/02	5.00U	0.500U	0.963	1.09	0.500U	0.500U	5.00U	1.70	1.22	0.500U	9.39	2.84	6.58	1.04	--
DB-5-13.0	9/23/02	100U	29.2	48.6	180	16.3	15.3	100U	66.0	68.5	339	472	158	ANR	ANR	1,050
DB-6-16.5	9/25/02	0.0625	0.0171	0.005U	0.0129	0.005U	0.005U	0.0035U	0.0431	0.005U	0.0266	0.0586	0.0117	ANR	ANR	0.118
DB-7-11.5	9/24/02	0.0300U	0.0015U	0.005U	0.004U	0.005U	0.005U	0.00488	0.005U	0.005U	0.0015U	0.005U	0.005U	ANR	ANR	0.100U
DB-8-16.5	9/25/02	0.0300U	0.0015U	0.005U	0.005U	0.005U	0.005U	0.0035U	0.005U	0.005U	0.0015U	0.005U	0.005U	ANR	ANR	0.010U
BLANK #1[(1)]	9/24/02	25.0U	1.00U	1.00U	1.00U	1.00U	1.00U	5.00U	1.00U	1.00U	1.00U	1.00U	1.00U	2.00U	1.00U	--
BLANK #2[(1)]	9/24/02	25.0U	1.00U	1.00U	1.00U	1.00U	1.00U	5.00U	1.00U	1.00U	1.00U	1.00U	1.00U	2.00U	1.00U	--
BLANK #3[(1)]	9/26/02	25.0U	1.00U	1.00U	1.00U	1.00U	1.00U	5.00U	1.00U	1.00U	1.00U	1.00U	1.00U	2.00U	1.00U	--
BLANK #4[(1)]	9/26/02	25.0U	1.00U	1.00U	1.00U	1.00U	1.00U	5.00U	1.00U	1.00U	1.00U	1.00U	1.00U	2.00U	1.00U	--

NOTE: All results reported as mg/kg
ANR - Analyte not reported or reported as total value
U - Analyte was not detected at or above the reported value.
Note: Only those analytes detected in the samples listed at or above the laboratory reporting limits have been included in this table,
Complete analytical laboratory reports are included in Appendix B.
[(1)] Results are for water, and reported as ug/L.

TABLE 5

SOIL ANALYTICAL RESULTS
SEMIVOLATILE ORGANIC COMPUNDS
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D.	Date	Benzyl alcohol (mg/kg)	2-Methylnaphthalene (mg/kg)	Naphthalene (mg/kg)
DB-2-14	9/23/02	4.99	0.330U	0.330U
DB-3-11	9/26/02	6.34	0.330U	0.330U
DB-4-9	9/25/02	0.330U	0.330U	0.330U
DB-5-13	9/23/02	9.27	31.8	40.0
DB-6-16.5	9/25/02	0.330U	0.330U	0.330U
DB-7-11.5	9/24/02	7.71	0.330U	0.330U
DB-8-16.5	9/25/02	0.330U	0.330U	0.330U
Blank #1[(1)]	9/24/02	10.00U	10.00U	10.00U
Blank #2[(1)]	9/24/02	10.00U	10.00U	10.00U
Blank #3[(1)]	9/26/02	10.00U	10.00U	10.00U
Blank #4[(1)]	9/26/02	10.00U	10.00U	10.00U

[(1)] Results are for water, and reported as ug/L.
U - Analyte was not detected at or above the reported value.
Note: Only those analytes detected in the samples listed at or above the laboratory reporting limits have been included in this table, complete analytical laboratory reports are included as Appendix B.

TABLE 6

SOIL PHYSICAL DATA
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Sample I.D. [1]	Depth (feet)	Moisture Content [3] (% of dry weight)	Organic Content [2] (% of dry weight)	Dry Density [4] (lbs/ft^3)	Total Porosity	Effective Porosity [6]	Hydraulic Conductivity (cm/s)	Air Permeability [5] (cm^2)
DB-3-18	18	19.98	1.12	118.3	0.31	0.27	3.41E-02	
DB-4-6.5	6.5	18.32	0.78	95.3	0.44			1.72E-08
DB-4-18	18	22.41	1.48	113.9	0.33	0.28	3.11E-03	
DB-5-9	9	20.57	0.38	97.6	0.40			<1.87E-10
DB-5-18	18	10.95	1.56	114.1	0.33	0.12	3.69E-03	
DB-7-6.5	6.5	17.54	0.62	85.0	0.49			1.52E-08
DB-7-20.5	20.5	9.54	0.55	110.2	0.35	0.35	2.76E-02	

1 - Samples were collected between Sept 23 and 26, 2002.
2 - The Fraction of Organic Carbon was measured according to ASTM Method D-2974
3 - The Moisture Content was measured according to ASTM D2216.
4 - The Density was measured according to ASTM D2937.
5 - The Air Permeability was measured according to ASTM D4525.
6 - The Effective Porosity was calculated from the break-through curved developed by passing a tracer througl the sample.

TABLE 7

WELL COMPLETION DATA WITH ELEVATIONS

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Well Identification Casing	Top of Well Casing (feet)[1]	Casing Diameter (inches)	Total Depth (feet)	Screened Interval (feet)
VP-1	103.03	2.0	14.81	NA
VP-2	104.72	2.0	14.55	NA
VP-3 (MW-2)	104.75	2.0	9.10	NA
VP-4	103.35	2.0	14.70	NA
VP-5 (MW-5)	102.63	2.0	16.50	NA
VP-6	101.90	2.0	14.72	NA
VP-7 (MW-3)	100.40	2.0	17.42	NA
VP-8 (MW-7)	104.88	2.0	16.76	NA
VP-9	112.35	2.0	13.50	NA
MW-4	102.07	2.0	17.50	NA
MW-6	113.32	2.0	28.32	NA
MW-9	114.27	2.0	27.70	NA
MW-10	115.28	2.0	29.15	NA
MW-11	NS	2.0	17.30	NA
DB-1 (MW-12)	113.36	2.0	16.28	7-17
DB-2 (MW-13)	114.80	2.0	19.90	10-20
DB-6 (MW-14)	104.64	2.0	24.45	10-25
DB-8 (MW-15)	99.03	2.0	24.80	10-25
DB-9 (MW-16)	101.83	2.0	24.70	10-25
DB-10 (MW-17)	99.29	2.0	24.85	10-25
RW-2	106.63	8.0	21.40	NA
RW-3	100.70	8.0	NS	NA
RW-4	110.82	8.0	32.78	NA
RW-5	104.22	8.0	14.25	NA

Notes:
Wells surveyed relative to on-site datum
Total depth = Depth below top of well casing in feet
NS - Elevation has not been established - well not surveyed

TABLE 8

SOIL VAPOR ANALYTICAL RESULTS

Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Compound Name	Sample Location Sample I.D. Concentration Date	DVP-1 SUMMA 0132 ppb (v) 10/3/02	DVP-2 SUMMA 0101 ppb (v) 10/3/02
EPA METHODS 18 & 25			
Methane		25,000	350
>C4-C10 Hydrocarbons		8,600	3,800
EPA METHOD TO-14			
Dichlorodifluoromethane		1500 U	0.2 U
Feron 114		1500 U	0.2 U
Chloromethane		1500 U	0.2 U
Vinyl chloride		1500 U	0.2 U
Bromomethane		1500 U	0.2 U
Chloroethane		1500 U	0.2 U
Trichlorofluoromethane		1500 U	0.2 U
1,1-Dichloroethene		1500 U	0.2 U
Feron 113		3800 U	0.5 U
3-Chloropropane		3800 U	0.5 U
Methylene chloride		3800 U	0.5 U
1,1-Dichloroethene		1500 U	0.2 U
cis-1,2-Dichloroethene		1500 U	0.2 U
Chloroform		1500 U	0.2 U
1,1,1-Trichloroethane		1500 U	0.2 U
Carbon tetrachloride		1500 U	0.2 U
1,2-Dibromoethane		1500 U	0.2 U
Benzene		**13000 D**	**6 D**
Trichlorofluoromethane		1500 U	0.2 U
1,2-Dichloropropane		1500 U	0.2 U
cis-1,3-Dichloropropene		1500 U	0.2 U
Toluene		**110000 D**	**35 D**
trans-1,3-Dichloropropene		1500 U	0.2 U
1,1,2-Trichloroethane		1500 U	0.2 U
Tetrachloroethene		**6200 D**	0.5 U
1,2-Dibromoethane		1500 U	0.2 U

TABLE 8

SOIL VAPOR ANALYTICAL RESULTS

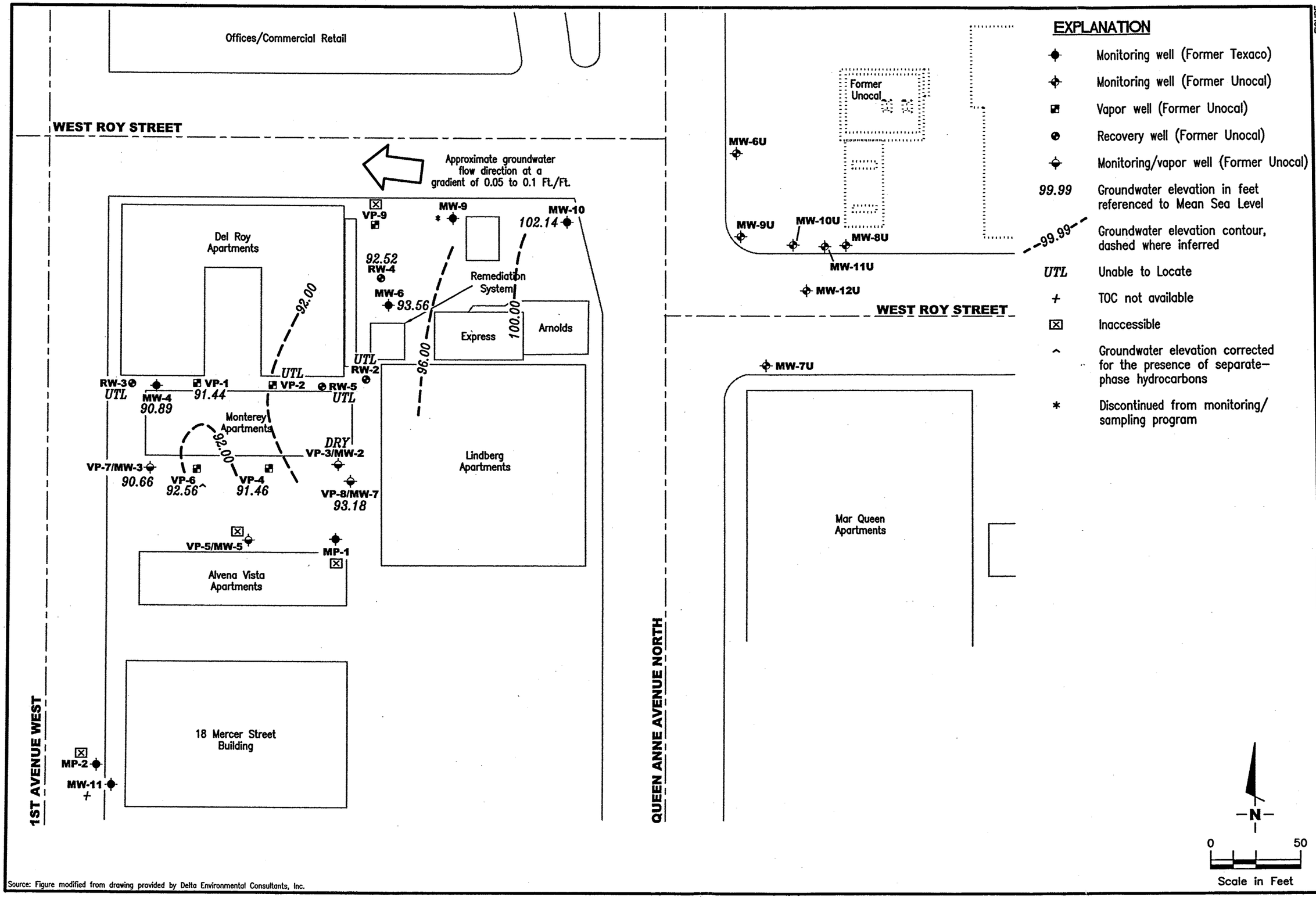
Former Queen Anne Texaco 211577
631 Queen Anne Avenue North
Seattle, WA

Compound Name	Sample I.D. Concentration Date	SUMMA 0132 ppb (v) 10/3/02	SUMMA 0101 ppb (v) 10/3/02
EPA METHOD TO-14 Con't			
Chlorobenzene		1500 U	0.2 U
Ethylbenzene		**55000 D**	**10 D**
m/p-Xylene		**360000 D**	**62 D**
o-Xylene		**140000 D**	**26 D**
Styrene		1500 U	0.2 U
1,1,2,2-Tetrachloroethane		1500 U	0.2 U
4-Ethyltoluene		**100000 D**	**16 D**
1,3,5-Trimethylbenzene		**64000 D**	**11 D**
1,2,4-Trimethylbenzene		**110000 D**	**18 D**
1,3-Dichlorobenzene		3800 U	0.5 U
1,4-Dichlorobenzene		3800 U	0.5 U
Benzyl chloride		1500 U	0.2 U
1,2-Dichlorobenzene		3800 U	0.5 U
1,2,4-Trichlorobenzene		7500 U	1 U
Hexachlorobutadiene		3800 U	0.5 U

APPENDIX A

Gettler-Ryan Inc. Groundwater Monitoring and Sampling Report

Figures from the latest Gettler-Ryan,Inc. *Groundwater Monitoring and Sampling Report* were not available for inclusion with this Appendix. In thier place, Figures 1 and 3 from Gettler-Ryan's previous *Groundwater Monitoring and Sampling Report* (July 24, 2002) have been included for reference.



Source: Figure modified from drawing provided by Delta Environmental Consultants, Inc.

FIGURE 1

POTENTIOMETRIC MAP
Former Texaco Service Station
631 Queen Anne North
Seattle, Washington (Site #211577)

REVISED DATE

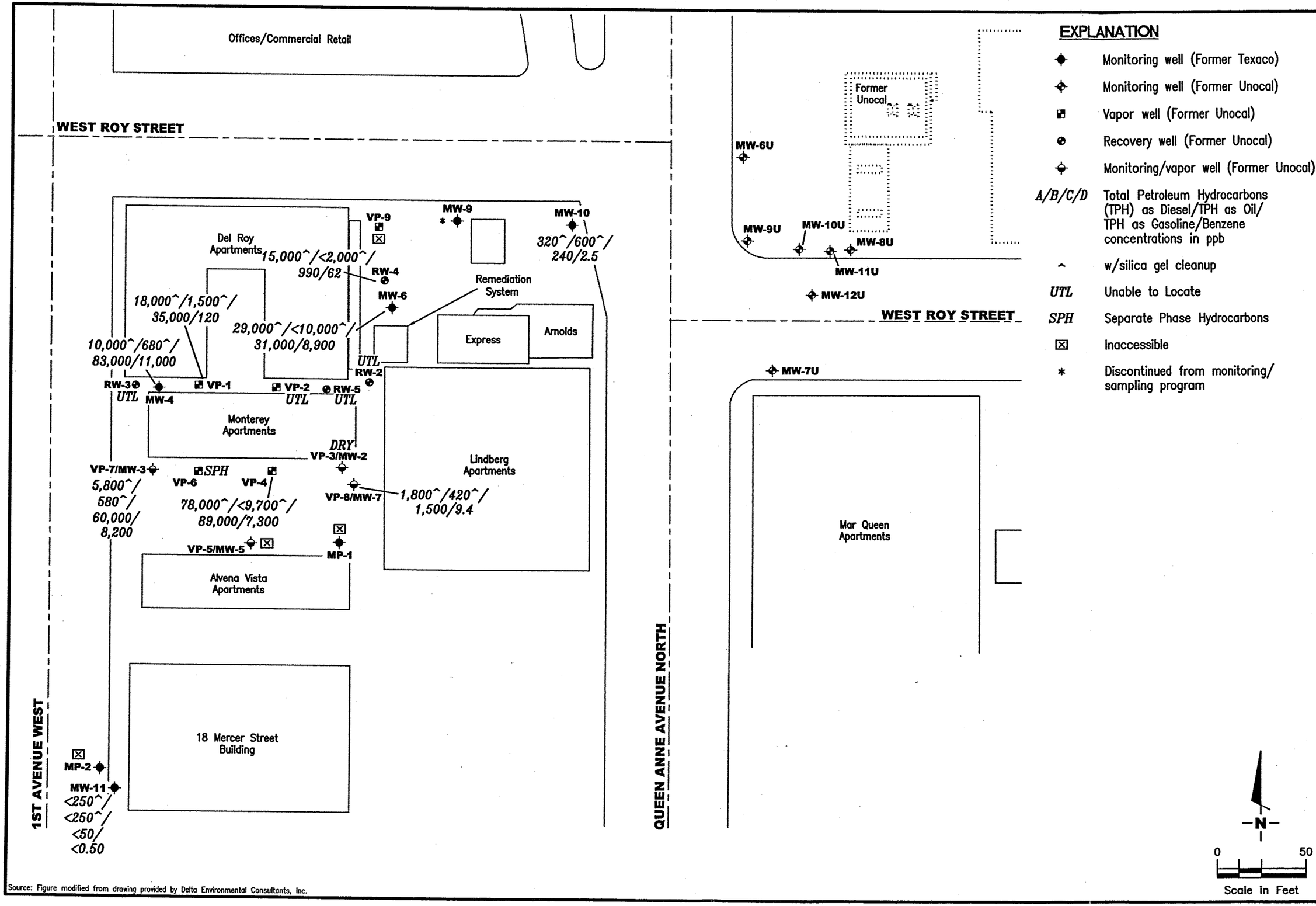
DATE July 24, 2002

GETTLER-RYAN INC.
6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555

PROJECT NUMBER 386765

REVIEWED BY

FILE NAME: P:\ENVIRO\TEXACO\211577\002-211577.DWG | Layout Tab: Pot3



Source: Figure modified from drawing provided by Delta Environmental Consultants, Inc.

FIGURE 2

CONCENTRATION MAP
Former Texaco Service Station
631 Queen Anne North
Seattle, Washington (Site #211577)

REVISED DATE

DATE
July 24, 2002

GETTLER-RYAN INC.
6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555

PROJECT NUMBER
386765

REVIEWED BY

FILE NAME: P:\ENVIRO\TEXACO\211577\Q02-211577.DWG | Layout Tab: Con3

Ta' 1

Groundwater Monitoring Data and Analytical Results

Former Texaco Service Station (Site #211577)

631 Queen Anne North

Seattle, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (msl)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)
VP-1											
103.03	07/24/02	11.59	91.44	0.00	18,000[1]	1,500[1]	35,000	120	820	280	4,600
	10/17-18/02	12.70	90.33	0.00	7,500[1]	598[1,2]	27,300	170	756	334	4,820
	01/21/03	**12.70**	**90.33**	**0.00**	**14,200[1]**	**807[1,2]**	**36,700**	**90.5**	**801**	**500**	**6,630**
VP-2											
104.72	07/24/02	UNABLE TO LOCATE		--	--	--	--	--	--	--	--
	10/17-18/02	13.60	91.12	0.00	NOT SAMPLED DUE TO INSUFFICIENT WATER				--	--	--
	01/21/03	**13.63**	**91.09**	**0.00**	**NOT SAMPLED DUE TO INSUFFICIENT WATER**				--	--	--
VP-3 (MW-2)											
104.75	07/24/02	DRY	--	--	--	--	--	--	--	--	--
	10/17-18/02	DRY	--	--	--	--	--	--	--	--	--
	01/21/03	**DRY**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
VP-4											
103.35	07/24/02	11.89	91.46	0.00	78,000[1]	<9,700[1]	89,000	7,300	7,500	1,900	13,000
	10/17-18/02	12.75	90.62**	0.03	NOT SAMPLED DUE TO THE PRESENCE OF SPH				--	--	--
	01/21/03	**12.61**	**90.82****	**0.10**	**NOT SAMPLED DUE TO THE PRESENCE OF SPH**				**--**	**--**	**--**
VP-5 (MW-5)											
102.63	07/24/02	INACCESSIBLE - VEHICLE PARKED OVER WELL				--	--	--	--	--	--
	10/17-18/02	12.31	90.32	0.00	3,900[1]	<500[1]	15,900	318	49.3	880	1,870
	01/21/03	**INACCESSIBLE - VEHICLE PARKED OVER WELL**				**--**	**--**	**--**	**--**	**--**	**--**
VP-6											
101.90	07/24/02	10.60	92.56**	1.58	NOT SAMPLED DUE TO THE PRESENCE OF SPH				--	--	--
	10/17-18/02	11.35	91.07**	0.65	NOT SAMPLED DUE TO THE PRESENCE OF SPH				--	--	--
	01/21/03	**11.27**	**91.93****	**1.63**	**NOT SAMPLED DUE TO THE PRESENCE OF SPH**				**--**	**--**	**--**

Ta' 1

Groundwater Monitoring Data and Analytical Results

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID/ TOC*(ft.)		DATE	DTW (ft.)	GWE (msl)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)
VP-7 (MW-3)												
100.40		07/24/02	9.74	90.66	0.00	5,800[1]	580[1]	60,000	8,200	7,000	1,500	8,300
		10/17-18/02	10.57	89.83	0.00	5,160[1]	510[1,2]	71,600	11,100	5,880	1,940	10,800
		01/21/03	**10.29**	**90.11**	**0.00**	**714[1,4]**	**<500[1]**	**41,600**	**9,440**	**1,470**	**1,360**	**6,190**
VP-8 (MW-7)												
104.88		07/24/02	11.70	93.18	0.00	1,800[1]	420[1]	1,500	9.4	9.2	34	50
		10/17-18/02	12.78	92.10	0.00	1,830[1]	<500[1]	552	9.75	1.45	4.25	5.73
		01/21/03	**12.63**	**92.25**	**0.00**	**1,120[1]**	**<500[1]**	**1,910**	**139**	**291**	**59.1**	**216**
VP-9												
112.35		07/24/02	INACCESSIBLE - VEHICLE PARKED OVER WELL				--	--	--	--	--	--
		10/17-18/02	11.90	100.45	0.00	13,200[1]	786[1,2]	1,910	11.3	2.62	8.86	14.7
		01/21/03	**INACCESSIBLE - VEHICLE PARKED OVER WELL**				--	--	--	--	--	--
MW-4												
102.07		07/24/02	11.18	90.89	0.00	10,000[1]	680[1]	83,000	11,000	9,900	1,800	11,000
		10/17-18/02	11.98	90.09	0.00	9,860[1]	697[1,2]	110,000	14,500	11,600	2,630	15,200
	(D)	10/17-18/02	--	--	--	7,100[1]	<500[1]	92,400	12,400	9,980	2,090	12,200
		01/21/03	**11.81**	**90.26**	**0.00**	**2,540[1,5]**	**<500[1]**	**80,000**	**10,700**	**10,100**	**1,920**	**11,700**
MW-6												
113.32		07/24/02	19.76	93.56	0.00	29,000[1]	<10,000[1]	31,000	8,900	1,600	820	4,200
		10/17-18/02	20.64	92.72**	0.05	NOT SAMPLED DUE TO THE PRESENCE OF SPH				--	--	--
		01/21/03	**21.71**	**91.63****	**0.03**	**NOT SAMPLED DUE TO THE PRESENCE OF SPH**				--	--	--
MW-9												
114.27		10/17-18/02	20.88	93.39	0.00	43,600[1]	671[1,2]	6,380	493	13.0	230	107
		01/21/03	**INACCESSIBLE - VEHICLE PARKED OVER WELL**				--	--	--	--	--	--

Ta' 1

Groundwater Monitoring Data and Analytical Results
Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (msl)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)
MW-10											
115.28	07/24/02	13.14	102.14	0.00	320[1]	600[1]	240	2.5	<0.50	<1.0	<1.5
	10/17-18/02	13.59	101.69	0.00	667[1]	<500[1]	490	3.42	<0.500	1.34	5.00
	01/21/03	**12.46**	**102.82**	**0.00**	**<250[1]**	**<500[1]**	**416**	**3.44**	**0.550**	**0.519**	**3.24**
MW-11											
	07/24/02	11.16	--	0.00	<250[1]	<250[1]	<50	<0.50	<0.50	<0.50	<1.5
	10/17-18/02	11.43	--	0.00	<250[1]	<500[1]	<50.0	<0.500	<0.500	<0.500	<1.00
	01/21/03	**11.29**	**--**	**0.00**	**<250[1]**	**<500[1]**	**<50.0**	**<0.500**	**<0.500**	**<0.500**	**<1.00**
DB-1 (MW-12)											
113.36	10/17-18/02	12.22	101.14	0.00	<250[1]	<500[1]	<50.0	0.516	0.869	<0.500	<1.00
	01/21/03	**11.72**	**101.64**	**0.00**	**<250[1]**	**<500[1]**	**<50.0**	**<0.500**	**<0.500**	**<0.500**	**<1.00**
DB-2 (MW-13)											
114.80	10/17-18/02	19.31	95.49	0.00	NOT SAMPLED DUE TO INSUFFICIENT WATER				--	--	--
	01/21/03	**19.01**	**95.79**	**0.00**	**NOT SAMPLED DUE TO INSUFFICIENT WATER**				**--**	**--**	**--**
DB-6 (MW-14)											
101.64	10/17-18/02	--	--	--	--	--	--	--	--	--	--
	11/14/02	11.88	89.76	0.00	4,710[1]	<500[1]	43,100[3]	9,900[3]	4,930[3]	1,540[3]	6,020[3]
	01/21/03	**INACCESSIBLE - VEHICLE PARKED OVER WELL**				**--**	**--**	**--**	**--**	**--**	**--**
DB-8 (MW-15)											
99.03	10/17-18/02	--	--	--	--	--	--	--	--	--	--
	11/14/02	9.44	89.59	0.00	780[1]	<500[1]	3,280	1,640	5.23	5.06	<10.0
	01/21/03	**9.29**	**89.74**	**0.00**	**<250[1]**	**<500[1]**	**<50.0**	**<0.500**	**<0.500**	**<0.500**	**<1.00**

Ta' 1

Groundwater Monitoring Data and Analytical Results
Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID/ TOC*(ft.)		DATE	DTW (ft.)	GWE (msl)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)
DB-9 (MW-16)												
101.83		10/17-18/02	--	--	--	--	--	--	--	--	--	--
		11/14/02	12.36	89.47	0.00	<250[1]	<500[1]	<50.0	<0.500	<0.500	<0.500	<1.00
		01/21/03	**11.88**	**89.95**	**0.00**	**<250[1]**	**<500[1]**	**<50.0**	**<0.500**	**<0.500**	**<0.500**	**<1.00**
DB-10 (MW-17)												
99.29		10/17-18/02	--	--	--	--	--	--	--	--	--	--
		11/14/02	10.00	89.29	0.00	<250[1]	<500[1]	2,780	569	31.0	91.1	250
		01/21/03	**9.62**	**89.67**	**0.00**	**<250[1]**	**<500[1]**	**<50.0**	**<0.500**	**<0.500**	**<0.500**	**<1.00**
RW-2												
106.63		07/24/02	UNABLE TO LOCATE		--	--	--	--	--	--	--	--
	NP	10/17-18/02	14.44	92.19	0.00	988[1]	<500[1]	1,380	90.5	8.05	29.2	31.5
	NP	**01/21/03**	**10.61**	**96.02**	**0.00**	**<250[1]**	**<500[1]**	**126**	**33.5**	**0.859**	**1.28**	**4.11**
RW-3												
100.70		07/24/02	UNABLE TO LOCATE		--	--	--	--	--	--	--	--
		10/17-18/02	UNABLE TO LOCATE		--	--	--	--	--	--	--	--
		01/21/03	**UNABLE TO LOCATE**		**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
RW-4												
110.82		07/24/02	18.30	92.52	0.00	15,000[1]	<2,000[1]	990	62	1.3	32	7.0
		10/17-18/02	19.29	91.53	0.00	8,930[1]	939[1]	3,160	59.8	2.50	40.4	15.6
		01/21/03	**17.88**	**92.94**	**0.00**	**2,830[1]**	**<500[1]**	**689**	**0.991**	**<0.500**	**2.37**	**7.03**
RW-5												
104.22		07/24/02	UNABLE TO LOCATE		--	--	--	--	--	--	--	--
		10/17-18/02	12.63	91.59	0.00	84,900[1]	3,650[1]	3,370	696	67.2	63.0	408
	NP	**01/21/03**	**11.81**	**92.41**	**0.00**	**1,860[1]**	**<500[1]**	**493**	**17.1**	**4.43**	**1.37**	**52.9**

Ta 1

Groundwater Monitoring Data and Analytical Results

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (msl)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)
MP-1											
	07/24/02	INACCESIBLE - UNABLE TO OPEN WELL				--	--	--	--	--	--
	10/17-18/02	INACCESIBLE - UNABLE TO OPEN WELL				--	--	--	--	--	--
	NOT MONITORED/SAMPLED										
MP-2											
	07/24/02	INACCESIBLE - CAR PARKED OVER WELL				--	--	--	--	--	--
	10/17-18/02	--	--	--	--	--	--	--	--	--	--
	NOT MONITORED/SAMPLED										
Trip Blank											
QA	07/24/02	--	--	--	--	--	<50	<0.50	<0.50	<0.50	<1.5
	10/17-18/02	--	--	--	--	--	<50.0	<0.500	<0.500	<0.500	<1.00
	11/14/02	--	--	--	--	--	<50.0	<0.500	<0.500	<0.500	<1.00
	01/21/03	--	--	--	--	--	**<50.0**	**<0.500**	**<0.500**	**<0.500**	**<1.00**

	TPH-D	TPH-O	TPH-G	B	T	E	X
Standard Laboratory Reporting Limits:	250	250	50.0	0.500	0.500	0.500	1.00
MTCA Method A Cleanup Levels:	1,000	1,000	1,000	5.0	40	30	20
Current Method:	NWTPH-D Extended		NWTPH-G and EPA 8021B				

Ta' 1

Groundwater Monitoring Data and Analytical Results

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

EXPLANATIONS:

TOC = Top of Casing
(ft.) = Feet
DTW = Depth to Water
GWE = Groundwater Elevation
(msl) = Mean Sea Level
TPH-D = Total Petroleum Hydrocarbons as Diesel
TPH-O = Total Petroleum hydrocarbons as Oil
TPH-G = Total Petroleum Hydrocarbons as Gasoline
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
D. LEAD = Dissolved Lead
(ppb) = Parts per billion
-- = Not Measured/Not Analyzed
QA = Quality Assurance/Trip Blank
NP = No Purge
MTCA = Model Toxics Control Act Cleanup Regulations [WAC 173-340-720(2)(a)(I), as amended 12/93].

* TOC elevations have been surveyed in feet relative to msl.

** GWE corrected due to the presence of SPH; correction factor: [(TOC - DTW) + (SPHT x 0.8)].

1 Analysis with silica gel cleanup.

2 Laboratory report indicates the heavy oil range organics present are due to hydrocarbons eluting primarily in the diesel range.

3 Laboratory report indicates this sample was received and analyzed unpreserved.

4 Laboratory report indicates results in the diesel organics range are primarily due to overlap from a gasoline range product.

5 Laboratory report indicates the sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Table 2

Separate Phase Hydrocarbon Thickness/Removal Data

Former Texaco Service Station (Site #211577)

631 Queen Anne North

Seattle, Washington

WELL ID	DATE	DTW *(ft.)*	SPH THICKNESS *(ft.)*	AMOUNT BAILED (SPH + WATER) *(gallons)*
VP-4	10/17-18/02	12.75	0.03	0.00
	01/21/03	**12.61**	**0.10**	**0.00**
VP-6	07/24/02	10.60	1.58	0.00
	10/17-18/02	11.35	0.65	0.00
	01/21/03	**11.27**	**1.63**	**0.00**
MW-6	10/17-18/02	20.64	0.05	0.00
	01/21/03	**21.71**	**0.03**	**0.00**

EXPLANATIONS:

DTW = Depth to Water

(ft.) = Feet

SPH = Separate Phase Hydrocarbons

Ta 3

Groundwater Analytical Results - SVOC and PAH

Former Texaco Service Station (Site #211577)

631 Queen Anne North

Seattle, Washington

WELL ID	DATE	2-Methylnaphthalene (ppb)	2,4-Dimethylphenol (ppb)	Naphthalene (ppb)	Phenol (ppb)	2-Methylphenol (ppb)	4- Methylphenol (ppb)	bis (2-Ethylhexyl) phthalate (ppb)	Benzoic acid (ppb)
VP-1	7/24/2002	84	80	160	ND	13	18	31	<10
VP-2	7/24/2002	UNABLE TO LOCATE		--	--	--	--	--	--
VP-5 (MW-5)	7/24/2002	INACCESSIBLE - VEHICLE PARKED OVER WELL			--	--	--	--	--
VP-7 (MW-3)	7/24/2002	69	28	420	ND	<5.0	6	<10	34
VP-8 (MW-7)	7/24/2002	<5.0	<5.0	<5.0	ND	<5.0	<5.0	<10	<10
VP-9	7/24/2002	INACCESSIBLE - VEHICLE PARKED OVER WELL			--	--	--	--	--
MW-4	7/24/2002	160	24	500	ND	6	9	<10	<10
MW-10	7/24/2002	<5.0	<5.0	<5.0	ND	<5.0	<5.0	13	<10
MW-11	7/24/2002	<5.0	<5.0	<5.0	ND	<5.0	<5.0	<10	<10

Ta 3

Groundwater Analytical Results - SVOC and PAH

Former Texaco Service Station (Site #211577)

631 Queen Anne North

Seattle, Washington

WELL ID	DATE	2-Methylnaphthalene (ppb)	2,4-Dimethylphenol (ppb)	Naphthalene (ppb)	Phenol (ppb)	2-Methylphenol (ppb)	4- Methylphenol (ppb)	bis (2-Ethylhexyl) phthalate (ppb)	Benzoic acid (ppb)
DB-1 (MW-12)	10/17-18/02	<10.0	<10.0	<10.0	<10.0	<10.0	--	<50.0	<20.0
DB-2 (MW-13)	10/17-18/02	--	--	--	--	--	--	--	--
DB-6 (MW-14)	10/17-18/02	--	--	--	--	--	--	--	--
	11/14/02	52.2	13.4	242	34.5	11.0	24.8[1]	<50.0	<20.0
DB-8 (MW-15)	10/17-18/02	--	--	--	--	--	--	--	--
	11/14/02	<10.0	<10.0	<10.0	37.0	<10.0	<10.0[1]	<50.0	<20.0
RW-4	7/24/2002	<5.0	<5.0	<5.0	ND	<5.0	<5.0	<10	<10

Ta 3

Groundwater Analytical Results - SVOC and PAH

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

EXPLANATIONS:

(ppb) = Parts per billion
-- = Not Analyzed
ND = Not Detected

[1] Results are for 3 & 4-Methylphenol.

ANALYTICAL METHODS:

Semi-Volatile Organic Compounds (SVOC) by EPA Method 8270
Polynuclear Aromatic Hydrocarbons (PAH) by EPA Method 8270

NOTE:

Other PAH and SVOC constituents were less than the reporting limit.

Ta 4

Groundwater Analytical Results - SVOC

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID/	DATE	Chloroform (ppb)	cis-1,2-Dichloroethene (ppb)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Tetrachloroethene (ppb)	Trichloroethene (ppb)	m+p-Xylene (ppb)	o-Xylene (ppb)	Isopropylbenzene (ppb)	n-Propylbenzene (ppb)	1,3,5-Trimethylbenzene (ppb)	1,2,4-Trimethylbenzene (ppb)	sec-Butylbenzene (ppb)	p-Isopropyltoluene (ppb)	n-Butylbenzene (ppb)	Naphthalene (ppb)	Methyl t-butyl ether (ppb)	t-Butyl alcohol (ppb)
VP-3 (MW-2)	07/24/02	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VP-5 (MW-5)	07/24/02	INACCESSIBLE - VEHICLE PARKED OVER WELL							--	--	--	--	--	--	--	--	--	--	--	--
VP-7 (MW-3)	10/17-18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<10.0	<100
VP-9	07/24/02	INACCESSIBLE - VEHICLE PARKED OVER WELL							--	--	--	--	--	--	--	--	--	--	--	--
MW-4	07/24/02	ND	<8.0	12,000	10,000	1,800	ND	ND	8,900	3,500	46	140	500	1,800	<10	<10	23	360	6	120
	10/17-18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<50.0	<500
MW-10	07/24/02	ND	15	2	<0.5	<0.5	ND	ND	<0.5	<0.5	<2	<1	<1	<1	1	<1	<1	<2	<2	<100
MW-11	07/24/02	ND	<1	<0.5	<0.5	<0.5	ND	ND	<0.5	<0.5	<2	<1	<1	<1	<1	<1	<1	<2	<2	<100
DB-1 (MW-12)	10/17-18/02	1.68	9.07	<1.00	<1.00	<1.00	9.58	2.75	<2.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<50.0

Ta 4

Groundwater Analytical Results - SVOC

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID/	DATE	Chloroform (ppb)	cis-1,2-Dichloroethene (ppb)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Tetrachloroethene (ppb)	Trichloroethene (ppb)	m+p-Xylene (ppb)	o-Xylene (ppb)	Isopropylbenzene (ppb)	n-Propylbenzene (ppb)	1,3,5-Trimethylbenzene (ppb)	1,2,4-Trimethylbenzene (ppb)	sec-Butylbenzene (ppb)	p-Isopropyltoluene (ppb)	n-Butylbenzene (ppb)	Naphthalene (ppb)	Methyl t-butyl ether (ppb)	t-Butyl alcohol (ppb)
DB-2 (MW-13)	10/17-18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DB-6 (MW-14)	10/17-18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DB-8 (MW-15)	10/17-18/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RW-4	07/24/02	ND	<1	70	1	36	ND	ND	3	2	<2	3	<1	20	<1	2	1	5	<2	<100

Groundwater Analytical Results - SVOC
Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

EXPLANATIONS:

(ppb) = Parts per billion
SVOC = Volatile Organic Compounds
-- = Not Analyzed
ND = Not Detected

ANALYTICAL METHOD:

SVOC by EPA Method 8260

NOTE:

Other SVOC were less than the reporting limit.

Ta 5

Groundwater Analytical Results - Dissolved Metals

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID/	DATE	MERCURY (ppb)	ARSENIC (ppb)	CADMIUM (ppb)	CHROMIUM (ppb)	LEAD (ppb)	SELENIUM (ppb)	SILVER (ppb)	BARIUM TR (ppb)
VP-1	07/24/02	--	--	--	--	22.9	--	--	--
	10/17-18/02[1]	--	--	--	--	18.0	--	--	--
	01/21/03	--	--	--	--	**47.1**	--	--	--
VP-2	07/24/02	UNABLE TO LOCATE		--	--	--	--	--	--
	10/17-18/02	NOT SAMPLED DUE TO INSUFFICIENT WATER			--	--	--	--	--
	01/21/03	**NOT SAMPLED DUE TO INSUFFICIENT WATER**			--	--	--	--	--
VP-3 (MW-2)	07/24/02	DRY	--	--	--	--	--	--	--
	10/17-18/02	DRY	--	--	--	--	--	--	--
	01/21/03	**DRY**	--	--	--	--	--	--	--
VP-4	07/24/02	--	--	--	--	28.0	--	--	--
	10/17-18/02	NOT SAMPLED DUE TO THE PRESENCE OF SPH				--	--	--	--
	01/21/03	**NOT SAMPLED DUE TO THE PRESENCE OF SPH**				--	--	--	--
VP-5 (MW-5)	07/24/02	INACCESSIBLE - VEHICLE PARKED OVER WELL			--	--	--	--	--
	10/17-18/02[1]	--	--	--	--	2.29	--	--	--
	01/21/03	**INACCESSIBLE - VEHICLE PARKED OVER WELL**				--	--	--	--
VP-6	07/24/02	NOT SAMPLED - DUE TO PRESENCE OF SPH			--	--	--	--	--
	10/17-18/02	NOT SAMPLED DUE TO THE PRESENCE OF SPH				--	--	--	--
	01/21/03	**NOT SAMPLED DUE TO THE PRESENCE OF SPH**				--	--	--	--
VP-7 (MW-3)	07/24/02	<0.079	97.3	<0.080	2.2	25.0	<1.1	0.068	33.6
	10/17-18/02	--	--	--	--	2.40	--	--	--
	01/21/03	--	--	--	--	**<1.00**	--	--	--

Ta 5

Groundwater Analytical Results - Dissolved Metals

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID/		DATE	MERCURY (ppb)	ARSENIC (ppb)	CADMIUM (ppb)	CHROMIUM (ppb)	LEAD (ppb)	SELENIUM (ppb)	SILVER (ppb)	BARIUM TR (ppb)
VP-8 (MW-7)		07/24/02	<0.079	2.1	0.13	0.82	11.4	<1.1	<0.050	49.6
		10/17-18/02	--	--	--	--	1.93	--	--	--
		01/21/03	--	--	--	--	**8.33**	--	--	--
VP-9		07/24/02	INACCESSIBLE - VEHICLE PARKED OVER WELL			--	--	--	--	--
		10/17-18/02	--	--	--	--	<1.00	--	--	--
		01/21/03	**INACCESSIBLE - VEHICLE PARKED OVER WELL**				--	--	--	--
MW-4		07/24/02	<0.079	31.0	<0.080	<0.28	15.5	<1.1	<0.050	63.8
		10/17-18/02[1]	--	--	--	--	10.7	--	--	--
	(D)	10/17-18/02	--	--	--	--	9.61	--	--	--
		01/21/03	--	--	--	--	**14.5**	--	--	--
MW-6		07/24/02	--	--	--	--	5.1	--	--	--
		10/17-18/02	NOT SAMPLED DUE TO THE PRESENCE OF SPH				--	--	--	--
		01/21/03	**NOT SAMPLED DUE TO THE PRESENCE OF SPH**				--	--	--	--
MW-9		10/17-18/02	--	--	--	--	2.66	--	--	--
		01/21/03	**INACCESSIBLE - VEHICLE PARKED OVER WELL**				--	--	--	--
MW-10		07/24/02	<0.079	4.1	0.17	0.38	1.3	<1.1	<0.050	52.1
		10/17-18/02	--	--	--	--	<1.00	--	--	--
		01/21/03	--	--	--	--	**<1.00**	--	--	--
MW-11		07/24/02	--	--	--	--	<1.2	--	--	--
		10/17-18/02	--	--	--	--	<1.00	--	--	--
		01/21/03	--	--	--	--	**<1.00**	--	--	--

Ta 5

Groundwater Analytical Results - Dissolved Metals

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID/	DATE	MERCURY *(ppb)*	ARSENIC *(ppb)*	CADMIUM *(ppb)*	CHROMIUM *(ppb)*	LEAD *(ppb)*	SELENIUM *(ppb)*	SILVER *(ppb)*	BARIUM TR *(ppb)*
DB-1 (MW-12)	**01/21/03**	--	--	--	--	**<1.00**	--	--	--
DB-6 (MW-14)	11/14/02	<1.00	17.0	<1.00	<1.00	1.82	1.48	<1.00	18.4
	01/21/03	**INACCESSIBLE - VEHICLE PARKED OVER WELL**				--	--	--	--
DB-8 (MW-15)	11/14/02	<1.00	1.33	<1.00	<1.00	1.04	<1.00	<1.00	<10.0
	01/21/03	--	--	--	--	**<1.00**	--	--	--
DB-9 (MW-16)	11/14/02	--	--	--	--	<1.00	--	--	--
	01/21/03	--	--	--	--	**<1.00**	--	--	--
DB-10 (MW-17)	11/14/02	--	--	--	--	<1.00	--	--	--
	01/21/03	--	--	--	--	**<1.00**	--	--	--
RW-2	07/24/02	UNABLE TO LOCATE		--	--	--	--	--	--
	10/17-18/02	--	--	--	--	2.23	--	--	--
	01/21/03	--	--	--	--	**<1.00**	--	--	--
RW-3	07/24/02	UNABLE TO LOCATE		--	--	--	--	--	--
	10/17-18/02	UNABLE TO LOCATE		--	--	--	--	--	--
	01/21/03	**UNABLE TO LOCATE**		--	--	--	--	--	--
RW-4	07/24/02	<0.079	6.1	<0.080	1.2	3.3	<1.1	<0.050	66.9
	10/17-18/02	--	--	--	--	1.23	--	--	--
	01/21/03	--	--	--	--	**<1.00**	--	--	--

Ta 5

Groundwater Analytical Results - Dissolved Metals

Former Texaco Service Station (Site #211577)

631 Queen Anne North

Seattle, Washington

WELL ID/	DATE	MERCURY *(ppb)*	ARSENIC *(ppb)*	CADMIUM *(ppb)*	CHROMIUM *(ppb)*	LEAD *(ppb)*	SELENIUM *(ppb)*	SILVER *(ppb)*	BARIUM TR *(ppb)*
RW-5	07/24/02	UNABLE TO LOCATE		--	--	--	--	--	--
	10/17-18/02	--	--	--	--	3.91	--	--	--
	01/21/03	--	--	--	--	**13.3**	--	--	--

Groundwater Analytical Results - Dissolved Metals
Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

EXPLANATIONS:

(ppb) = Parts per billion
-- = Not Analyzed
(D) - Duplicate

ANALYTICAL METHODS:

Dissolved Metals by EPA Method Series 7000
Barium TR by EPA Method 6010B

[1] Organic Lead was <300 ppb.

Ta 6

Groundwater Analytical Results - Oxygenate Compounds

Former Texaco Service Station (Site #211577)
631 Queen Anne North
Seattle, Washington

WELL ID	DATE	ETHANOL *(ppb)*	TBA *(ppb)*	MTBE *(ppb)*	DIPE *(ppb)*	ETBE *(ppb)*	TAME *(ppb)*	1,2-DCA *(ppb)*	EDB *(ppb)*
DB-1 (MW-12)	10/18/02	--	<50.0	<5.00	--	<1.00	<1.00	--	--
VP-7 (MW-3)	10/18/02	<40.0	<100	<10.0	<2.00	<2.00	<2.00	<1.00	<1.00
MW-4	10/18/02	<200	<500	<50.0	<10.0	<10.0	<10.0	<5.00	<5.00

EXPLANATIONS:

TBA = Tertiary butyl alcohol
MTBE = Methyl tertiary butyl ether
DIPE = Di-isopropyl ether
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
1,2- DCA = 1,2-Dichloroethane
EDB = 1,2-Dibromoethane
(ppb) = Parts per billion

ANALYTICAL METHOD:

EPA Method 8260 for Oxygenate Compounds

APPENDIX B

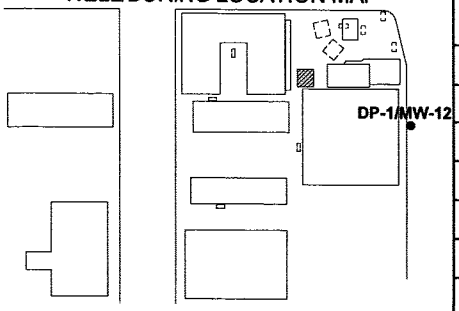
Laboratory Analytical Reports – Soils

Analytical reports to be included in Final RI report

APPENDIX C

Boring and Well Completion Logs/Survey Data Sheets

WELL/BORING LOCATION MAP



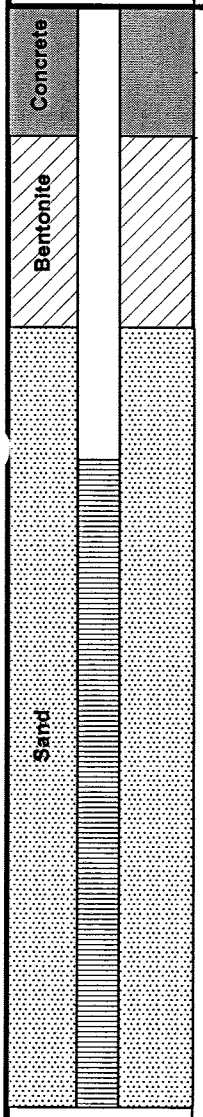
Delta Environmental Consultants, Inc.

WELL/BORING: DB-1
MW-12

INSTALLATION DATE: 9/26/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 17'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 7-17' (0.010")
DRILLER: Cascade	SAND PACK: 5-17' (2 X12)

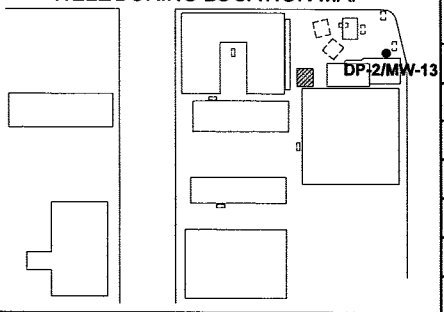
CASING ELEVATION	113.36
SURVEY DATE:	9/26/02
DTW:	13.0

DESCRIPTION/LOGGED BY: MATT MILLER



DEPTH (FEET)	FIRST	STABILIZED	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
0										Concrete surface
1–9								SP		SAND: dark brown; trace fines; very fine to fine sand; 10% medium to coarse sand; trace gravel; very dense; no hydrocarbon odor.
10			DP	6	50 -6"			SP		
11–14		▼								
15	▽		WT	10	19 50 -6"			SM		SILTY SAND: dark grayish brown; 20% fines; very fine to fine sand; trace to 5% medium to coarse sand; very dense; no hydrocarbon odor
16–22										Refusal @17' (concrete); Driller was reasonably certain that a concrete slab was encountered based on the action of the drilling during refusal.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

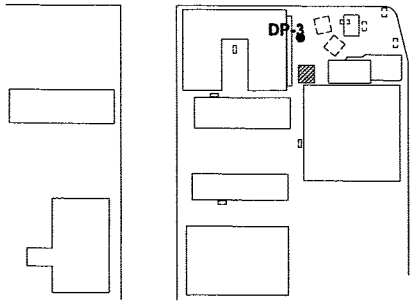
WELL/BORING: DB-2
MW-13

INSTALLATION DATE: 9/24/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 21.5'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 10-20' (0.010")
DRILLER: Cascade	SAND PACK: 7-21.5' (2 X12)

CASING ELEVATION	114.80
SURVEY DATE:	9/26/02
DTW:	19.0

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION/LOGGED BY: MATT MILLER
Concrete / Bentonite / Sand						1–22					Asphalt/concrete surface
									SP		SAND: brown to gray; trace to 5% fines;
					15 25 27	10–11		■			
						12			SM		@11.5' No recovery.
			DP	277	21 50-5"	13–14	■	■			SILTY SAND: dark gray; 5% fines; fine sand; thin interbedded clay lense (<0.5"); very dense; strong hydrocarbon odor; sheen.
	▽		WT	68	11 21 30	15–16	■	■			@16.5'; as above; iron oxide staining; trace to 10% gravel; very dense.
		▼	MST	14	50-6"	17–18	■	■			
			DP	11	19 29 50	19–21	■	■	CL		CLAY: dark gray; low plasticity; very hard; no hydrocarbon odor.
						22					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

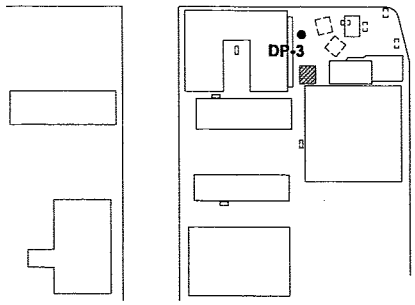
WELL/BORING: DB-3

INSTALLATION DATE: 9/26/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 31.5'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION/LOGGED BY: MATT MILLER
Concrete											Asphalt surface
Backfilled with Bentonite						1			SP		SAND: dark brown; trace fines; very fine sand; trace gravel.
						2					
						3					
						4					
					50-0"	5					No recovery at 5'.
						6					
						7					
						8					
						9					
						10					
	▽		WT	140	150-6"	11					SAND: very dark gray; trace fines; fine sand; very dense; hydrocarbon odor.
						12			SM		
			WT	22	19 21 25	13					SILTY SAND: very dark gray; 10% fines; fine sand; trace to 5% medium to coarse sand; interbedded clay lense (<1" thick); very dense; hydrocarbon odor.
						14					
						15					
				125	29 36 16	16					@16' Same as above.
						17					
						18			SP		@18' SAND: very dark gray; trace fines; fine to coarse sand; very dense; hydrocarbon odor; minimal sample recovery.
			WT	-	50-0"	19					
						20					
			WT		50-3"	21			SM		
						22					No recovery @22'.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

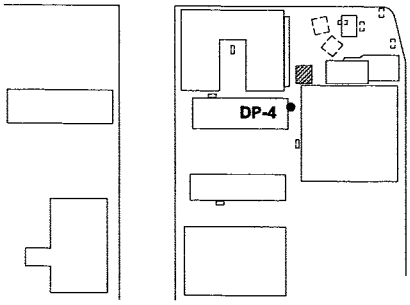
WELL/BORING: DB-3

INSTALLATION DATE: 9/26/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 31.5'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION/LOGGED BY: MATT MILLER
Backfilled with Bentonite			WT	89	50 50	23			SM		SILTY SAND: very dark gray; 10% fines; fine to coarse sand; trace gravel; very dense; hydrocarbon odor.
						24					
						25					
						26					
						27					
						28					
						29					
			WT	33	14 15 19	30			CL		CLAY: dark gray; low plasticity; hard; no hydrocarbon odor.
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					
						41					
						42					
						43					
						44					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-4

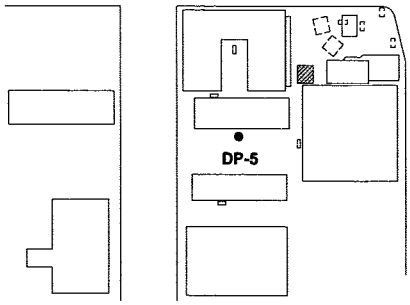
INSTALLATION DATE: 9/23/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 21.5'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Concrete						0					Concrete surface
Backfilled with Bentonite						1			SP		SAND: dark brown; trace fines; very fine to fine sand; medium dense; no hydrocarbon odor.
						2					
						3					
						4					
			DP	7.0	11 16 8	5					
						6					
						7					
	▽		WT	2000+	19 21 20	8					SAND: very dark grayish brown; trace fines; fine sand; dense; strong hydrocarbon odor.
						9					
						10					
			WT	2000+	11 12 14	11			SP/ SM		@11.5' SILTY SAND/SAND: very dark grayish brown; trace to 20% fines; interbedded clay lense; fine sand; trace organics; medium dense; hydrocarbon odor; sheen.
						12					
			WT	2000+	25- 50-6"	13					@13.5" Same as above; very dense.
						14					
						15					
			WT	2000+	29 50-6"	16					@16' Same as above; very dense.
						17					
			WT	189	50-6"	18			SP		@18' SAND: very dark gray; trace fines; fine sand; trace medium sand; very dense; hydrocarbon odor.
						19					
						20					
			WT	460	7 13 15	21			CL		CLAY: olive gray; low to moderate plasticity; 10% very fine to coarse sand; trace gravel; trace organics; iron oxide staining; very stiff.
						22					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-5

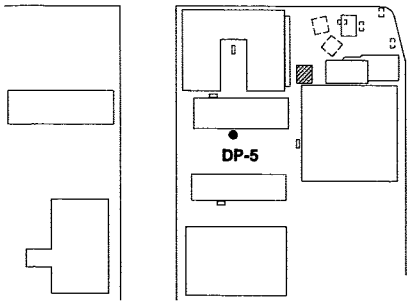
INSTALLATION DATE: 9/23/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Backfilled with Bentonite			WT	15	32	23			SM		
			DP		31						
					50	24			CL		CLAY: dark gray; low to moderate plasticity; trace iron oxide staining; very hard; no hydrocarbon odor.
						25					
						26					
						27					
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					
						41					
						42					
						43					
						44					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-5

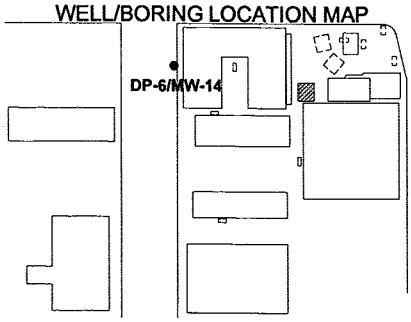
INSTALLATION DATE: 9/23/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Concrete						0					Asphalt surface
Backfilled with Bentonite						1			SM		SILTY SAND: olive brown; 10% fines; very fine to fine sand; dense; no hydrocarbon odor.
						2					
						3					
						4					
			DP	18	10 12 22	5					
						6					
						7					
			DP	20	18 23 27	8					
						9			CL		@9' Same as above; thin clay lense; low plasticity; dark grayish brown; dense; no hydrocarbon odor.
						10			SM		
			MST	328	14 22 23	11					@11' SILTY SAND: dark grayish brown; 5 to 10% fines; very fine to fine sand; dense; slight odor.
						12					
			MST	2000	50- 6"	13					@13' Same as above; 5% fines; very dense; strong hydrocarbon odor.
	▽					14					
			WT	1575	26 50- 6"	15					@15' Same as above; very dark gray.
						16					
						17					
			WT	797	50- 6"	18					@18' Same as above; sheen.
						19					
						20					
				381	50- 6"	21			SM		
						22					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

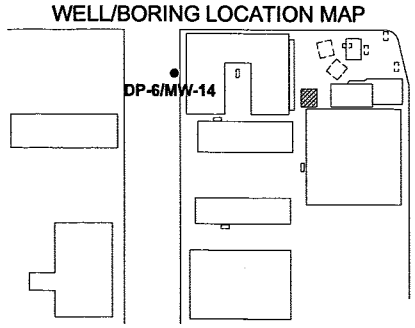
WELL/BORING: DB-6
MW-14

INSTALLATION DATE: 9/25/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 26.5'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 10-25' (0.010")
DRILLER: Cascade	SAND PACK: 7-26.5' (2 X12)

CASING ELEVATION	101.64
SURVEY DATE:	9/26/02
DTW:	

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION/LOGGED BY: MATT MILLER
Concrete											Concrete surface
Bentonite						1			SM		SILTY SAND: olive gray; 30% fines; very fine to fine sand; organics; no hydrocarbon odor.
						2					
						3					
						4					
						5					
			MST	5	4 5 11	6			ML		SILT: olive gray; low to moderate plasticity; 10% very fine sand; abundant organics; very stiff; no hydrocarbon odor.
						7					
						8					
						9			SP		
			MST	4	13 22 25	10					SAND: very dark gray; trace fines; fine sand; very dense.
						11					
						12					
						13					
						14					
Sand						15					
	▽		WT	1367	16 26 29	16			SM		@16.5'; Same as above; increasing fines; very dense; hydrocarbon odor; thin (<1") interbedded silt lense.
						17					
						18					
						19					
						20					
			WT	402	50-6"	21					@20' Same as above; trace <5% fines; very dense; hydrocarbon odor.
						22					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-6
MW-14

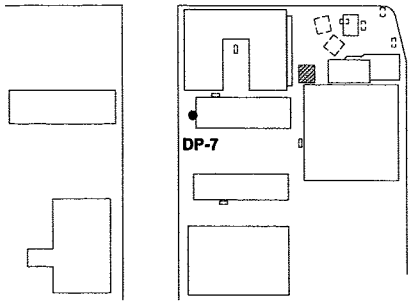
INSTALLATION DATE: 9/25/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 26.5'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 10-25' (0.010")
DRILLER: Cascade	SAND PACK: 7-26.5' (2 X12)

CASING ELEVATION	101.64
SURVEY DATE:	9/26/02
DTW:	

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Sand						23					
						24			SP		
						25					
			WT	180	9 12 12	26			CL		CLAY: dark gray; moderate plasticity; trace very fine to medium sand; 10% gravel; very stiff; hydrocarbon odor.
						27					
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					
						41					
						42					
						43					
						44					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

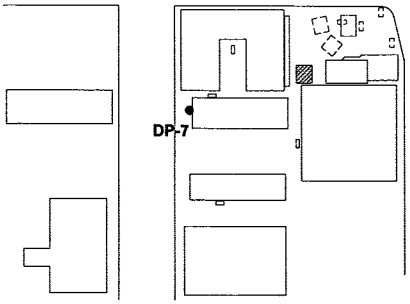
WELL/BORING: DB-7

INSTALLATION DATE: 9/24/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 33.5'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION/LOGGED BY: MATT MILLER
Concrete											Asphalt surface
Backfilled with Bentonite						1			SM		SILTY SAND: very dark brown; 5% fines; highly organic; very fine sand.
						2					
						3					
						4					
			DP	0	15 15 15	5					
						6					@6' ; light olive brown; 5% fines; iron oxide staining; dense; no hydrocarbon odor.
						7					
						8					
						9					
			MST	3	11 22 27	10			SM		
	▽					11					@11.5' ; dark olive gray; 5% fines; very fine to fine sand; dense; no hydrocarbon odor.
						12					
						13					
						14					
			WT	32	50-6"	15			SM		@15' Same as above.
						16					
						17					
						18					
						19					
			WT	2	50-6"	20					@20.5' Same as above.
						21					
						22					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-7

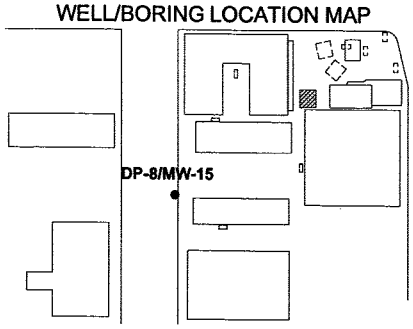
INSTALLATION DATE: 9/24/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 33.5'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Backfilled with Bentonite						23			SM		
						24					
			WT	6	50-6"	25			SP		SAND: dark olive gray; trace fines; fine sand; very dense; no hydrocarbon odor.
						26					
						27					
						28					
						29					
						30					
						31					
			DP	1	19 39 50-4"	32			CL		CLAY: dark gray; moderate plasticity; very hard; no hydrocarbon odor.
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					
						41					
						42					
						43					
						44					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-8 MW-15

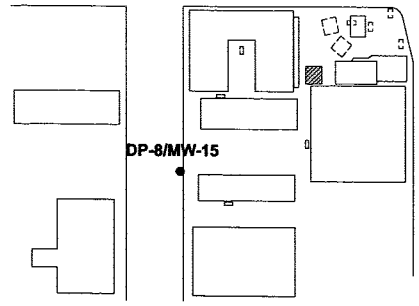
INSTALLATION DATE: 9/25/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 35'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 10-25' (0.010")
DRILLER: Cascade	SAND PACK: 7-35' (2 X12)

CASING ELEVATION	99.03
SURVEY DATE:	9/26/02
DTW:	9.25

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST	STABILIZED	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Concrete						0					Concrete surface
Bentonite						1			SM		SILTY SAND: dark yellowish brown; 10% fines; very fine sand; 10% fine to coarse sand; interbedded clay lense; clay as grayish; low to moderate plasticity; medium dense; no hydrocarbon odor.
			DP	23	5 6 8	5					
		▼				9					
Sand			MST	28	7 30 30	10			SP		SAND: dark gray; trace fines; fine sand; very dense; no hydrocarbon odor.
	▽		WT	31	15 29 25	15					@16.5'; as above; slight hydrocarbon odor.
						19			SM		
			WT	27	50-6"	20					SILT SAND: olive gray; 20% fines; very fine sand; very dense; hydrocarbon odor.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

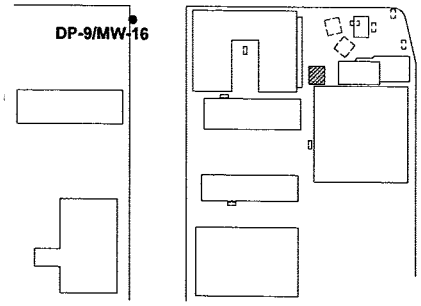
WELL/BORING: DB-8
MW-15

INSTALLATION DATE: 9/25/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 35'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 10-25' (0.010")
DRILLER: Cascade	SAND PACK: 7-35' (2 X12)

CASING ELEVATION	99.03
SURVEY DATE:	9/26/02
DTW:	9.25

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION/LOGGED BY: MATT MILLER
Sand						23			SM		
						24					
						25					No recovery @25'
			WT	-	50-2"	26					
						27					
						28					
						29			SP		SAND: dark gray; trace to 5% fines; fine sand; very dense; no hydrocarbon odor.
						30					
			WT	13	50-6"	31					Heaving sands No samples collected @35'
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					
						41					
						42					
						43					
						44					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-9
MW-16

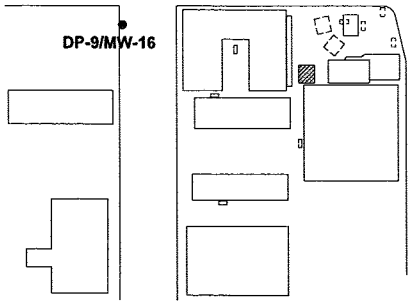
INSTALLATION DATE: 9/24/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 31'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 10-25' (0.010")
DRILLER: Cascade	SAND PACK: 7-31' (2 X12)

CASING ELEVATION	101.83
SURVEY DATE:	9/26/02
DTW:	11.85

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST	STABILIZED	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Concrete						1					Concrete surface
Bentonite						2			SP		
						3					
						4					
						5					
						6					
						7					
						8					
						9					
			DP	2	25 30 30	10					SAND: olive brown; trace to 5% fines; fine sand; very dense; no hydrocarbon odor.
		▼				11					
						12					
						13					
						14					
Sand						15					
	▽		MST WT	12	26 50-5"	16					@16'; as above.
						17					
						18					
						19					
						20					
			WT	34	50-6"	21					@20'; as above.
						22					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-9
MW-16

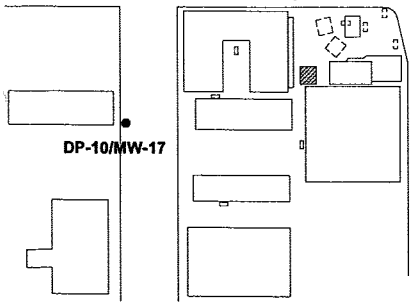
INSTALLATION DATE: 9/24/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 31'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 10-25' (0.010")
DRILLER: Cascade	SAND PACK: 7-31' (2 X12)

CASING ELEVATION	101.83
SURVEY DATE:	9/26/02
DTW:	11.85

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Sand						23			SP		
						24					
						25			SM		SILTY SAND: olive gray; 10% fines; very fine to fine sand; very dense; no hydrocarbon odor.
			WT	12	50-6"	26					
						27					
						28					
						29					
						30					
			DP	20	22 50-6"	31			CL		CLAY: dark gray; low plasticity; very hard; no hydrocarbon odor.
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					
						41					
						42					
						43					
						44					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-10
MW-17

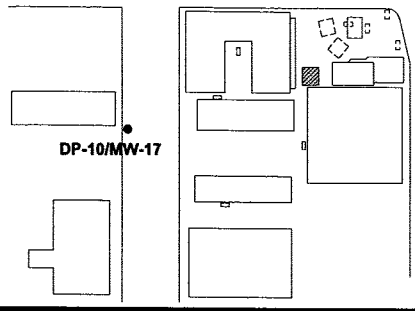
INSTALLATION DATE: 9/23/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 34'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 10-25' (0.010")
DRILLER: Cascade	SAND PACK: 7-34' (2 X12)

CASING ELEVATION	99.29
SURVEY DATE:	9/26/02
DTW:	9.72

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Concrete						0					Concrete surface
						1			SM		SILTY SAND: olive brown; 10% fines; very fine to fine sand; thin (<1") interbedded clay lense; iron oxide staining; dense; no hydrocarbon odor.
						2					
						3					
						4					
Bentonite			DP	4	7 12 19	5					
						6					
						7					
						8					
		▼				9					
						10			SM		
			MST	7	33 50-6"	11					@11' SILTY SAND: olive brown; 10% fines; very fine to fine sand; trace gravel; very dense; no hydrocarbon odor.
						12					
						13					
	▽					14					
Sand						15					
			WT	34	31 50-6"	16					@16.5'; as above; dark gray; slight odor.
						17					
						18					
						19			SM		
						20					
			WT	12	21 50-6"	21					@21' ; as above.
						22					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-10
MW-17

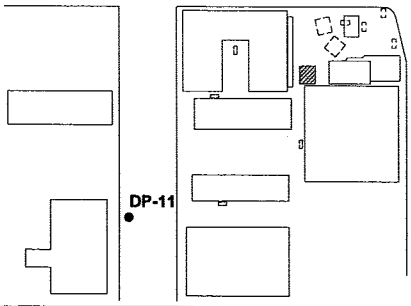
INSTALLATION DATE: 9/23/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 34'
CITY: Seattle	WELL CASING: SCH 40 PVC 2"
STATE: WA	WELL SCREEN: 10-25' (0.010")
DRILLER: Cascade	SAND PACK: 7-34' (2 X12)

CASING ELEVATION	99.29
SURVEY DATE:	9/26/02
DTW:	9.72

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Sand						23			SM		SILTY SAND: dark gray; 5% fines; very fine to fine sand; very dense.
			WT	11	37 50-6"	25 26					
			WT		50-3"	29					
			WT		50-2"	30					
			WT	12	9 11 11	33			CL		@33'; as above; interbedded clay lenses. CLAY: very dark gray; moderate plasticity; very stiff; no hydrocarbon odor.
						34 35 36 37 38 39 40 41 42 43 44					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DB-11

INSTALLATION DATE: 9/26/02	DRILLING METHOD: Hollow Stem Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 8 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 12'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: MATT MILLER

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Concrete						0					Concrete surface
Backfilled with Bentonite						1			CL		CLAY: olive gray; moderate plasticity; 5% very fine to fine sand; trace gravel; organics; no hydrocarbon odor.
						2					
						3					
						4					
						5					
						6					
						7					
						8					
						9			SC		CLAYEY SAND: olive gray; 40% fines; very fine sand; trace fine to coarse sand; very dense; no hydrocarbon odor.
			DP	2	50-6"	10					
						11					
						12					Refusal @12'.
						13					
						14					
						15					
						16					
						17					
						18					
						19					
						20					
						21					
						22					

WELL/BORING LOCATION MAP

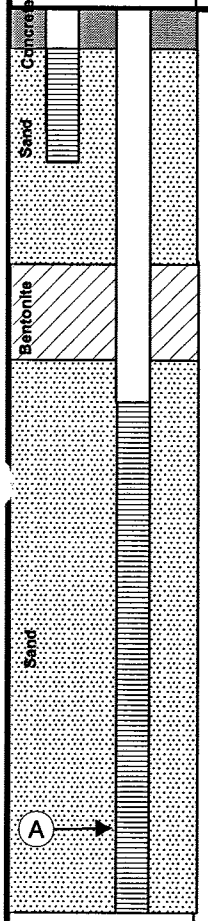
Delta Environmental Consultants, Inc.

WELL/BORING: DVP-1

INSTALLATION DATE: 9/12/02	DRILLING METHOD: Hand Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 3 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 7'
CITY: Seattle	WELL CASING: 1/4" Stainless Steel
STATE: WA	WELL SCREEN: 0.02 Hole Dia. Screen
DRILLER: Cascade	SAND PACK: 0.25 - 2.0 (2 X12)

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON



WELL/BORING COMPLETION	FIRST	STABILIZED	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
			DP					SP		CONCRETE
				1480	1					SAND: brown; <5% fines; fine to medium sand, no odor.
								SM		SILTY SAND: gray; 25% fines; ;fine sand; odor; sheen.
			WT		2					
								CL		CLAY: brownish gray; medium plasticity; odor.
					3			SM		SILTY SAND: gray; 10% fines; fine to medium sand; odor; sheen.
					4					@3.5' Same as above but 25% silt.
				2000	5					
	▽	▼			6			SP		SAND: gray;<5% fines; fine sand; odor; sheen.
A			SAT	2000						
					7					
					8					
					9					
					10					
					11					

(A) = 1 Inch PVC monitoring well with 0.010 slotted screen. Well screened from 3' to 7'. Well abandoned after purging and sampling on 9/12/02.

WELL/BORING LOCATION MAP

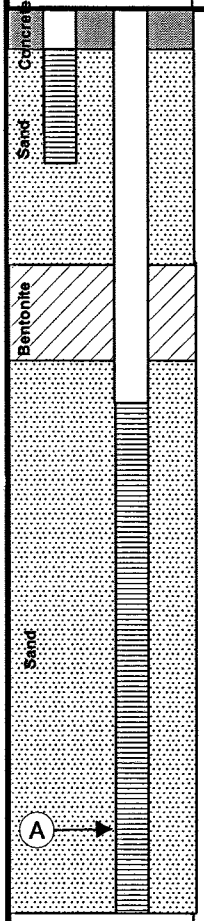
Delta Environmental Consultants, Inc.

WELL/BORING: DVP-2

INSTALLATION DATE: 9/12/02	DRILLING METHOD: Hand Auger
PROJECT: TW21577	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 21-1577	BORING DIAMETER: 3 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 7'
CITY: Seattle	WELL CASING: 1/4" Stainless Steel
STATE: WA	WELL SCREEN: 0.02 Hole Dia. Screen
DRILLER: Cascade	SAND PACK: 0.25 - 2.0 (2 X12)

CASING ELEVATION	
SURVEY DATE:	
DTW:	

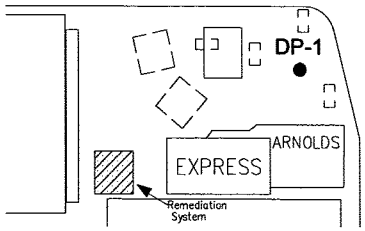
DESCRIPTION/LOGGED BY: SHAWN MADISON



DEPTH (FEET)	MOISTURE	PID (ppm)	USCS SYMBOL	DESCRIPTION
0	DP	13.9	SP	CONCRETE SAND: brown; <5% fines; very fine to fine sand; no odor.
1				SAND: brownish gray; <5% fines; very fine to fine sand; odor
2	WT			*Sand is inter bedded with layers of silt less than 0.25" thick.
3	WT	649		
4			SM	SILTY SAND: gray; 10% fines; very fine to fine sand; odor.
5	WT			
6	SAT	1327	SP	SAND: gray;<5% fines; fine sand; odor.
7				
8				
9				
10				
11				

(A) = 1 Inch PVC monitoring well with 0.010 slotted screen. Well screened from 3' to 7'. Well abandoned after purging and sampling on 9/12/02.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-1

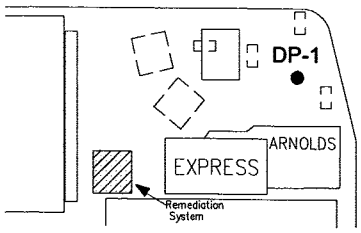
INSTALLATION DATE: 9/18/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Asphalt					0					
Bentonite			DP	2.7	1			SM		SILTY SAND: grayish brown; 20% fines; fine to medium sand; 15% gravel; no odor.
					2					
					3					
			DP	59.0	4			SM		SILTY SAND: brownish gray; 10% fines; fine to medium sand; 25% gravel; odor.
					5					
			DP	23.0	6					SILTY SAND: dark gray; 15% fines; medium to coarse sand; 10% gravel; odor.
					7					
			DP	11.0	8					Same as above.
					9					
			DP	14.5	10			SP		SAND: gray; <5% fines; fine sand; no odor.
	▽				11					
			WT	33.3	12					Same as above with odor.
					13					
			DP	0	14			SP		SAND: grayish brown; medium to coarse sand; no odor.
					15					
	▽		DP	70.1	16					Same as above.
					17					
			WT	0	18			SM		SILTY SAND: grayish brown; 15% fines; fine to medium sand; no odor.
					19					
			WT	5.7	20					SILTY SAND: gray; 20% fines; fine to medium sand; 30% gravel; no odor.
					21					
			WT	1.2	22			SM		Same as above.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-1

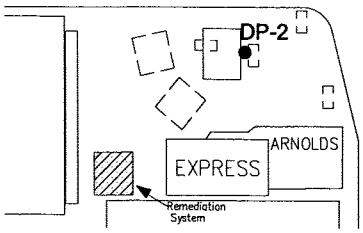
INSTALLATION DATE: 9/18/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Bentonite			WT	0.6	23			SM		SILTY SAND: gray; 20% fines; fine to medium sand; 30% gravel; no odor.
			DP		24			CL		CLAY: gray; medium plasticity; stiff; no odor.
					25					
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					
					38					
					39					
					40					
					41					
					42					
					43					
					44					
					45					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

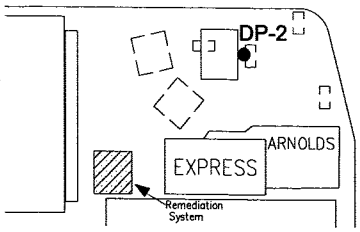
WELL/BORING: DP-2

INSTALLATION DATE: 9/18/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION/LOGGED BY: SHAWN MADISON
Asphalt					1			SM		
			DP	0	2					SILTY SAND: grayish brown; 20% fines; fine to medium sand 30% gravel; no odor.
					3					
			DP	0	4					Same as above with odor.
					5					
			DP	672	6					SILTY SAND: dark gray; 20% fines; fine to medium sand; 10% gravel; odor.
					7					
			DP	238	8					Same as above but very dark gray.
Bentonite					9			SM		
			DP	1340	10					Same as above but dark greenish gray; 2% wood debris.
					11					
			DP	1875	12					SILTY SAND: dark gray; 10% fines; fine to medium sand; 10% gravel; odor; minimal recovery. * See Page 2 of well log for note.
					13					
			DP	2000	14					Same as above; minimal recovery * See Page 2 of well log for note.
					15					
			DP	5.3	16					SILTY SAND: dark gray; 10% fines; medium to coarse sand; 5% gravel; odor.
					17					
			DP	7.1	18			SP		SAND: brown; medium sand; odor.
					19					
	▽		DP	10.2	20					Same as above.
					21					
			WT	21.7	22			SP		SAND: grayish brown; fine to medium sand; no odor.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-2

INSTALLATION DATE: 9/18/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC
Bentonite			WT		23			SP	
								CL	
			DP	0	24				
					25				
					26				
					27				
					28				
					29				
					30				
					31				
					32				
					33				
					34				
					35				
					36				
					37				
					38				
					39				
					40				
					41				
					42				
					43				
					44				
					45				

SAND: grayish brown; fine to medium sand; no odor.

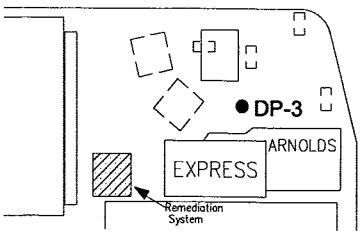
CLAY: yellowish brown; medium plasticity; stiff; no odor.

* Redrilled 1 foot north to get recovery for the 12 and 14 foot intervals.

10'-12' SILTY SAND: dark gray; 10% fines; fine to medium sand; 10% gravel; odor; P.I.D. reading 2000.

12'-14' SILTY SAND: dark gray; 10% fines; fine to medium sand; 10% gravel; odor; P.I.D. reading 2000.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-3

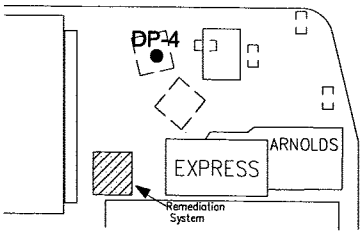
INSTALLATION DATE: 9/20/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 18'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Asphalt					1			SM		SILTY SAND: brown; 30% fines; very fine to fine sand; no odor.
				0	2					Same as above with construction debris; no odor.
					3					
				0	4					Same as above.
					5					
				0	6					Same as above without construction debris.
					7					
Bentonite				0	8					Same as above with 2% wood debris; very dark brown with color.
					9			SM		
				48.3	10					SILTY SAND: dark brownish gray; 10% fines; fine sand; 5% gravel; odor.
	▽				11					
			WT	2000	12					@11.5' SILT: dark gray; fines; 25% very fine to fine sand; stiff; odor.
					13					
			WT	2000	14					
					15					
			WT	1557	16					@15.5' SILTY SAND: dark gray; 15% fines; fine sand; odor.
					17					
			DP	146	18			CL		@17.5' CLAY: reddish brown with gray streaks; medium plasticity; stiff; odor.
					19					
					20					
					21					
					22					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-4

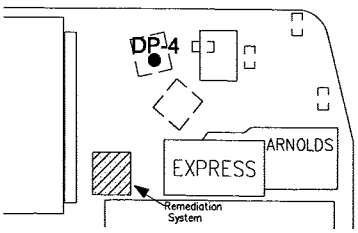
INSTALLATION DATE: 9/20/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 28'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Asphalt					1			SM		
Bentonite			DRY	0	2					SILTY SAND: gray; 30% fines; fine sand; 10% gravel; no odor.
					3					
			DP	801	4					Same as above with light odor.
					5					
			DP	49.4	6					SILTY SAND: dark gray; 10% fines; fine to medium sand; light odor.
					7					
			DP	0	8					Same as above with 5% gravel.
					9			SM		
			DP	0	10					Same as above with 15% gravel.
					11					
			DP	8.3	12					SILTY SAND: very dark gray; 10% fines; medium to coarse sand; light odor; encountered PVC well screen at 12 feet.
					13					
			DP	174	14					SAND: dark gray to brown; fine to medium sand; no odor.
					15					15 to 15.5' SILTY SAND: 30% fine; fine to medium sand; no odor.
			DP	219	16					@15.5' SAND: brownish gray; <5% fines; fine to medium sand; 15% coarse sand; no odor.
					17					
			DP	58.4	18			SP		
	▽				19					SAND: gray; fine sand; odor.
			WT	2000	20					
					21					
				21.7	22					Same sand grades to medium sand; odor.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-4

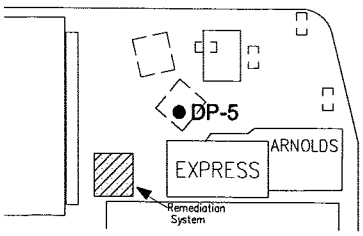
INSTALLATION DATE: 9/20/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 28'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Bentonite					23			SP		
			WT	1	24					SAND: brownish gray; <5% fines; medium to coarse sand; odor.
					25					
			DP	0	26					
								CL		@26.25' CLAY: reddish brown with gray molting; medium plasticity; stiff; no odor.
					27					
			WT	0				SP		@27.0" SAND: gray; coarse sand; no odor.
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					
					38					
					39					
					40					
					41					
					42					
					43					
					44					
					45					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-5

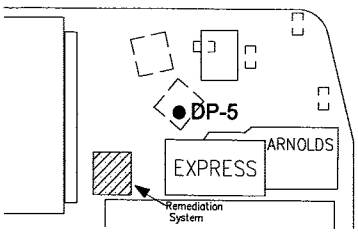
INSTALLATION DATE: 9/20/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Asphalt					1			SM		
			DP	0	2					SILTY SAND: brown; 15% fines; fine to medium sand; no odor.
					3					
			DP	77.0	4					Same as above grades to grayish brown.
					5					
			DP	77.4	6					Same as above; gray to dark gray; construction debris (Brick); no odor.
					7					
			DP	8.0	8					Same as above with construction debris (Asphalt); no odor.
Bentonite					9			SM		
			DP	0	10					Same as above with Asphalt and wood debris.
					11					
			DP	166	12					SILTY SAND: dark gray; 15% fines; fine sand; odor.
	▽				13					
			WT	2000	14					Same as above; 30% fines; odor.
					15					
			WT	2000	16					SILTY SAND: gray to brownish gray; 20% fines; very fine to fine sand; odor.
					17					
			WT	1345	18			SP		
					19					SAND: brownish gray; <5% fines; fine to medium sand; odor.
			WT	2000	20					Same as above.
					21					
			WT	1162	22					Same as above.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-5

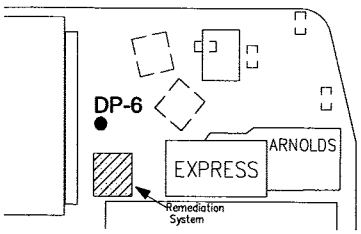
INSTALLATION DATE: 9/20/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Bentonite			WT		23			SP		SAND: brownish gray; <5% fines; fine to medium sand; coarse sand; odor.
			DP	3.1	24			CL		@23.5' CLAY: brown; medium plasticity; stiff; no odor.
					25					
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					
					38					
					39					
					40					
					41					
					42					
					43					
					44					
					45					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-6

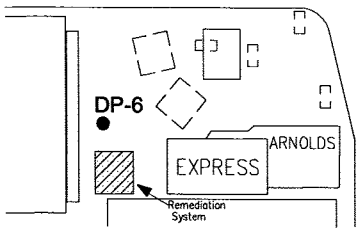
INSTALLATION DATE: 9/20/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 26'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Asphalt										
Bentonite			DP	0	1–2			SM		SILTY SAND: brownish gray; 40% fines; fine to medium sand; 10% gravel; 5% construction debris (Brick); no odor.
			DP	0	3–4					SILTY SAND: dark brownish gray; 25% fines; fine sand; 10% medium sand; no odor.
			DP	0	5–6					@5.5' SILTY SAND: very dark gray; 15% fines; medium to coarse sand; no odor.
			DP	7.4	7–8					@7.5' CLAY: very dark gray; medium plasticity; 10% very fine to fine sand; no odor.
			DP	6.9	9–10			SM		@9.0' SILTY SAND: 15% fines; 40% fine sand; medium to coarse and; no odor; minimal recovery.
	▽		DP	67.4	11–12					Same as above. Minimal Recovery
			WT	231	13–14			SP		SAND: grayish brown; <5% fines; very fine to fine sand; odor.
			WT	72	15–16					Same as above.
			WT	4.2	17–18					@17.5' SAND: grayish brown; <5% fines; 30% medium sand; coarse sand; odor.
			WT	341	19–20			CL		19.25' to 19.5' CLAY: yellowish brown; stiff; sand stringers; very fine sand; odor.
								SM		@19.5' SILTY SAND: brownish gray; 30% fines; very fine to fine sand; odor.
			WT	2000	21–22					Same as above.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-6

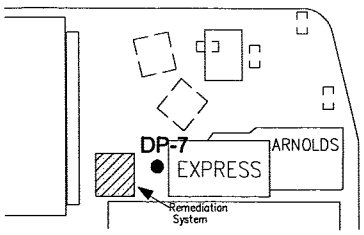
INSTALLATION DATE: 9/20/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 26'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Bentonite					23			SM		SILTY SAND: brownish gray; 30% fines; very fine to fine sand; odor.
			WT	2000	24			SP		SAND: brownish gray; <5% fines; very fine to fine sand; odor.
					25					
			DP	33.4	26			CL		@25.4' CLAY: brownish yellow; medium plasticity; stiff; odor.
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					
					38					
					39					
					40					
					41					
					42					
					43					
					44					
					45					

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-7

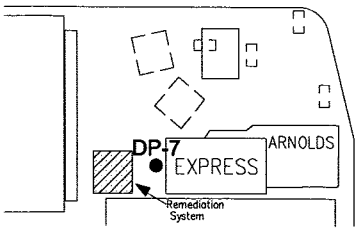
INSTALLATION DATE: 9/20/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Asphalt					1			SM		SILTY SAND: brown; 20% fines; fine to medium sand; 10% gravel; no odor.
			DRY	0	2					
					3					Same but brown to dark brown with construction debris (Brick); no odor.
			DP	0	4					
					5					
			DP	0	6					SILTY SAND: brownish gray; 10% fines; fine to medium sand; no odor.
					7					@7.5' SILTY SAND: dark brown; 35% fines; fine to medium sand; 10% coarse sand; no odor.
			DP	0	8					
Bentonite	▽				9			SM		
			WT	110	10					@9.5' Grades to brown in color; odor.
					11					@10.5' grades to gray; 10% fines; odor.
			WT	193	12					
					13			SP		SAND: gray; fine sand; odor.
			WT	307	14					
					15					
			WT	126	16					SAND: brownish gray; fine sand; odor.
					17					
			WT	355	18					SAND: brownish gray; fine to medium sand; odor.
					19					
			WT	2000	20					@20' Grades to very fine sand.
					21					
			WT	2000	22					@22' Grades to fine to medium sand; odor.

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: DP-7

INSTALLATION DATE: 9/20/02	DRILLING METHOD: Geo Probe
PROJECT: TW21577	SAMPLING METHOD: Sleeve
CLIENT: Chevron 21-1577	BORING DIAMETER: 1 "
LOCATION: 631 Queen Anne Ave No.	BORING DEPTH: 24'
CITY: Seattle	WELL CASING: NA
STATE: WA	WELL SCREEN: NA
DRILLER: Cascade	SAND PACK: NA

CASING ELEVATION	
SURVEY DATE:	
DTW:	

DESCRIPTION/LOGGED BY: SHAWN MADISON

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Bentonite			DP	18.2	23			CL		@23' CLAY: yellowish brown with gray streaks; medium plasticity; stiff; no odor.
					24					
					25					
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					
					38					
					39					
					40					
					41					
					42					
					43					
					44					
					45					

MONITORING WELL SURVEY FORM

CHEVRON STATION NO. 211577 DELTA PROJECT NO. TW21 577

ADDRESS 631 Queen Anne Ave N FIELD PERSONNEL Shawn Madison

SEATTLE WA DATE 9-26-2

**********ATTACH SITE PLAN TO THIS SHEET**********

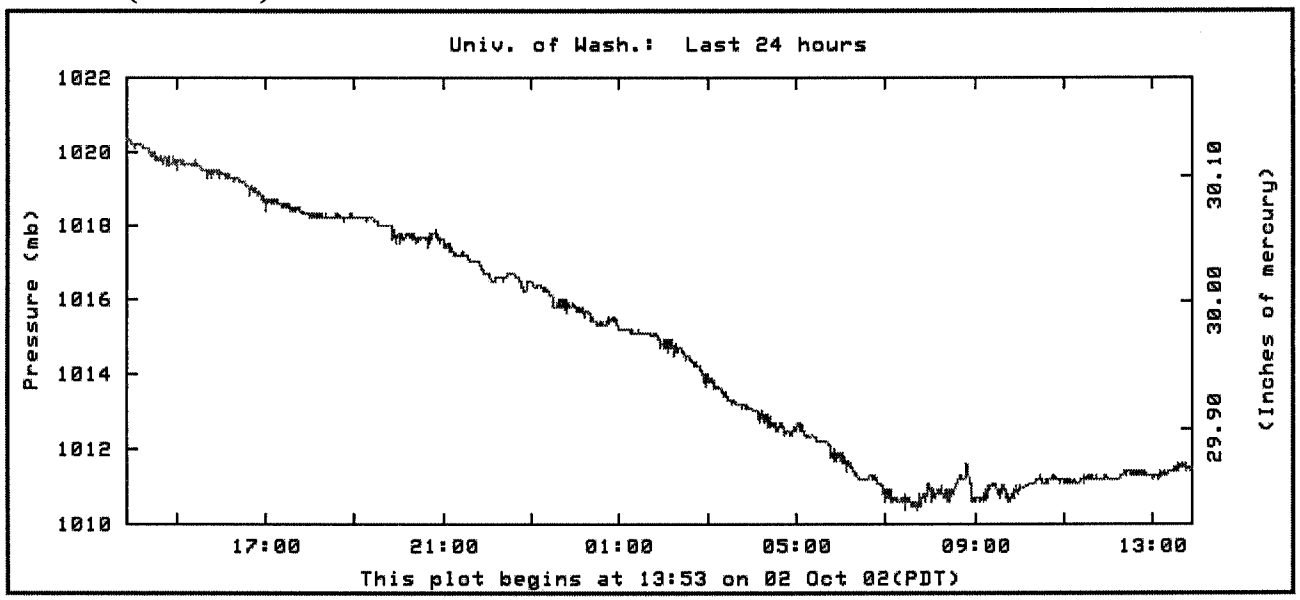
LOCATION	ELEVATION	TOP	MIDDLE	BOTTOM	CHECK	
mw-3 (Bm)	100.4	5.20	5.06	4.92	.14	.14
MW-15	99.03 -1.37	6.56	6.43	6.30	.13	.13
MW-17	99.29 -.11	6.45	6.17	5.89	.28	.28
MW-16	101.83 +1.43	4.45	3.63	2.81	.82	.82
MW-16 (Turn)	101.83	6.89	6.66	6.43	.23	.23
MW-14	101.64 -.19	7.01	6.85	6.69	.16	.16
MW-9 (Bm)	114.27	6.42	6.32	6.12	.10	.10
MW-13	111.80 +53	5.89	5.58	5.27	.31	.31
MW-13 (Turn)	111.80	5.90	5.78	5.66	.12	.12
MW-12	113.36 -1.44	7.60	7.22	6.80	.44	.44

APPENDIX D

Barometric Pressure Data

Weather data from: Univ. of Wash.

Pressure (millibars)



Created by:

Rich Edgerton
Harry Edmon
Neal Johnson
Jim Tillman
David Warren
Fred Weller

University of Washington
Seattle, Washington USA

Clicking on a plot brings up the data file that was used to create that plot and available station information.

Current time GMT/UTC Thu Oct 3 20:53:15 2002
Local (Pacific Daylight Time) Thu Oct 3 13:53:15 2002

APPENDIX E

Laboratory Analytical Data – Summa Canister Vapor Samples

Analytical reports to be included in Final RI report

APPENDIX F

Laboratory Analytical Reports – Groundwater

Analytical reports to be included in Final RI report

APPENDIX G
Soil Vapor Modeling Results

DATA ENTRY SHEET

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432				Benzene

Enter soil gas concentration above.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Totals must add up to value of Ls (cell C24) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
200	225	10	225	0	0			1.62E-08

MORE ↓

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.45	0.227						

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
12	40	3200	1067	244	0.1	0.1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	365

END

Predicted Apartment Benzene Concentration

Present Condition

	Bldg 1	
Floor Area (sf)	3,675.00	*user input footprint area of buildings*
L (ft)	105.00	*user input actual or longest length if footprint not rectangular*
W (ft)	35.00	*user input actual or longest width if footprint not rectangular*
H (ft)	8.00	*user input maximum height*
Floor Area (sf)	3,675.00	*Value from B2*
L (ft)	105.00	*Value from B3*
W (ft)	35.00	*Value from B4*
H (ft)	8.00	*Value from B5*
Pressure differential (Pascal)	40.00	*pressure differential; J&E default = 4.0 Pascal and assumes building pressure less than atmosphere value from DATAENTER C44*
Q air rate (cfm/sf)	0.10	*fresh air exchange rate value from DATAENTER H44*
Floor-Wall seam crack width (cm)	0.10	*floor-wall crack width value from DATENTER G44; J&E default = 0.1 cm*
C soil (ppbv)	13,000.00	*user input average contaminant concentration in near surface soil vapor*
MW Benzene	78.11	*gram molecular weight value from CHEMPROPS H9*
C air (ug/m3)	0.00	*user input contaminant concentration in background air*
ASIL (ug/m3)	0.12	*user input contaminant ASIL limit*
MTCA Method B (ug/m3)	0.32	*user input contaminant MTCA Method B cleanup standard*
ACGIH TLV (ug/m3)	1,600.00	*user input contaminant ACGIH TLV standard*
OSHA PEL (ug/m3)	3,190.00	*user input contaminant OSHA PEL standard*
Subgrade Soil Vapor Permeability	1.62E-08	*soil permeability value from DATENTER J24*
Pressure differential (g/cm-sec2)	400.00	*unit conversion and program input to DATENTER C44*
L (cm)	3,200.40	*unit conversion and program input to DATENTER D44*
W (cm)	1,066.80	*unit conversion and program input to DATENTER E44*
H (cm)	243.84	*unit conversion and program input to DATENTER F44*
Q air (cfm)	367.50	*equals Area (sf) * Q bldg rate*
Q air (m3/sec)	0.17	*unit conversion for fresh air exchange rate*
Air exchange rate (1/hr)	0.75	*calculate fresh air exchange rate = [Q bldg / (Floor Area * H)] * 60 and program input to DATENTER H44; J&E default = 0.45/h*
Q soil (cm3/sec)	23.88	*value from INTERCALCS D31*
Q soil (m3/sec)	2.39E-05	*unit conversion for soil vapor inflow to building*
C soil (ug/m3)	41,508.46	*unit conversion for contaminant concentration where ug/m3 = ppbv * (P/RT) * MW *1/1000 = ppbv * MW * 0.04088*
Results		
C bldg (ug/m3)	**5.71**	*building contaminant concentration by mass balance ((C air * Q bldg)+(C soil * Q soil))/(Q soil + Q bldg)*
Factor greater than or less than ASIL	47.62	*how much C bldg is either greater or less than the ASIL*
Factor greater than or less than MTCA Method B	17.80	*how much C bldg is either greater or less than the MTCA Method B cleanup standard*
Factor greater than or less than ACGIH TLV	-280.00	*how much C bldg is either greater or less than the ACGIH TLV standard*
Factor greater than or less than OSHA PEL	-558.26	*how much C bldg is either greater or less than the OSHA PEL standard*

Predicted Apartment Benzene Concentration

Adjusted Condition

	Bldg 1	
Floor Area (sf)	3,675.00	*user input footprint area of buildings*
L (ft)	105.00	*user input actual or longest length if footprint not rectangular*
W (ft)	35.00	*user input actual or longest width if footprint not rectangular*
H (ft)	8.00	*user input maximum height*
Floor Area (sf)	3,675.00	*Value from B2*
L (ft)	105.00	*Value from B3*
W (ft)	35.00	*Value from B4*
H (ft)	8.00	*Value from B5*
Pressure differential (Pascal)	40.00	*pressure differential; J&E default = 4.0 Pascal and assumes building pressure less than atmosphere value from DATAENTER C44*
Q air rate (cfm/sf)	0.10	*fresh air exchange rate value from DATAENTER H44*
Floor-Wall seam crack width (cm)	0.10	*floor-wall crack width value from DATENTER G44; J&E default = 0.1 cm*
C soil (ppbv)	275.00	*user input average contaminant concentration in near surface soil vapor*
MW Benzene	78.11	*gram molecular weight value from CHEMPROPS H9*
C air (ug/m3)	0.00	*user input contaminant concentration in background air*
ASIL (ug/m3)	0.12	*user input contaminant ASIL limit*
MTCA Method B (ug/m3)	0.32	*user input contaminant MTCA Method B cleanup standard*
ACGIH TLV (ug/m3)	1,600.00	*user input contaminant ACGIH TLV standard*
OSHA PEL (ug/m3)	3,190.00	*user input contaminant OSHA PEL standard*
Subgrade Soil Vapor Permeability	1.62E-08	*soil permeability value from DATENTER J24*
Pressure differential (g/cm-sec2)	400.00	*unit conversion and program input to DATENTER C44*
L (cm)	3,200.40	*unit conversion and program input to DATENTER D44*
W (cm)	1,066.80	*unit conversion and program input to DATENTER E44*
H (cm)	243.84	*unit conversion and program input to DATENTER F44*
Q air (cfm)	367.50	*equals Area (sf) * Q bldg rate*
Q air (m3/sec)	0.17	*unit conversion for fresh air exchange rate*
Air exchange rate (1/hr)	0.75	*calculate fresh air exchange rate = [Q bldg / (Floor Area * H)] * 60 and program input to DATENTER H44; J&E default = 0.45/h*
Q soil (cm3/sec)	23.88	*value from INTERCALCS D31*
Q soil (m3/sec)	2.39E-05	*unit conversion for soil vapor inflow to building*
C soil (ug/m3)	878.06	*unit conversion for contaminant concentration where ug/m3 = ppbv * (P/RT) * MW *1/1000 = ppbv * MW * 0.04088*
Results		
C bldg (ug/m3)	**0.12**	*building contaminant concentration by mass balance ((C air * Q bldg)+(C soil * Q soil))/(Q soil + Q bldg)*
Factor greater than or less than ASIL	1.01	*how much C bldg is either greater or less than the ASIL*
Factor greater than or less than MTCA Method B	-2.66	*how much C bldg is either greater or less than the MTCA Method B cleanup standard*
Factor greater than or less than ACGIH TLV	-13,236.58	*how much C bldg is either greater or less than the ACGIH TLV standard*
Factor greater than or less than OSHA PEL	-26,390.42	*how much C bldg is either greater or less than the OSHA PEL standard*

DATA ENTRY SHEET

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
127184				Tetrachloroethylene

Enter soil gas concentration above.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Totals must add up to value of Ls (cell C24) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
200	225	10	225	0	0			1.62E-08

MORE ↓

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.45	0.227						

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
12	40	3200	1067	244	0.1	0.1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	365

END

Predicted Apartment PCE Concentration

Current Condition

	Bldg 1	
Floor Area (sf)	3,675.00	*user input footprint area of buildings*
L (ft)	105.00	*user input actual or longest length if footprint not rectangular*
W (ft)	35.00	*user input actual or longest width if footprint not rectangular*
H (ft)	8.00	*user input maximum height*
Floor Area (sf)	3,675.00	*Value from B2*
L (ft)	105.00	*Value from B3*
W (ft)	35.00	*Value from B4*
H (ft)	8.00	*Value from B5*
Pressure differential (Pascal)	40.00	*pressure differential; J&E default = 4.0 Pascal and assumes building pressure less than atmosphere value from DATAENTER C44*
Q air rate (cfm/sf)	0.10	*fresh air exchange rate value from DATAENTER H44*
Floor-Wall seam crack width (cm)	0.10	*floor-wall crack width value from DATENTER G44; J&E default = 0.1 cm*
C soil (ppbv)	6,200.00	*user input average contaminant concentration in near surface soil vapor*
MW Tetrachloroethene	165.83	*gram molecular weight value from CHEMPROPS H9*
C air (ug/m3)	0.00	*user input contaminant concentration in background air*
ASIL (ug/m3)	1.10	*user input contaminant ASIL limit*
MTCA Method B (ug/m3)		*user input contaminant MTCA Method B cleanup standard*
ACGIH TLV (ug/m3)	170,000.00	*user input contaminant ACGIH TLV standard*
OSHA PEL (ug/m3)	678,000.00	*user input contaminant OSHA PEL standard*
Subgrade Soil Vapor Permeability	1.62E-08	*soil permeability value from DATENTER J24*
Pressure differential (g/cm-sec2)	400.00	*unit conversion and program input to DATENTER C44*
L (cm)	3,200.40	*unit conversion and program input to DATENTER D44*
W (cm)	1,066.80	*unit conversion and program input to DATENTER E44*
H (cm)	243.84	*unit conversion and program input to DATENTER F44*
Q air (cfm)	367.50	*equals Area (sf) * Q bldg rate*
Q air (m3/sec)	0.17	*unit conversion for fresh air exchange rate*
Air exchange rate (1/hr)	0.75	*calculate fresh air exchange rate = [Q bldg / (Floor Area * H)] * 60 and program input to DATENTER H44; J&E default = 0.45/h*
Q soil (cm3/sec)	23.88	*value from INTERCALCS D31*
Q soil (m3/sec)	2.39E-05	*unit conversion for soil vapor inflow to building*
C soil (ug/m3)	42,028.26	*unit conversion for contaminant concentration where ug/m3 = ppbv * (P/RT) * MW *1/1000 = ppbv * MW * 0.04088*
Results		
C bldg (ug/m3)	**5.79**	*building contaminant concentration by mass balance ((C air * Q bldg)+(C soil * Q soil))/(Q soil + Q bldg)*
Factor greater than or less than ASIL	5.26	*how much C bldg is either greater or less than the ASIL*
Factor greater than or less than MTCA Method B	#DIV/0!	*how much C bldg is either greater or less than the MTCA Method B cleanup standard*
Factor greater than or less than ACGIH TLV	-29,382.53	*how much C bldg is either greater or less than the ACGIH TLV standard*
Factor greater than or less than OSHA PEL	-117,184.44	*how much C bldg is either greater or less than the OSHA PEL standard*

Predicted Apartment PCE Concentration

Adjusted Condition

	Bldg 1	
Floor Area (sf)	3,675.00	*user input footprint area of buildings*
L (ft)	105.00	*user input actual or longest length if footprint not rectangular*
W (ft)	35.00	*user input actual or longest width if footprint not rectangular*
H (ft)	8.00	*user input maximum height*
Floor Area (sf)	3,675.00	*Value from B2*
L (ft)	105.00	*Value from B3*
W (ft)	35.00	*Value from B4*
H (ft)	8.00	*Value from B5*
Pressure differential (Pascal)	40.00	*pressure differential; J&E default = 4.0 Pascal and assumes building pressure less than atmosphere value from DATAENTER C44*
Q air rate (cfm/sf)	0.10	*fresh air exchange rate value from DATAENTER H44*
Floor-Wall seam crack width (cm)	0.10	*floor-wall crack width value from DATENTER G44; J&E default = 0.1 cm*
C soil (ppbv)	1,200.00	*user input average contaminant concentration in near surface soil vapor*
MW Tetrachloroethene	165.83	*gram molecular weight value from CHEMPROPS H9*
C air (ug/m3)	0.00	*user input contaminant concentration in background air*
ASIL (ug/m3)	1.10	*user input contaminant ASIL limit*
MTCA Method B (ug/m3)		*user input contaminant MTCA Method B cleanup standard*
ACGIH TLV (ug/m3)	170,000.00	*user input contaminant ACGIH TLV standard*
OSHA PEL (ug/m3)	678,000.00	*user input contaminant OSHA PEL standard*
Subgrade Soil Vapor Permeability	1.62E-08	*soil permeability value from DATENTER J24*
Pressure differential (g/cm-sec2)	400.00	*unit conversion and program input to DATENTER C44*
L (cm)	3,200.40	*unit conversion and program input to DATENTER D44*
W (cm)	1,066.80	*unit conversion and program input to DATENTER E44*
H (cm)	243.84	*unit conversion and program input to DATENTER F44*
Q air (cfm)	367.50	*equals Area (sf) * Q bldg rate*
Q air (m3/sec)	0.17	*unit conversion for fresh air exchange rate*
Air exchange rate (1/hr)	0.75	*calculate fresh air exchange rate = [Q bldg / (Floor Area * H)] * 60 and program input to DATENTER H44; J&E default = 0.45/h*
Q soil (cm3/sec)	23.88	*value from INTERCALCS D31*
Q soil (m3/sec)	2.39E-05	*unit conversion for soil vapor inflow to building*
C soil (ug/m3)	8,134.50	*unit conversion for contaminant concentration where ug/m3 = ppbv * (P/RT) * MW *1/1000 = ppbv * MW * 0.04088*
Results		
C bldg (ug/m3)	**1.12**	*building contaminant concentration by mass balance ((C air * Q bldg)+(C soil * Q soil))/(Q soil + Q bldg)*
Factor greater than or less than ASIL	1.02	*how much C bldg is either greater or less than the ASIL*
Factor greater than or less than MTCA Method B	#DIV/0!	*how much C bldg is either greater or less than the MTCA Method B cleanup standard*
Factor greater than or less than ACGIH TLV	-151,809.73	*how much C bldg is either greater or less than the ACGIH TLV standard*
Factor greater than or less than OSHA PEL	-605,452.92	*how much C bldg is either greater or less than the OSHA PEL standard*

DATA ENTRY SHEET

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883				Toluene

Enter soil gas concentration above.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of Ls (cell C24)					
200	225	10	225	0	0			1.62E-08

MORE ↓

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.45	0.227						

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
12	40	3200	1067	244	0.1	0.1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	365

END

Predicted Apartment Toluene Concentration

Current Condition

	Bldg 1	
Floor Area (sf)	3,675.00	*user input footprint area of buildings*
L (ft)	105.00	*user input actual or longest length if footprint not rectangular*
W (ft)	35.00	*user input actual or longest width if footprint not rectangular*
H (ft)	8.00	*user input maximum height*
Floor Area (sf)	3,675.00	*Value from B2*
L (ft)	105.00	*Value from B3*
W (ft)	35.00	*Value from B4*
H (ft)	8.00	*Value from B5*
Pressure differential (Pascal)	40.00	*pressure differential; J&E default = 4.0 Pascal and assumes building pressure less than atmosphere value from DATAENTER C44*
Q air rate (cfm/sf)	0.10	*fresh air exchange rate value from DATAENTER H44*
Floor-Wall seam crack width (cm)	0.10	*floor-wall crack width value from DATENTER G44; J&E default = 0.1 cm*
C soil (ppbv)	110,000.00	*user input average contaminant concentration in near surface soil vapor*
MW Toluene	92.14	*gram molecular weight value from CHEMPROPS H9*
C air (ug/m3)	0.00	*user input contaminant concentration in background air*
ASIL (ug/m3)	400.00	*user input contaminant ASIL limit*
MTCA Method B (ug/m3)	183.00	*user input contaminant MTCA Method B cleanup standard*
ACGIH TLV (ug/m3)	188,000.00	*user input contaminant ACGIH TLV standard*
OSHA PEL (ug/m3)	754,000.00	*user input contaminant OSHA PEL standard*
Subgrade Soil Vapor Permeability	1.62E-08	*soil permeability value from DATENTER J24*
Pressure differential (g/cm-sec2)	400.00	*unit conversion and program input to DATENTER C44*
L (cm)	3,200.40	*unit conversion and program input to DATENTER D44*
W (cm)	1,066.80	*unit conversion and program input to DATENTER E44*
H (cm)	243.84	*unit conversion and program input to DATENTER F44*
Q air (cfm)	367.50	*equals Area (sf) * Q bldg rate*
Q air (m3/sec)	0.17	*unit conversion for fresh air exchange rate*
Air exchange rate (1/hr)	0.75	*calculate fresh air exchange rate = [Q bldg / (Floor Area * H)] * 60 and program input to DATENTER H44; J&E default = 0.45/h*
Q soil (cm3/sec)	23.88	*value from INTERCALCS D31*
Q soil (m3/sec)	2.39E-05	*unit conversion for soil vapor inflow to building*
C soil (ug/m3)	414,311.98	*unit conversion for contaminant concentration where ug/m3 = ppbv * (P/RT) * MW *1/1000 = ppbv * MW * 0.04088*
Results		
C bldg (ug/m3)	**57.04**	*building contaminant concentration by mass balance ((C air * Q bldg)+(C soil * Q soil))/(Q soil + Q bldg)*
Factor greater than or less than ASIL	-7.01	*how much C bldg is either greater or less than the ASIL*
Factor greater than or less than MTCA Method B	-3.21	*how much C bldg is either greater or less than the MTCA Method B cleanup standard*
Factor greater than or less than ACGIH TLV	-3,296.19	*how much C bldg is either greater or less than the ACGIH TLV standard*
Factor greater than or less than OSHA PEL	-13,219.82	*how much C bldg is either greater or less than the OSHA PEL standard*

DATA ENTRY SHEET

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414				Ethylbenzene

Enter soil gas concentration above.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Totals must add up to value of Ls (cell C24) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
200	225	10	225	0	0			1.62E-08

MORE ↓

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.45	0.227						

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
12	40	3200	1067	244	0.1	0.1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	365

END

Predicted Apartment Ethylbenzene Concentration

Current Condition

	Bldg 1	
Floor Area (sf)	3,675.00	*user input footprint area of buildings*
L (ft)	105.00	*user input actual or longest length if footprint not rectangular*
W (ft)	35.00	*user input actual or longest width if footprint not rectangular*
H (ft)	8.00	*user input maximum height*
Floor Area (sf)	3,675.00	*Value from B2*
L (ft)	105.00	*Value from B3*
W (ft)	35.00	*Value from B4*
H (ft)	8.00	*Value from B5*
Pressure differential (Pascal)	40.00	*pressure differential; J&E default = 4.0 Pascal and assumes building pressure less than atmosphere value from DATAENTER C44*
Q air rate (cfm/sf)	0.10	*fresh air exchange rate value from DATAENTER H44*
Floor-Wall seam crack width (cm)	0.10	*floor-wall crack width value from DATENTER G44; J&E default = 0.1 cm*
C soil (ppbv)	55,000.00	*user input average contaminant concentration in near surface soil vapor*
MW Ethylbenzene	106.17	*gram molecular weight value from CHEMPROPS H9*
C air (ug/m3)	0.00	*user input contaminant concentration in background air*
ASIL (ug/m3)	1,000.00	*user input contaminant ASIL limit*
MTCA Method B (ug/m3)	4,570.00	*user input contaminant MTCA Method B cleanup standard*
ACHIH TLV (ug/m3)	434,000.00	*user input contaminant ACGIH TLV standard*
OSHA PEL (ug/m3)	435,000.00	*user input contaminant OSHA PEL standard*
Subgrade Soil Vapor Permeability	1.62E-08	*soil permeability value from DATENTER J24*
Pressure differential (g/cm-sec2)	400.00	*unit conversion and program input to DATENTER C44*
L (cm)	3,200.40	*unit conversion and program input to DATENTER D44*
W (cm)	1,066.80	*unit conversion and program input to DATENTER E44*
H (cm)	243.84	*unit conversion and program input to DATENTER F44*
Q air (cfm)	367.50	*equals Area (sf) * Q bldg rate*
Q air (m3/sec)	0.17	*unit conversion for fresh air exchange rate*
Air exchange rate (1/hr)	0.75	*calculate fresh air exchange rate = [Q bldg / (Floor Area * H)] * 60 and program input to DATENTER H44; J&E default = 0.45/h*
Q soil (cm3/sec)	23.88	*value from INTERCALCS D31*
Q soil (m3/sec)	2.39E-05	*unit conversion for soil vapor inflow to building*
C soil (ug/m3)	238,699.28	*unit conversion for contaminant concentration where ug/m3 = ppbv * (P/RT) * MW *1/1000 = ppbv * MW * 0.04088*
Results		
C bldg (ug/m3)	**32.86**	*building contaminant concentration by mass balance ((C air * Q bldg)+(C soil * Q soil))/(Q soil + Q bldg)*
Factor greater than or less than ASIL	-30.43	*how much C bldg is either greater or less than the ASIL*
Factor greater than or less than MTCA Method B	-139.07	*how much C bldg is either greater or less than the MTCA Method B cleanup standard*
Factor greater than or less than ACGIH TLV	-13,207.49	*how much C bldg is either greater or less than the ACGIH TLV standard*
Factor greater than or less than OSHA PEL	-13,237.92	*how much C bldg is either greater or less than the OSHA PEL standard*

DATA ENTRY SHEET

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476				o-Xylene

Enter soil gas concentration above.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of Ls (cell C24)					
200	225	10	225	0	0			1.62E-08

MORE ↓

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.45	0.227						

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
12	40	3200	1067	244	0.1	0.1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	365

END

Predicted Apartment 0-Xylene Concentration

Current Condition

	Bldg 1	
Floor Area (sf)	3,675.00	*user input footprint area of buildings*
L (ft)	105.00	*user input actual or longest length if footprint not rectangular*
W (ft)	35.00	*user input actual or longest width if footprint not rectangular*
H (ft)	8.00	*user input maximum height*
Floor Area (sf)	3,675.00	*Value from B2*
L (ft)	105.00	*Value from B3*
W (ft)	35.00	*Value from B4*
H (ft)	8.00	*Value from B5*
Pressure differential (Pascal)	40.00	*pressure differential; J&E default = 4.0 Pascal and assumes building pressure less than atmosphere value from DATAENTER C44*
Q air rate (cfm/sf)	0.10	*fresh air exchange rate value from DATAENTER H44*
Floor-Wall seam crack width (cm)	0.10	*floor-wall crack width value from DATENTER G44; J&E default = 0.1 cm*
C soil (ppbv)	140,000.00	*user input average contaminant concentration in near surface soil vapor*
MW o-xylene	106.17	*gram molecular weight value from CHEMPROPS H9*
C air (ug/m3)	0.00	*user input contaminant concentration in background air*
ASIL (ug/m3)	1,500.00	*user input contaminant ASIL limit*
MTCA Method B (ug/m3)	320.00	*user input contaminant MTCA Method B cleanup standard*
ACGIH TLV (ug/m3)	434,000.00	*user input contaminant ACGIH TLV standard*
OSHA PEL (ug/m3)	435,000.00	*user input contaminant OSHA PEL standard*
Subgrade Soil Vapor Permeability	1.62E-08	*soil permeability value from DATENTER J24*
Pressure differential (g/cm-sec2)	400.00	*unit conversion and program input to DATENTER C44*
L (cm)	3,200.40	*unit conversion and program input to DATENTER D44*
W (cm)	1,066.80	*unit conversion and program input to DATENTER E44*
H (cm)	243.84	*unit conversion and program input to DATENTER F44*
Q air (cfm)	367.50	*equals Area (sf) * Q bldg rate*
Q air (m3/sec)	0.17	*unit conversion for fresh air exchange rate*
Air exchange rate (1/hr)	0.75	*calculate fresh air exchange rate = [Q bldg / (Floor Area * H)] * 60 and program input to DATENTER H44; J&E default = 0.45/h*
Q soil (cm3/sec)	23.88	*value from INTERCALCS D31*
Q soil (m3/sec)	2.39E-05	*unit conversion for soil vapor inflow to building*
C soil (ug/m3)	607,598.17	*unit conversion for contaminant concentration where ug/m3 = ppbv * (P/RT) * MW *1/1000 = ppbv * MW * 0.04088*
Results		
C bldg (ug/m3)	**83.64**	*building contaminant concentration by mass balance ((C air * Q bldg)+(C soil * Q soil))/(Q soil + Q bldg)*
Factor greater than or less than ASIL	-17.93	*how much C bldg is either greater or less than the ASIL*
Factor greater than or less than MTCA Method B	-3.83	*how much C bldg is either greater or less than the MTCA Method B cleanup standard*
Factor greater than or less than ACGIH TLV	-5,188.66	*how much C bldg is either greater or less than the ACGIH TLV standard*
Factor greater than or less than OSHA PEL	-5,200.61	*how much C bldg is either greater or less than the OSHA PEL standard*

DATA ENTRY SHEET

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
106423				p-Xylene

Enter soil gas concentration above.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of Ls (cell C24)					
200	225	10	225	0	0			1.62E-08

MORE ↓

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.5	0.45	0.227						

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
12	40	3200	1067	244	0.1	0.1

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	365

END

Predicted Apartment m, p-Xylene Concentration

Current Condition

	Bldg 1	
Floor Area (sf)	3,675.00	*user input footprint area of buildings*
L (ft)	105.00	*user input actual or longest length if footprint not rectangular*
W (ft)	35.00	*user input actual or longest width if footprint not rectangular*
H (ft)	8.00	*user input maximum height*
Floor Area (sf)	3,675.00	*Value from B2*
L (ft)	105.00	*Value from B3*
W (ft)	35.00	*Value from B4*
H (ft)	8.00	*Value from B5*
Pressure differential (Pascal)	40.00	*pressure differential; J&E default = 4.0 Pascal and assumes building pressure less than atmosphere value from DATAENTER C44*
Q air rate (cfm/sf)	0.10	*fresh air exchange rate value from DATAENTER H44*
Floor-Wall seam crack width (cm)	0.10	*floor-wall crack width value from DATENTER G44; J&E default = 0.1 cm*
C soil (ppbv)	360,000.00	*user input average contaminant concentration in near surface soil vapor*
MW m/p xylene	106.17	*gram molecular weight value from CHEMPROPS H9*
C air (ug/m3)	0.00	*user input contaminant concentration in background air*
ASIL (ug/m3)	1,500.00	*user input contaminant ASIL limit*
MTCA Method B (ug/m3)	320.00	*user input contaminant MTCA Method B cleanup standard*
ACGIH TLV (ug/m3)	434,000.00	*user input contaminant ACGIH TLV standard*
OSHA PEL (ug/m3)	435,000.00	*user input contaminant OSHA PEL standard*
Subgrade Soil Vapor Permeability	1.62E-08	*soil permeability value from DATENTER J24*
Pressure differential (g/cm-sec2)	400.00	*unit conversion and program input to DATENTER C44*
L (cm)	3,200.40	*unit conversion and program input to DATENTER D44*
W (cm)	1,066.80	*unit conversion and program input to DATENTER E44*
H (cm)	243.84	*unit conversion and program input to DATENTER F44*
Q air (cfm)	367.50	*equals Area (sf) * Q bldg rate*
Q air (m3/sec)	0.17	*unit conversion for fresh air exchange rate*
Air exchange rate (1/hr)	0.75	*calculate fresh air exchange rate = [Q bldg / (Floor Area * H)] * 60 and program input to DATENTER H44; J&E default = 0.45/h*
Q soil (cm3/sec)	23.88	*value from INTERCALCS D31*
Q soil (m3/sec)	2.39E-05	*unit conversion for soil vapor inflow to building*
C soil (ug/m3)	1,562,395.28	*unit conversion for contaminant concentration where ug/m3 = ppbv * (P/RT) * MW *1/1000 = ppbv * MW * 0.04088*
Results		
C bldg (ug/m3)	**215.08**	*building contaminant concentration by mass balance ((C air * Q bldg)+(C soil * Q soil))/(Q soil + Q bldg)*
Factor greater than or less than ASIL	-6.97	*how much C bldg is either greater or less than the ASIL*
Factor greater than or less than MTCA Method B	-1.49	*how much C bldg is either greater or less than the MTCA Method B cleanup standard*
Factor greater than or less than ACGIH TLV	-2,017.81	*how much C bldg is either greater or less than the ACGIH TLV standard*
Factor greater than or less than OSHA PEL	-2,022.46	*how much C bldg is either greater or less than the OSHA PEL standard*