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Alameda County
Environmental Health

February 22, 2011

Mr. Paresh Khatri
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

SUBJECT: GROUNDWATER AND SOIL GAS SUBSURFACE INVESTIGATION REPORT CERTIFICATION
County Case # RO 209
VIP Service
3889 Castro Valley Blvd.
Castro Valley, CA

Dear Mr. Khatri:

You will find enclosed one copy of the following document prepared by P&D Environmental, Inc.

- Groundwater and Soil Gas Subsurface Investigation Report (P35 and SG17) dated February 22, 2011 (document 0047.R46).

I declare, under penalty of perjury, that the information and/or recommendations contained in the above-mentioned document for the subject site is true and correct to the best of my knowledge.

Should you have any questions, please do not hesitate to contact my consultant Paul King at P&D Environmental, Inc. at (510) 658-6916.

Sincerely,

VIP Service

Lalji Patel

Enclosure

0047.L114

P&D ENVIRONMENTAL, INC.
55 Santa Clara Ave, Suite 240
Oakland, CA 94610
(510) 658-6916

February 22, 2011
Report 0047.R46

Mr. L.B. Patel
Mr. P. Gupta
VIP Service
385 Century Circle
Danville, CA 94526

SUBJECT: GROUNDWATER AND SOIL GAS SUBSURFACE INVESTIGATION REPORT
(P35 AND SG17)
County Case # RO 209
VIP Service
3889 Castro Valley Blvd.
Castro Valley, CA

Gentlemen:

P&D Environmental, Inc. (P&D) is pleased to present this report documenting the collection of one groundwater grab sample at location P35 and one soil gas sample designated as SG17 at properties neighboring the subject site. Drilling and sample collection activities were performed on November 30, 2010. The groundwater grab sample was collected to verify that the horizontal extent of petroleum hydrocarbon-impacted groundwater has been defined. The soil gas sample was collected to evaluate the presence of soil gas beneath a residence located down gradient of the subject site where elevated soil gas concentrations have historically been detected. A Site Location Map is attached as Figure 1, and a Site Vicinity Map showing the borehole and soil gas sample collection locations is attached as Figure 2.

The groundwater grab sample and the soil gas samples were collected in accordance with recommendations set forth in P&D's Groundwater and Soil Gas Subsurface Investigation Report dated October 27, 2009 (document 0047.R42). The recommendations were approved in a letter from the Alameda County Department of Environmental Health (ACDEH) in a letter dated May 20, 2010. All work was performed under the direct supervision of a professional geologist.

BACKGROUND

It is P&D's understanding that the site was purchased by VIP Service in December 1984. Prior to purchase of the property by VIP Service, the site was operated as a retail gasoline station for an undetermined period of time. The site was operated by VIP Service as a retail gasoline station from the time of purchase until the tanks were removed by Accutite on April 26, 1993. The underground tank system consisted of three 10,000-gallon capacity gasoline tanks, two dispenser islands, and one 550-gallon waste oil tank. It is P&D's understanding that the fuel tanks contained leaded and unleaded gasoline while in use by VIP Service. In addition, VIP Service reported that diesel fuel was not stored at the site at any time.

Documentation of the installation of monitoring wells MW1 through MW3, associated soil boring, and associated sample results are presented in P&D's report 0047.R2 dated January 24, 1994. The locations of the monitoring wells are shown in Figure 2.

In response to a letter dated March 18, 1994 from Mr. Scott Seery of the ACDEH which commented upon the results of the initial groundwater sampling associated with the installation of the monitoring wells at the subject site, a quarterly groundwater monitoring and sampling program was initiated. Based upon subsequent conversations with Mr. Seery, the monitoring and sampling frequency was reduced to semi-annually.

A detailed discussion on the site background, and historical monitoring and sampling, and investigations are provide in P&D's Remedial Investigation and Feasibility Study (RI/FS) Work Plan dated May 17, 2005 (document 0047.W5), and P&D's Groundwater and Soil Gas Subsurface Investigation Report dated October 27, 2009 (document 0047.R42). The 2009 report documents the collection of soil gas samples SG13 through SG16 from locations surrounding the house located at 3945 Castro Valley Boulevard at a depth of approximately 5 feet below the ground surface (bgs). The highest soil gas benzene concentration encountered during the investigation was at SG15, which was located approximately 10 feet away from the building because of a large diameter high pressure natural gas main that services the mobile home park and that is located near the side of the house. The locations of soil gas sample locations SG13 through SG16 are shown in Figure 2, and the soil gas sample results and calculated risk and hazard for vapor intrusion to indoor air (tables 2 and 3, respectively) are presented in Appendix A.

On December 6 through 9, 2010 P&D oversaw the installation of dual phase extraction wells EW1 through EW3, observation wells OW1 and OW3 through OW6, soil vapor extraction wells C1 through C4, and soil vapor extraction wells F1 through F4 at and near the subject site. The wells were installed in accordance with procedures identified in P&D's Remedial Investigation and Feasibility Study (RI/FS) Work Plan dated May 17, 2005 (document 0047.W5), P&D's Remedial Investigation and Feasibility Study (RI/FS) Work Plan Addendum dated August 13, 2007 (document 0047.W5A), and documents referenced in an ACDEH August 20, 2010 letter approving installation of the wells. New wells EW1 through EW3, OW1 and OW3 through OW6, C1 through C4, and F1 through F4 were installed and surveyed in December 2010. Documentation of the installation of the new wells is provided in P&D's Well Installation Report dated February 22, 2011 (document 0047.R47). The measured depth to water in the wells, and the groundwater sample results for samples collected from the wells are attached with this report in Appendix A.

FIELD ACTIVITIES

Prior to drilling, Alameda County Public Works Agency (ACPWA) permit W2010-0944 was obtained for the drilling of boreholes for collection of a groundwater grab sample at location P35 and for collection of a soil gas sample at location SG17. In addition, permission for offsite property access was obtained, the drilling locations were marked with white paint, Underground Service Alert was notified for underground utility location, a health and safety plan was prepared, and notification of the scheduled drilling date was provided to ACPWA and ACDEH. Drilling activities were performed on November 30, 2010 by Vironex, Inc. of Pacheco, California.

Groundwater Sample Collection

On November 30, 2010 P&D personnel oversaw the hand-augering of boring P35 to a depth of 12.0 feet bgs with a 3.5-inch outside diameter stainless steel hand auger at the location shown in Figure 2. The soil from the borehole was logged in the field in accordance with standard geologic field techniques and the Unified Soil Classification System. The soil was evaluated with a Photoionization Detector (PID) equipped with a 10.6 eV bulb and calibrated with a 100 ppm isobutylene standard, and was also evaluated for other evidence of petroleum hydrocarbon contamination such as odors, staining, and discoloration. No soil samples were retained for laboratory analysis.

In borehole P35, discoloration and detectable PID readings were recorded as follows.

- Greenish-brown discoloration in clayey sand, accompanied by a strong petroleum hydrocarbon odor and a PID reading of 249 ppm, was detected from 9.0 to 12.0 feet bgs.

Groundwater was initially encountered while hand augering borehole P35 at a depth of 8.5 feet bgs, and was not subsequently measured in the borehole. A copy of the boring log is attached with this report as Appendix B.

One groundwater grab sample was collected from the borehole using a temporary slotted PVC pipe and a polyethylene tube with a stainless steel check valve. The sample was placed into 40-milliliter VOAs and 1-liter amber glass bottles preserved with hydrochloric acid and capped with Teflon-lined screw caps. All sample containers were clean and provided by the laboratory. The VOAs were overturned and tapped to ensure that no air bubbles were present. The sample was then stored in a cooler with ice, pending delivery to the laboratory. Chain of custody procedures were observed for all sample handling.

All drilling and sampling equipment was either new or cleaned with an Alconox solution followed by a clean water rinse prior to use in the borehole. Following completion of sample collection activities, the borehole was filled with neat cement grout. Soil and water generated during drilling was stored in drums at the site pending characterization and disposal.

Soil Gas Sample Collection

A total of one soil gas sample and one soil gas sample duplicate, designated as SG17 and SG17-Dup, were collected from a temporary soil gas sampling well on November 30, 2010 that was constructed beneath a concrete slab located adjacent to the building at the location shown as SG17 on Figure 2. The sample location was located horizontally approximately one foot from the northeast corner of the house. The east side of the house is inaccessible because of a large diameter high pressure natural gas pipe that provides service to the mobile home park at the site.

The temporary well was constructed by driving a hollow 1-inch diameter Geoprobe rod with an expendable tip to a depth of 1.5 feet, dislodging the expendable tip, and then inserting a 0.250-inch outside diameter (0.187-inch inside diameter) Teflon tube measuring 7 feet in length to the bottom of the hollow rod. Prior to inserting the Teflon tubing, a 1-inch long, 3/8-inch diameter stainless steel screen was attached to the Teflon tubing. A #2/16 Lonestar sack sand was added to the annular space between the hollow rod and the Teflon tube as the hollow rod was withdrawn from the ground until the lowermost 8 inches of the hole was filled with sand. Granular bentonite (with grains measuring approximately 2 to 3 millimeters in diameter) was placed in the annular space to a height of approximately 2 inches above the sand, and the remaining borehole annular space was filled with bentonite slurry. The 6-liter Summa purge canister and 1-liter Summa sample canister were then connected to the Teflon tubing using the configuration shown in Figure 3. A stainless steel tee was also present at the location of the location of the sample canister, and a duplicate Summa canister was attached to the stainless steel tee. At the time that the sampling manifold was assembled, the vacuum for the sample canister and for the duplicate canister were checked with a vacuum gauge and recorded.

The temporary well was then undisturbed to allow soil gas equilibration for a minimum of 30 minutes prior to leak testing and purging for sample collection. Following the equilibration period and prior to purging the soil gas from the temporary soil gas sampling well, a 10 minute leak check of the sampling manifold was performed by closing the valve located between the filter and the pressure gauge, opening the purge canister valve, and recording the manifold system vacuum (see Figure 3). No purge testing for purge volume determination was done because samples were collected into Summa canisters. Following successful verification of the manifold leak check, a default of three purge volumes was extracted prior to sample collection. The calculations for the purge volume are provided in Appendix C. The purge time was calculated using a nominal flow rate provided by the flow controller of 200 milliliters per minute. Following completion of purging three purge volumes, the valve to the purge canister was closed, a tracer gas (2-Propanol) was placed in a dish adjacent to the purge canister, and a clear Rubbermaid bin was placed over the top of the temporary well, the sampling manifold, the 1-liter sample canister, and the 1-liter duplicate canister.

The vapor concentration of the 2-Propanol was monitored with a Photoionization Detector (PID) until 2-Propanol vapor concentrations appeared to have equilibrated. The Rubbermaid bin was then temporarily and partially lifted long enough to open the sample canister and duplicate canister valves and the bin was then replaced over the sampling equipment and the 2-Propanol vapor concentrations was then monitored again with the PID. Once the vacuum for the manifold had decreased to 5 inches of mercury, the Rubbermaid bin was removed and the sample canister and duplicate canister valves were closed. The pressure gage on the inlet side of the flow controller (see Figure 3) was monitored during sample collection to ensure that the vacuum applied to the temporary well did not exceed 100 inches of water.

Following collection of the Summa canister sample and duplicate sample, a soil gas sample was collected using a sorbent tube. The sorbent tube was kept in a cooler with ice prior to use and after use. At the time of sample collection, the inlet for the sampling tube was connected to the temporary well by connecting the sorbent tube inlet to the manifold where the 1-liter sampling canister had been connected to the manifold. A vacuum pump was connected to the downstream side of the sorbent tube using a length of tubing and Swagelok fittings, and the Rubbermaid bin was placed over the sorbent tube (the vacuum pump was located outside of the Rubbermaid bin). A vacuum was applied with the vacuum pump to the sorbent tube for 5 minutes. The flow controller in the manifold resulted in a nominal flow rate of 200 milliliters per minute.

Following completion of the 5 minute sample collection period, the sorbent tube was removed from the temporary well tubing, the ends of the sorbent tube were sealed, and the sorbent tube was stored in a cooler with ice pending delivery to the laboratory. One replicate soil gas sample was collected using a sorbent tube immediately following collection of the sorbent tube sample using the methods described above. Following soil gas sample collection, a PID was connected to the Teflon tubing to obtain a preliminary field value for the sample collection location. The Summa canisters were then stored in a box and the sorbent tubes were then stored in a cooler with ice and promptly shipped to the laboratory for extraction and analysis. Chain of custody procedures were observed for all sample handling. Measurements of vacuums, purging and equilibration time intervals, and PID readings were recorded on Soil Gas Sampling Data Sheets that are provided in Appendix C of this report.

All drilling rods and associated drilling fittings for construction of the temporary soil gas wells were cleaned with an Alconox solution wash followed by a clean water rinse prior to use at each location. New Teflon tubing and clean, unused vacuum gages and stainless steel sampling manifolds were used at each sample collection location. A new stainless steel tee was used in the sampling manifold for collection of the duplicate sample. Following soil gas sample collection the Teflon tubing was pulled from each temporary soil gas sampling well and the temporary soil gas wells were destroyed using a 1-inch diameter solid steel rod driven through the bentonite and sand to the total depth of the temporary soil gas sampling well. The solid steel rod was removed, and the borehole was filled with neat cement.

No precipitation occurred during the week preceding the soil gas sampling or on the day of soil gas sampling (November 30, 2010). Weather data, including precipitation and barometric pressure for the day of the sampling event and also for the month of November 2010 and the first two weeks of December 2010 is provided as Appendix C. The weather station is located at Agualinda Pool in Castro Valley at an elevation of 278 feet, approximately 1.3 miles to the northwest of the subject site. The subject site is located at an elevation of approximately 175 feet above sea level. An internet link to the weather station information is provided in Appendix C.

The drilling rod and associated drilling fittings were cleaned with an Alconox solution wash followed by a clean water rinse prior to use, and new Teflon tubing was used. Clean, unused vacuum gages and a stainless steel sampling manifold containing a flow restrictor were used. Following completion of soil gas sample collection the Teflon tubing was pulled from the temporary soil gas sampling well borehole and a 1-inch diameter solid steel rod was driven through the bentonite and sand to the total depth of the temporary soil gas sampling well. The solid steel rod was then removed, and the borehole was filled with neat cement.

GEOLOGY AND HYDROGEOLOGY

Based on review of regional geologic maps from U. S. Geological Survey Professional Paper 943, "Flatland Deposits - Their Geology and Engineering Properties and Their Importance to Comprehensive Planning," by E. J. Helley and K. R. Lajoie, 1979, the subject site is underlain by Late Pleistocene Alluvium (Qpa), which is described as weakly consolidated slightly weathered poorly sorted irregularly interbedded clay, silt, sand, and gravel.

Review of the boring log for borehole P35 attached with this report as Appendix A shows that the subsurface materials encountered in the borehole are consistent with the Qpa description provided above. The subsurface materials consisted of clay, with clayey sand encountered between the depths of approximately 9.0 and 10.5 feet bgs. Groundwater was encountered at a depth of approximately 8.5 feet bgs while hand augering. The depth of the sand layer and the depth at which groundwater was encountered are consistent with the depth at which the petroleum-impacted sand layer is encountered and the depth at which groundwater are encountered in boreholes located at and near the subject site.

Based on the water levels measured in wells MW1, MW2 and MW3 on December 20, 2010 the groundwater flow direction at the site was to the west, and the historical groundwater flow direction at the site has been westerly. Based on the measured depth to water in all of the wells, groundwater surface contours were identified as shown on Figure 4. Review of Figure 4 shows that the groundwater surface contours suggest a more northwesterly flow direction than the groundwater flow direction calculated using the depth-to-water level measurements in wells MW1 through MW3. The lower water levels in wells F1 and F4 when compared with adjacent wells is interpreted to be the result of slow infiltration of water into the clay layer in which these wells were constructed.

LABORATORY ANALYSIS

The groundwater sample collected from borehole P35 was analyzed at McCampbell Analytical, Inc. (McCampbell) in Pittsburg, California for Total Petroleum Hydrocarbons as Gasoline (TPH-G), and methyl-tert-butyl ether (MTBE), benzene, toluene, ethylbenzene, and xylenes (MBTEX), using EPA Method 8021B in conjunction with modified EPA Method 8015B.

The soil gas sample collected from borehole SG17 and the duplicate sample identified as SG17 DUP that were collected with Summa canisters were analyzed at Air Toxics Limited (Air Toxics) of Folsom California for TPH-G, MBTEX and 2-Propanol using modified EPA Method TO-15. Additionally, the soil gas sample and the replicate that were collected from borehole SG17 using sorbent tubes were analyzed at Air Toxics for 2-Propanol and naphthalene using modified EPA Method TO-17.

The groundwater sample results are summarized in Table 1, and the soil gas sample results are summarized in Table 2. Copies of the laboratory analytical reports and chain of custody documentation are attached with this report as Appendix E.

SOIL GAS RISK AND HAZARD EVALUATION

The SFRWQCB May 2008 Environmental Screening Level (ESL) guidance document "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater" section 2.7 references the DTSC Vapor Intrusion guide (Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air, revised 2/7/05) for interpretation of sample results exceeding ESLs. The ESL Guidance document indicates that the recommended approach of DTSC for sensitive land use scenarios (i.e.- residential) is appropriate. The DTSC guidance document ("Guidance For The Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor

Air" revised February 7, 2005) recommends that if look up table screening levels are exceeded, that a site-specific evaluation of the site be conducted using appropriate fate and transport modeling (Step 7 in the guidance document). DTSC recommends that the USEPA version of the Johnson and Ettinger (JE) soil gas model be used (USEPA Vapor Intrusion Model, 2003). The DTSC has developed a California-specific spreadsheet for calculation of risk and hazard associated with vapor intrusion and exposure to the chemicals which were detected in the soil gas sample collected during the current investigation. The DTSC has most recently updated the soil gas model spreadsheet on February 4, 2009.

The February 2009 DTSC soil gas model spreadsheet was used to calculate the risk and hazard index associated with the soil gas sample results for the current investigation. Evaluation of hazard associated with TPH-G using the DTSC JE model spreadsheet is not possible because TPH is not one of the chemicals available in the chemical properties lookup table for use in the model. Additionally, TPH is not considered a carcinogen, and it is therefore not possible to calculate risk for TPH-G. The risk and hazard for the remaining detected compounds were calculated using the DTSC JE model spreadsheet default values for a residential exposure scenario with a soil gas sampling depth of 45.72 cm (1.5 feet) and a soil type of silt (SI).

The modeled cumulative risk and hazard for indoor air for the residential structure at 3945 Castro Valley Boulevard was evaluated by using the highest concentration for each detected chemical from the sample and the duplicate sample (SG17 and SG17 DUP), and the cumulative risk and hazard for indoor air were also calculated for sample SG17.

The DTSC vapor intrusion model spreadsheet output results for sample SG17 are summarized in Table 3, along with the calculated cumulative risk and hazard for the highest concentrations encountered in either the sample or the duplicate for each compound. The model input, intercalcs and output sheets for each calculation are attached with this report as Appendix F. The cumulative hazard quotient was calculated to be less than one and the incremental carcinogenic risk was calculated to be less than 1 in a million for both the highest concentration scenario and for sample SG17. Review of Table 3 shows that all of the risk and the majority of the hazard in sample SG17 and in the highest concentration scenario is from benzene.

Sensitivity analysis of the soil gas model was performed using benzene for a total of eight scenarios, including the DTSC JE model spreadsheet default value scenario for a residential exposure scenario with a soil gas sampling depth of 45.72 cm (1.5 feet) and a soil type of silt (SI). The results of the sensitivity analysis are summarized in Table 4, and the model input, intercalcs and output sheets for each calculation are attached with this report as Appendix G. Review of Table 4 shows that the model is insensitive to average soil temperature and soil type, but is sensitive to soil gas sampling depth and soil gas contaminant concentration.

DISCUSSION AND RECOMMENDATIONS

Based on the calculated risk and hazard for exposure from vapor intrusion for the highest concentrations of detected compounds collected at soil gas sample location SG17 (see Table 3), P&D recommends that no further investigation be performed in the vicinity of this sample location at this time. Appendix A contains the soil gas sample results and the associated calculated risk and hazard from vapor intrusion to indoor air (Tables 2 and 3, respectively) obtained from P&D's

Groundwater and Soil Gas Subsurface Investigation Report dated October 27, 2009 associated with historical investigation of the structure at 3495 Castro Valley Boulevard. Review of Appendix A Table 3 shows that the majority of the risk and hazard were from benzene, with the highest benzene soil gas concentrations detected in soil gas sample SG15 at a horizontal distance of approximately ten feet from the building. However, Appendix A Table 3 also shows that risk exceeding one in a million associated with ethyl benzene was also encountered at locations SG13 and SG14 (1.9E-06 and 4.8E-06, respectively). Based on the depth to groundwater of less than ten feet bgs at and near the subject site, P&D recommends that a permanent soil gas well be installed to a depth of 5 feet bgs adjacent to the building between locations SG13 and SG14, and that two soil gas samples be collected from the soil gas well on a semi-annual basis to evaluate soil gas quality during the wet season and the dry season.

Review of Table 1 shows that the groundwater grab sample collected at location P35 contained 99,000 ug/L TPH-G and 93 ug/L benzene. Although all detected compounds exceeded their May 2008 SFRWQCB Table A groundwater ESL, none of the detected compounds exceeded their respective Table E-1 ESL values for vapor intrusion to indoor air. Additionally, review of benzene concentrations in groundwater grab samples collected from nearby historical locations P5 and P28 shows that benzene was detected at concentrations of 40 and 180 ug/L, respectively, and was not detected at nearby location P29.

Appendix A contains all available groundwater level (Table 1) and water quality (Table 2) information for all of the wells at and near the site. Based on information obtained from the wells, groundwater surface elevation contours are shown in Figure 4, and groundwater TPH-G and benzene concentrations are shown in Figures 5 and 6, respectively. Appendix A contains Figures 3 and 4 from P&D's October 27, 2009 Groundwater and Soil Gas Subsurface Investigation Report showing TPH-G and benzene concentrations in groundwater, respectively, for groundwater grab samples collected from boreholes.

Although the downgradient extent of petroleum hydrocarbons is not fully defined in wells EW1 and OW1, groundwater grab samples collected from boreholes P29 and P30 show that benzene was not detected at these downgradient locations and that petroleum hydrocarbons were not detected at these locations at concentrations exceeding their respective SFRWQCB May 2008 Table A groundwater ESL values (see Figures 3 and 4 in Appendix A). Similarly, benzene was not detected in groundwater grab samples collected from locations P29, P30 or P32 at concentrations exceeding the SFRWQCB May 2008 Table E-1 (groundwater screening level for evaluation of potential vapor intrusion concerns) ESL value of 540 ug/L for residential land use. Although elevated groundwater grab sample petroleum hydrocarbon concentrations have historically been detected at groundwater grab sample locations downgradient of the wells, groundwater grab samples from boreholes are intended for screening purposes only and may be positively biased from petroleum hydrocarbons adsorbed on sediments in the samples. The groundwater results from wells are considered to be representative of water quality in the vicinity of the site. For these reasons, the extent of petroleum hydrocarbons in groundwater exceeding the SFRWQCB May 2008 Table E-1 residential land use benzene concentration of 540 ug/L has been defined by the wells located at and near the subject site.

Based on the groundwater benzene concentrations obtained from wells on December 20 and 21, 2010 (see Figure 6), in conjunction with the historically elevated groundwater benzene concentration at P3, P&D recommends that crawl space air samples be collected from beneath trailers #1, #2, #3 and #4 identified in Figure 6. At the time of crawl space air sample collection, P&D recommends that an ambient air sample also be collected.

As discussed in the semi-annual well monitoring and sampling report documenting the collection of groundwater samples from wells at and near the subject site on December 20 and 21, 2010 P&D recommends that the semi-annual monitoring and sampling program be continued for the wells located at and near the subject site, with monitoring of all of the wells, and collection of samples from wells MW3, EW1, OW1, OW3, OW5 and C3 on a semi-annual basis. Continuation of the monitoring and sampling program should be re-evaluated upon regulatory agency review of the Remedial Investigation/Feasibility Study Work Plan implementation results.

DISTRIBUTION

A copy of this report will be uploaded to the ACDEH website, in accordance with ACDEH requirements. In addition, a copy of this report will be uploaded to the GeoTracker database.

LIMITATIONS

This report was prepared solely for the use of VIP Service. The content and conclusions provided by P&D in this assessment are based on information collected during our investigation, which may include, but not be limited to, visual site inspections; interviews with site owner, regulatory agencies and other pertinent individuals; review of available public documents; subsurface exploration and our professional judgment based on said information at the time of preparation of this document. Any subsurface sample results and observations presented herein are considered to be representative of the area of investigation; however, geological conditions may vary between boreholes and may not necessarily apply to the general site as a whole. If future subsurface or other conditions are revealed which vary from these findings, the newly revealed conditions must be evaluated and may invalidate the findings of this report.

This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information contained herein is brought to the attention of the appropriate regulatory agencies, where required by law. Additionally, it is the sole responsibility of the owner to properly dispose of any hazardous materials or hazardous wastes left onsite, in accordance with existing laws and regulations.

This report has been prepared in accordance with generally accepted practices using standards of care and diligence normally practiced by recognized consulting firms performing services of a similar nature. P&D is not responsible for the accuracy or completeness of information provided by other individuals or entities which is used in this report. This report presents our professional judgment based upon data and findings identified in this report and interpretation of such data based upon our experience and background, and no warranty, either express or implied, is made. The conclusions presented are based upon the current regulatory climate and may require revision if future regulatory changes occur.

Should you have any questions, please do not hesitate to contact us at (510) 658-6916.

Sincerely,
P&D Environmental, Inc.

Paul H. King

PROFESSIONAL GEOLOGIST
PAUL H. KING
No. 5901
STATE OF CALIFORNIA

Paul H. King
Professional Geologist # 5901
Expires: 12/31/11

Attachments:

Table 1 - Summary of Borehole Groundwater Grab Sample Results
Table 2 - Summary of Detected Compounds in Soil Gas Samples
Table 3 - Summary of Soil Gas Risk and Hazard Analysis
Table 4 - Summary of Soil Gas Model Sensitivity Analysis

Figure 1 - Site Location Map
Figure 2 - Site Vicinity Map Showing Groundwater and Soil Gas Sampling Locations
Figure 3 - Typical Soil Gas Sampling Manifold
Figure 4 - Site Vicinity Map Detail Showing Groundwater Surface Contours
Figure 5 - Site Vicinity Map Showing TPH-G Concentrations in Groundwater
Figure 6 - Site Vicinity Map Showing Benzene Concentrations in Groundwater

Appendix A - Historical Investigation Data
Appendix B - Soil Boring Log
Appendix C - Weather Data
Appendix D - Soil Gas Purge Volume Calculations and Sampling Data Sheets
Appendix E - Laboratory Analytical Reports and Chain of Custody Documentation
Appendix F - Soil Gas Risk and Hazard Calculation Work Sheets
Appendix G - Soil Gas Model Sensitivity Analysis Risk and Hazard Calculation Work Sheets

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TABLES

Table 1
Summary of Borehole
Groundwater Grab Sample Results

Sample ID	Sample Date	TPH-G	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes
P35-W	11/30/10	**99,000, a**	ND<100	**93**	**440**	**990**	**2,800**
ESL[1]		100	5.0	1.0	40	30	20
ESL[2]		Use Soil Gas	24,000	540	380,000	170,000	160,000

Notes:
TPH-G = Total Petroleum Hydrocarbons as Gasoline.
MTBE = methyl tert-butyl ether
ND = Not Detected.
a = Laboratory analytical report note: lighter than water immiscible sheen/product present..
ESL[1] = Environmental Screening Level, developed by San Francisco Bay - Regional Water Quality Control Board (SF-RWQCB) updated May 2008, from Table A – Shallow Soil Screening Levels, Groundwater is a current or potential source of drinking water
ESL[2]= Environmental Screening Level, developed by San Francisco Bay - Regional Water Quality Control Board (SF-RWQCB) updated May 2008, from Table E-1 – Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion Concerns. Residential land use.
BOLD = Concentration in excess of applicable ESL[1].
Results and ESL values in micrograms per Liter (µg/L), unless otherwise indicated.

Table 2
Summary of Detected Compounds
In Soil Gas Samples

Sample/Borehole ID	Sample Date	Compound	Concentration	Residential ESL, a
SG-17	11/30/2010	TPH-G	670	10,000
		MTBE	ND<4.0	9,400
		Benzene	3.9	84
		Toluene	8.0	63,000
		Ethyl Benzene	ND<4.9	980
		m, p-Xylene	4.8	21,000 (combined)
		o-Xylene	ND<4.9	
		Naphthalene	ND<5.0	72
		2-Propanol	240	None
SG-17-Dup	11/30/2010	TPH-G	870	10,000
		MTBE	ND<4.0	9,400
		Benzene	6.8	84
		Toluene	16	63,000
		Ethyl Benzene	ND<4.8	980
		m, p-Xylene	9.2	21,000 (combined)
		o-Xylene	ND<4.8	
		2-Propanol	28	None
SG17 Rep	11/30/2010	Naphthalene	ND<5.0	72
		2-Propanol	ND<50	None

NOTES:
TPH-G = Total Petroleum Hydrocarbons as Gasoline
MTBE = methyl tert-butyl ether
ND = Not Detected
2-Propanol used as leak detection compound.
a = Environmental Screening Level, developed by San Francisco Bay Regional Water Quality Control Board (SF-RWQCB) updated May 2008, from Table E – Shallow Soil Gas Screening Levels For Evaluation of Potential Vapor Intrusion Concerns, volatile chemicals only.
BOLD = Concentration in excess of ESL.
Results and ESL values in micrograms per cubic meter ($\mu g/m^3$), unless otherwise noted.

Table 3
Summary of Soil Gas Risk and Hazard Analysis

USEPA Vapor Intrusion Model (2003)						
Johnson and Ettinger model (DTSC spreadsheet)						
VIP Service						
3889 Castro Valley Blvd.						
Castro Valley, CA						
Chemical	Concentration (mg/m^3)	Sample Result Location	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)	NOTES	CAS#
Highest Concentration						
TPH-G	870	SG17-DUP	Unknown	Unknown		None
Benzene	6.8	SG17-DUP	1.5E-07	3.9E-04		71432
Toluene	16	SG17-DUP	NA	9.1E-05		108883
Ethylbenzene	ND<4.8	SG17-DUP	0.0E+00	0.0E+00		100414
m,p-xylene	9.2	SG17-DUP	NA	1.5E-04	used p-xylene CAS #	106423
o-xylene	ND<4.8	SG17-DUP	0.0E+00	0.0E+00		95476
MTBE	ND<4.0	SG17-DUP	0.0E+00	0.0E+00		1634044
Naphthalene	ND<5.0	SG17	0.0E+00	0.0E+00		91203
		TOTAL	**1.5E-07**	**6.3E-04**		
SG17						
TPH-G	670	SG17	Unknown	Unknown		None
Benzene	3.9	SG17	8.3E-08	2.2E-04		71432
Toluene	8.0	SG17	NA	4.6E-05		108883
Ethylbenzene	ND<4.9	SG17	0.0E+00	0.0E+00		100414
m,p-xylene	4.8	SG17	NA	7.9E-05	used p-xylene CAS #	106423
o-xylene	ND<4.9	SG17	0.0E+00	0.0E+00		95476
MTBE	ND<4.0	SG17	0.0E+00	0.0E+00		1634044
Naphthalene	ND<5.0	SG17	0.0E+00	0.0E+00		91203
		TOTAL	**8.3E-08**	**3.5E-04**		

NOTES:

NA = Not Applicable because compound is not categorized as a carcinogen.

For highest concentration analysis the highest concentration from all samples and duplicates were used.

When duplicate sample results were available, the highest concentration of the sample or the duplicate was used.

The highest concentration of each chemical was used for each address.

JE spreadsheet default values were used except a soil gas sampling depth of 45.72 centimeters (18 inches) and a soil type was SI.

Report 0047.R46 Soil Gas Model Results

Table 4
Summary of Soil Gas Model Sensitivity Analysis

USEPA Vapor Intrusion Model (2003)					
Johnson and Ettinger model (DTSC spreadsheet)					
VIP Service					
3889 Castro Valley Blvd.				Incremental risk from vapor intrusion to indoor air, carcinogen	Hazard quotient from vapor intrusion to indoor air, noncarcinogen
Castro Valley, CA					
Chemical		Concentration (ug/m^3)	Sample Result Location	(unitless)	(unitless)
Scenario 1 = Table 2 Highest Concentration with Model Default Values Except for					
	Soil = SI and Sample Depth = 45.72 cm (1.5 ft).				
Benzene		6.8	SG17-DUP	1.5E-07	3.9E-04
Scenario 2 = Scenario 1 values except average soil temperature is 15 degrees C.					
Benzene		6.8	SG17-DUP	1.5E-07	3.9E-04
Scenario 3 = Scenario 1 values except soil type is CL.					
Benzene		6.8	SG17-DUP	1.5E-07	3.9E-04
Scenario 4 = Scenario 1 values except soil type is S.					
Benzene		6.8	SG17-DUP	1.5E-07	3.9E-04
Scenario 5 = Scenario 1 values except soil gas sampling depth is 152.4 cm (5 ft).					
Benzene		6.8	SG17-DUP	7.5E-08	2.0E-04
Scenario 6 = Scenario 1 values except soil gas sampling depth is 304.8 cm (10 ft).					
Benzene		6.8	SG17-DUP	4.4E-08	1.2E-04
Scenario 7 = Scenario 1 values except benzene concentration = 100 ug/m3.					
Benzene		100	SG17-DUP	2.1E-06	5.7E-03
Scenario 8 = Scenario 1 values except benzene concentration = 1,000 ug/m3.					
Benzene		1,000	SG17-DUP	2.1E-05	5.7E-02
Report 0047.R46 Soil Gas Model Sensitivity Analysis					

FIGURES

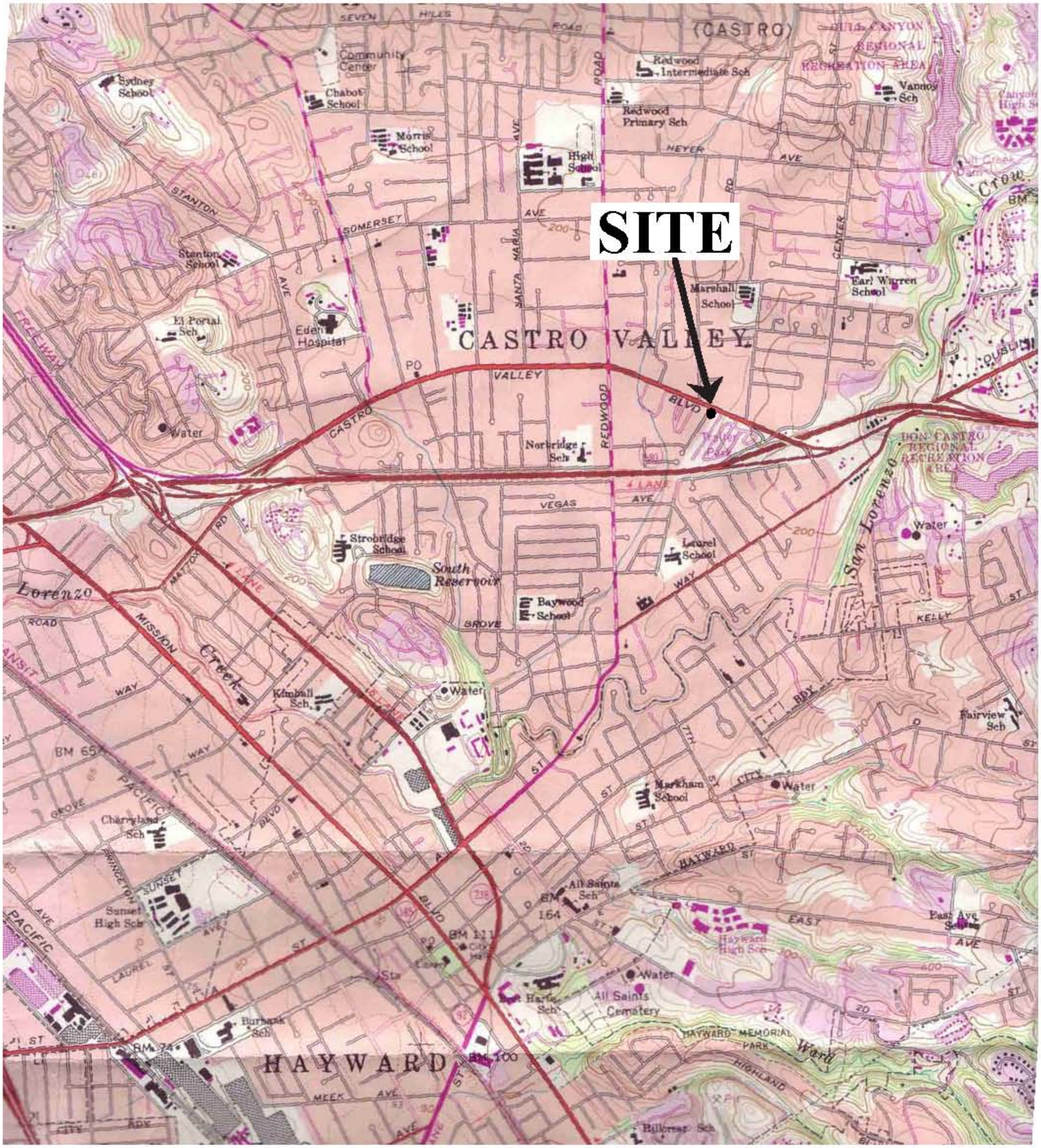


Figure 1
Site Location Map
3889 Castro Valley Boulevard
Castro Valley, California

N

Base Map From: U.S.Geological Survey 7.5 Minute Quadrangle Hayward, California Topomap Photorevised 1980	P&D Environmental, Inc. 55 Santa Clara Ave., Suite 240 Oakland, CA 94610	0 1,000 2,000 APPROXIMATE SCALE IN FEET

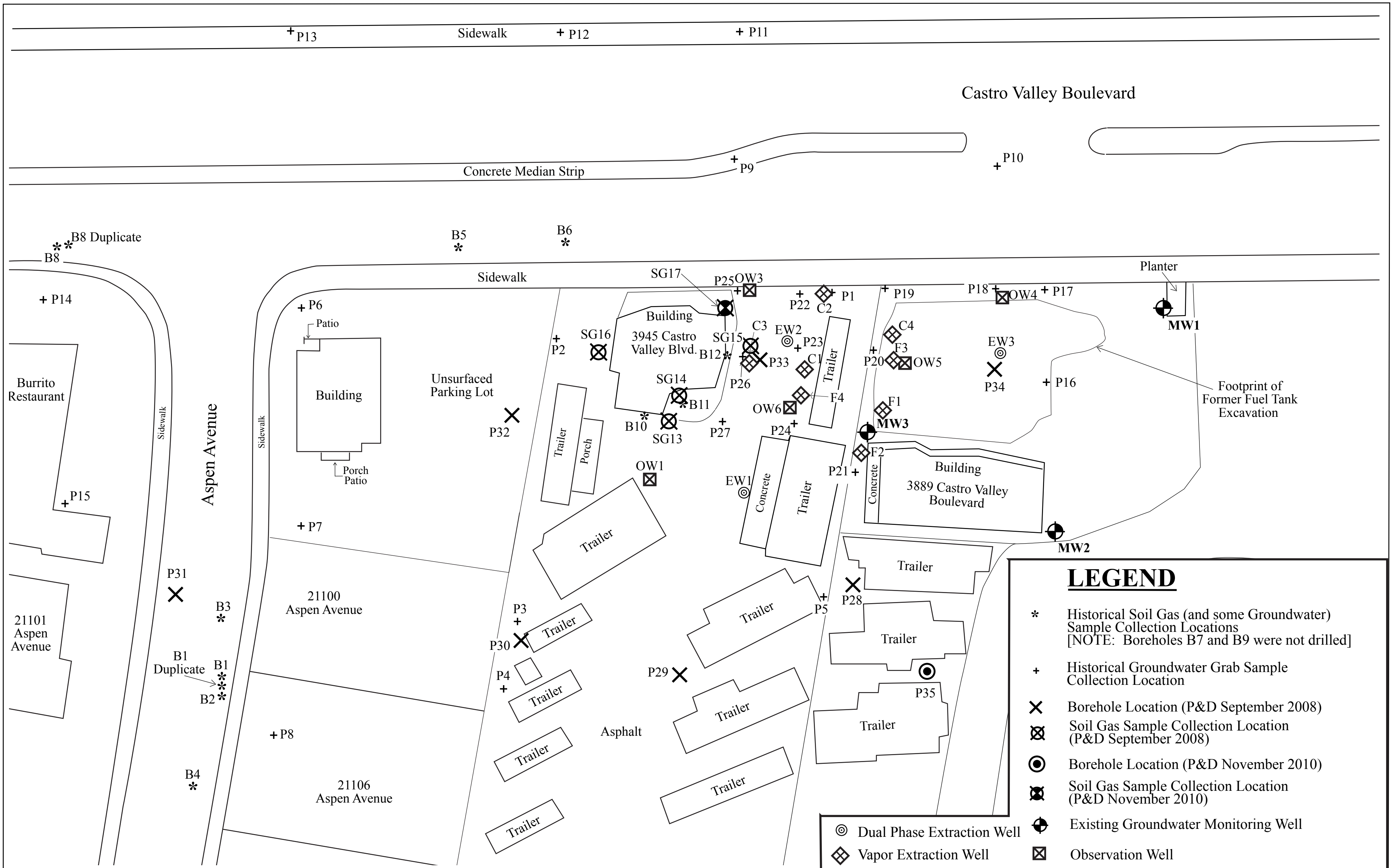


Figure 2
Site Vicinity Map Showing Groundwater and Soil Gas Sampling Locations
3889 Castro Valley Boulevard
Castro Valley, California

Base Map from: P&D Environmental October 1993, January and June 1995, September 2008; Kier & Wright Inc. Survey, September 2001; and Google Earth, June 2007	P&D Environmental, Inc. 55 Santa Clara Ave., Suite 240 Oakland, CA 94610	0 25 50 Approximate Scale in Feet

Figure 3
Typical Soil Gas Sampling Manifold
3889 Castro Valley Boulevard
Castro Valley, California

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

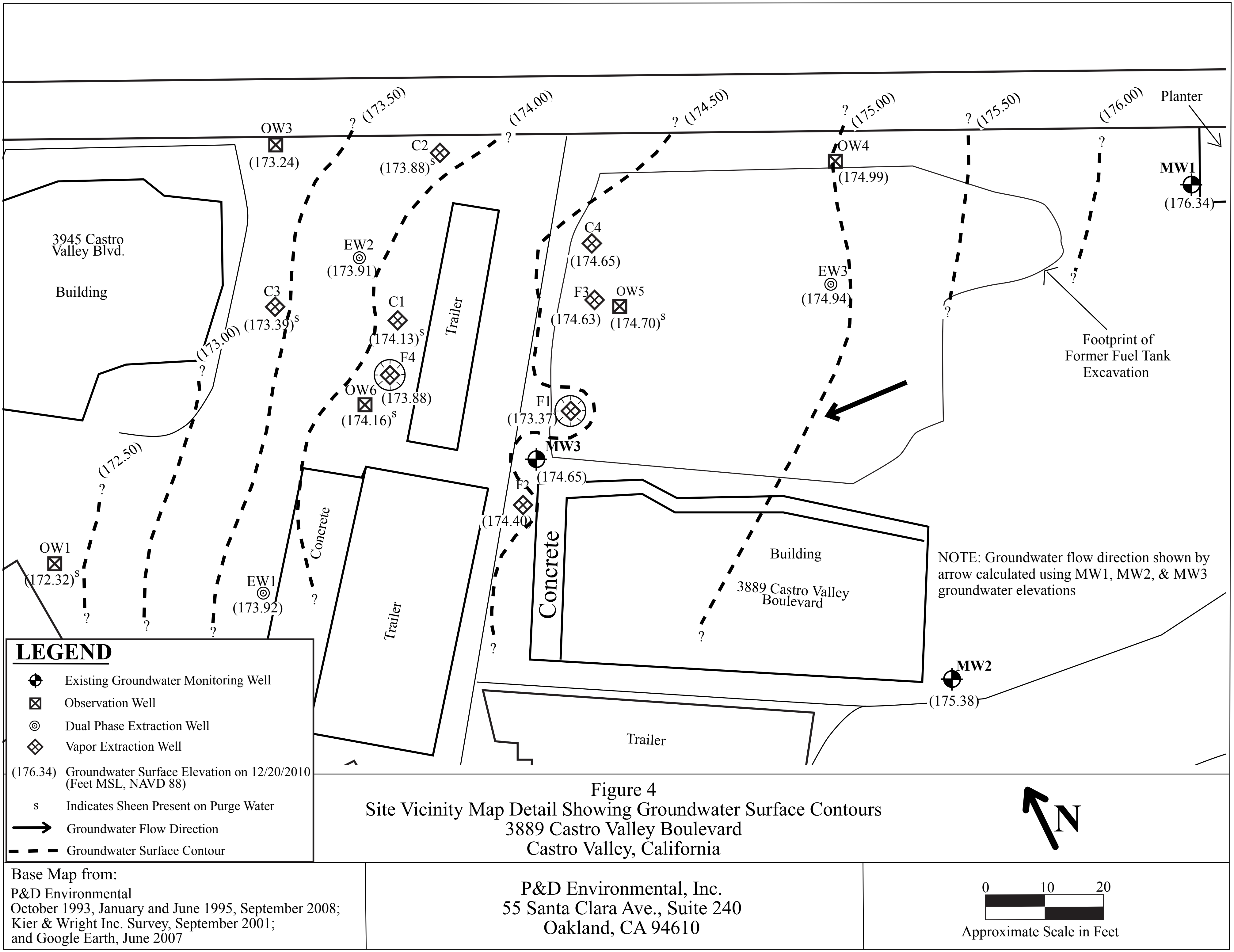


Figure 4
Site Vicinity Map Detail Showing Groundwater Surface Contours
3889 Castro Valley Boulevard
Castro Valley, California

Base Map from:
P&D Environmental
October 1993, January and June 1995, September 2008;
Kier & Wright Inc. Survey, September 2001;
and Google Earth, June 2007

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

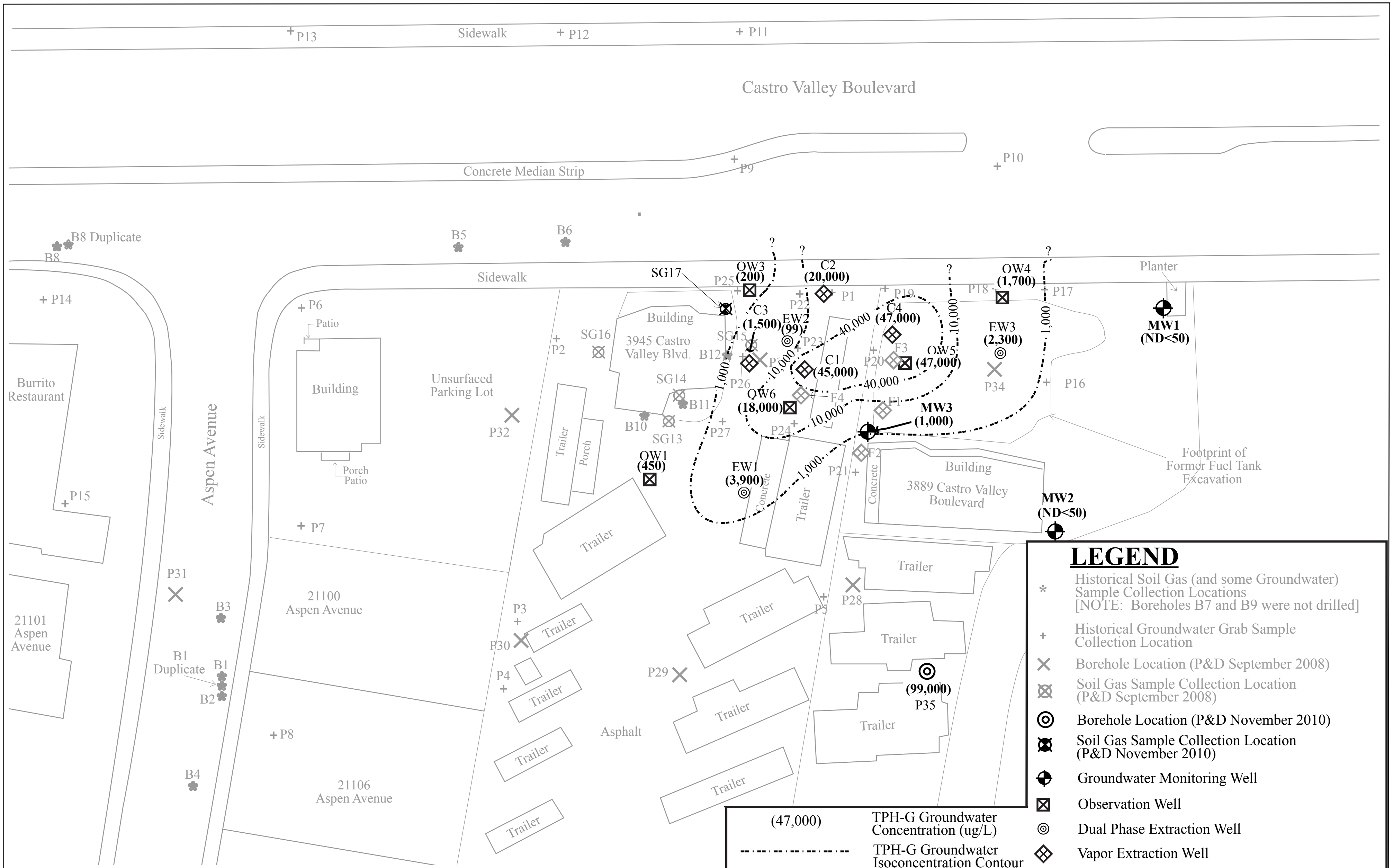


Figure 5
Site Vicinity Map Showing TPH-Gasoline Concentrations in Groundwater
3889 Castro Valley Boulevard
Castro Valley, California

N

Base Map from:		
P&D Environmental October 1993, January and June 1995, September 2008; Kier & Wright Inc. Survey, September 2001; and Google Earth, June 2007	P&D Environmental, Inc. 55 Santa Clara Ave., Suite 240 Oakland, CA 94610	0 25 50 Approximate Scale in Feet

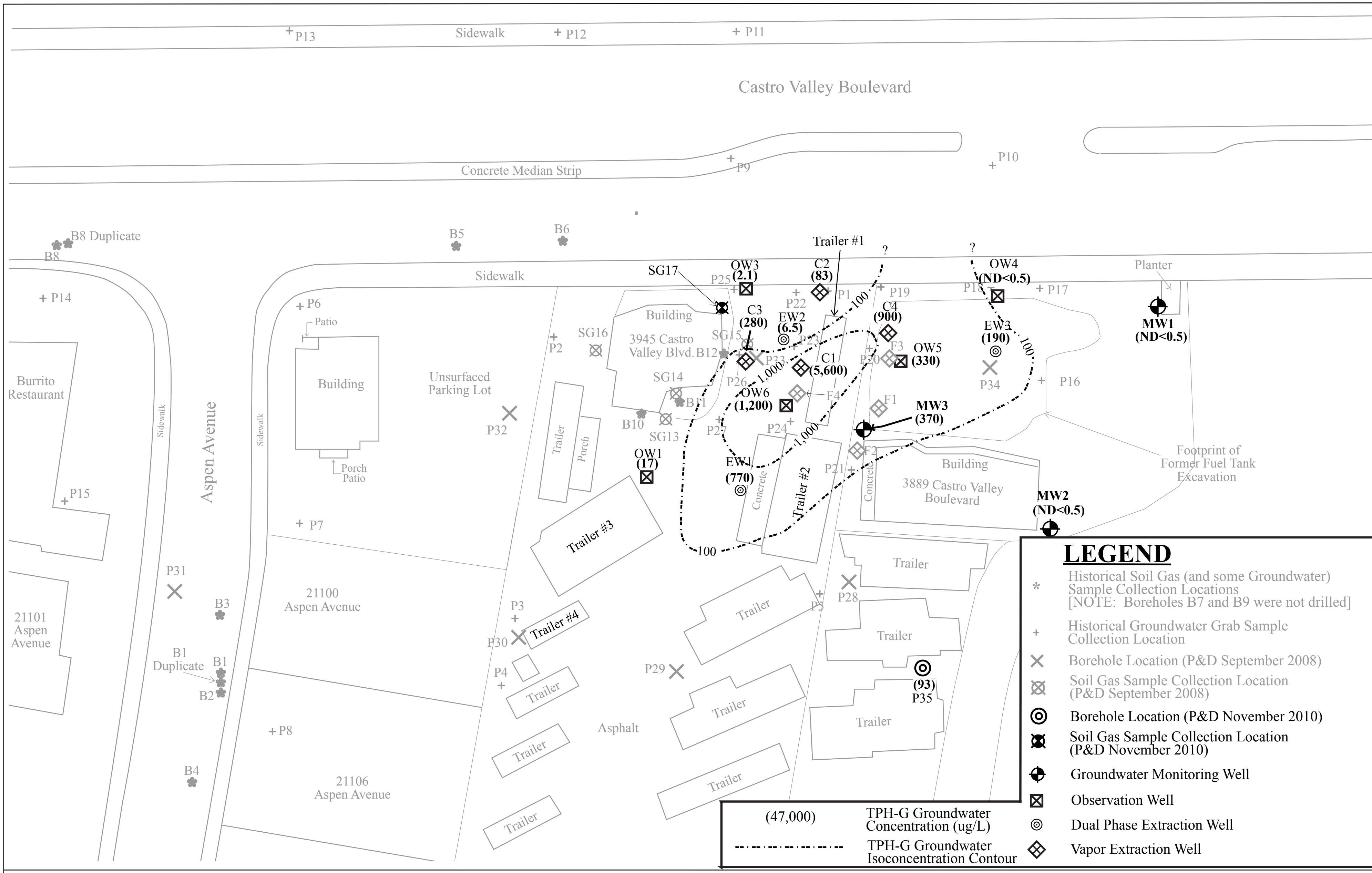


Figure 6
Site Vicinity Map Showing Benzene Concentrations in Groundwater
3889 Castro Valley Boulevard
Castro Valley, California

Base Map from:
P&D Environmental
October 1993, January and June 1995, September 2008;
Kier & Wright Inc. Survey, September 2001;
and Google Earth, June 2007

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610

APPENDIX A

Historical Investigation Data

- **Report 0047.R42 Table 2 Summary of Detected Compounds in Soil Gas Samples**
- **Report 0047.R42 Table 3 Summary of Soil Gas Risk and Hazard Analysis**
- **Report 0047.R48 Table 1 Summary of Well Monitoring Data**
- **Report 0047.R48 Table 2 Summary of Groundwater Analytical Results**
- **Report 0047.R42 Figure 3 Site Vicinity Map Showing TPH-G Concentrations in First Encountered Groundwater**
- **Report 0047.R42 Figure 4 Site Vicinity Map Showing Benzene Concentrations in First Encountered Groundwater**

TABLE 2
SUMMARY OF DETECTED COMPOUNDS
IN SOIL GAS SAMPLES

Sample/Borehole ID	Sample Date	Compound	Concentration	Residential ESL, a
SG13	9/11/2008	TPH-G	**260,000**	10,000
		Toluene	45,000	63,000
		Ethyl Benzene	**2,200**	980
		m, p-Xylene	6,500	21,000 (combined)
		o-Xylene	1,800	
SG14	9/11/2008	TPH-G	**380,000**	10,000
		Benzene	57	84
		Toluene	41,000	63,000
		Ethyl Benzene	**5,600**	980
		m, p-Xylene	**19,000**	21,000 (combined)
		o-Xylene	**6,300**	
SG14 Lab Duplicate	9/11/2008	TPH-G	**380,000**	10,000
		Benzene	54	84
		Toluene	41,000	63,000
		Ethyl Benzene	**5,600**	980
		m, p-Xylene	**19,000**	21,000 (combined)
		o-Xylene	**6,300**	
SG15	9/8/2008	TPH-G	**41,000**	10,000
		MTBE	53	9,400
		Benzene	**3,900**	84
		Toluene	680	63,000
		Ethyl Benzene	170	980
		m, p-Xylene	710	21,000 (combined)
		o-Xylene	250	
SG15-Dup	9/8/2008	TPH-G	**12,000**	10,000
		MTBE	31	
		Benzene	**1,800**	84
		Toluene	360	63,000
		Ethyl Benzene	110	980
		m, p-Xylene	430	21,000 (combined)
		o-Xylene	160	

TABLE 2
SUMMARY OF DETECTED COMPOUNDS
IN SOIL GAS SAMPLES

Sample/Borehole ID	Sample Date	Compound	Concentration	Residential ESL, a
SG16	9/8/2008	TPH-G	**11,000**	10,000
		Benzene	61	84
		Toluene	880	63,000
		Ethyl Benzene	100	980
		m, p-Xylene	330	21,000 (combined)
		o-Xylene	92	

<u>NOTES</u>:
TPH-SS = Total Petroleum Hydrocarbons as Stoddard solvent.
NA = Not Available
a = Environmental Screening Level, developed by San Francisco Bay Regional Water Quality Control Board (SF-RWQCB) updated May 2008, from Table E – Shallow Soil Gas Screening Levels For Evaluation of Potential Vapor Intrusion Concerns, volatile chemicals only.
BOLD = Concentration in excess of ESL.
Results are in micrograms per cubic meter ($\mu g/m^3$).

TABLE 3
SUMMARY OF SOIL GAS RISK AND HAZARD ANALYSIS

USEPA Vapor Intrusion Model (2003)
Johnson and Ettinger model (DTSC spreadsheet)
VIP Service
3889 Castro Valley Blvd.
Castro Valley, CA

Chemical	Concentration ($\mu g/m^3$)	Sample Result Location	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)	NOTES	CAS#
Highest Concentration						
TPH-G	380000	SG14	Unknown	Unknown		None
Benzene	3900	SG15	4.3E-05	1.1E-01		71432
Toluene	45000	SG13	NA	1.3E-01		108883
Ethylbenzene	5600	SG14	NA	4.5E-03		100414
m,p-xylene	19000	SG14	NA	1.5E-01	used p-xylene CAS #	106423
o-xylene	6300	SG14	NA	5.5E-02		95476
MTBE	53	SG15	5.7E-09	1.7E-05		1634044
		TOTAL	**4.3E-05**	**3.9E-01**		
SG13						
TPH-G	260000	SG13	Unknown	Unknown		None
Benzene	ND<42	SG13	0.0E+00	0.0E+00		71432
Toluene	45000	SG13	NA	1.3E-01		108883
Ethylbenzene	2200	SG13	NA	1.8E-03		100414
m,p-xylene	6500	SG13	NA	5.3E-02	used p-xylene CAS #	106423
o-xylene	1800	SG13	NA	1.6E-02		95476
MTBE	ND<48	SG13	0.0E+00	0.0E+00		1634044
		TOTAL	**0.0E+00**	**1.8E-01**		
SG14						
TPH-G	380000	SG14	Unknown	Unknown		None
Benzene	57	SG14	6.3E-07	1.7E-03		71432
Toluene	41000	SG14	NA	1.2E-01		108883
Ethylbenzene	5600	SG14	NA	4.5E-03		100414
m,p-xylene	19000	SG14	NA	1.5E-01	used p-xylene CAS #	106423
o-xylene	6300	SG14	NA	5.5E-02		95476
MTBE	ND<42	SG14	0.0E+00	0.0E+00		1634044
		TOTAL	**6.3E-07**	**2.8E-01**		
SG15						
TPH-G	41000	SG15	Unknown	Unknown		None
Benzene	3900	SG15	4.3E-05	1.1E-01		71432
Toluene	680	SG15	NA	2.0E-03		108883
Ethylbenzene	170	SG15	NA	1.4E-04		100414
m,p-xylene	250	SG15	NA	2.0E-03	used p-xylene CAS #	106423
o-xylene	250	SG15	NA	2.2E-03		95476
MTBE	53	SG15	5.7E-09	1.7E-05		1634044
		TOTAL	**4.3E-05**	**1.1E-01**		
SG16						
TPH-G	11000	SG16	Unknown	Unknown		None
Benzene	61	SG16	6.7E-07	1.8E-03		71432
Toluene	880	SG16	NA	2.6E-03		108883
Ethylbenzene	100	SG16	NA	8.0E-05		100414
m,p-xylene	330	SG16	NA	2.7E-03	used p-xylene CAS #	106423
o-xylene	92	SG16	NA	8.1E-04		95476
MTBE	ND<4.6	SG16	0.0E+00	0.0E+00		1634044
		TOTAL	**6.7E-07**	**7.2E-03**		

NOTES:
NA = Not Applicable because compound is not considered a carcinogen.
For highest concentration analysis the highest concentration from all samples and duplicates were used.
When duplicate sample results were available, the highest concentration of the sample or the duplicate was used.
The highest concentration of each chemical was used for each address.
JE spreadsheet default values were used, and soil type was SI.

Information taken from 0047.R42 Soil Gas Model Results

TABLE 1

SUMMARY OF WELL MONITORING DATA

Well No.	Date Monitored	Top of Casing Elev. (ft.)	Depth to Water (ft.)	Water Table Elev. (ft.)	Sheen	Odor
MW1						
	12/20/2010	183.61#	7.27	176.34	None	None
	6/17/2010		7.63	175.98	None	None
	11/25/2009		7.66	175.95	None	None
	2/26/2009		8.64	174.97	None	None
	8/13/2008		9.56	174.05	None	None
	2/19/2008		8.47	175.14	None	None
	8/16/2007		9.01	174.60	None	None
	2/13/2007		6.85	176.76	None	None
	8/9/2006		7.47	176.14	None	None
	1/31/2006		7.53	176.08	None	None
	7/29/2005		7.90	175.71	None	None
	1/31/2005		8.37	175.24	None	None
	7/14/2004		9.47	174.14	None	None
	12/18/2003		9.26	174.35	None	None
	6/19/2003		9.00	174.61	None	None
	12/21/2002		9.09	174.52	None	None
	4/30/2002		9.03	174.58	None	None
	10/16/2001		9.33	174.28	None	None
	11/8/2000		9.04	174.57	None	None
	5/24/2000		7.97	175.64	None	None
	9/10/1999		8.79	174.82	None	None
	2/10/1999		7.72	175.89	None	None
	2/24/1998		6.61	177.00	None	None
	11/18/1997		9.71	173.90	None	None
	8/12/1997		9.39	174.22	None	None
	4/25/1997		8.37	175.24	None	None
	1/31/1997		7.62	175.99	None	None
	7/19/1996		8.81	174.80	None	None
	4/23/1996		8.17	175.44	None	None
	1/17/1996		9.66	173.95	None	None
	10/26/1995		10.00	173.61	None	None
	8/15/1995		9.23	174.38	None	None
	5/2/1995		8.56	175.05	None	None
	1/30/1995		9.50	174.11	None	None
	10/31/1994		11.55	172.06	None	None
	7/29/1994		10.86	172.75	None	None
	4/25/1994		10.70	172.91	None	None
	11/16/1993		11.63	171.98	None	None
	11/12/93*		11.53	172.08	None	None

NOTES:

Elevations are in feet above Mean Sea Level (NAVD 1988).
Elevations are in feet above Mean Sea Level (NGVD 1929) prior to December 17, 2010 in all other reports.
(NAVD 1929 top of casing elevation for MW1, MW2, MW3 are 180.83, 179.70, and 178.98 feet, respectively.
ft. = Feet.
* = Depth to water measurements prior to groundwater monitoring well development.

TABLE 1

SUMMARY OF WELL MONITORING DATA

Well No.	Date Monitored	Top of Casing Elev. (ft.)	Depth to Water (ft.)	Water Table Elev. (ft.)	Sheen	Odor
MW2						
	12/20/2010	182.48#	7.10	175.38	None	None
	6/17/2010		7.33	175.15	None	None
	11/25/2009		7.43	175.05	None	None
	2/26/2009		8.00	174.48	None	None
	8/13/2008		9.20	173.28	None	None
	2/19/2008		8.15	174.33	None	None
	8/16/2007		8.45	174.03	None	None
	2/13/2007		7.56	174.92	None	None
	8/9/2006		7.28	175.20	None	None
	1/31/2006		7.10	175.38	None	None
	7/29/2005		7.70	174.78	None	None
	1/31/2005		7.94	174.54	None	None
	7/14/2004		9.14	173.34	None	None
	12/18/2003		8.76	173.72	None	None
	6/19/2003		8.68	173.80	None	None
	12/21/2002		7.95	174.53	None	None
	4/30/2002		8.76	173.72	None	None
	10/16/2001		9.76	172.72	None	None
	11/8/2000		8.63	173.85	None	None
	5/24/2000		7.65	174.83	None	None
	9/10/1999		8.48	174.00	None	None
	2/10/1999		7.05	175.43	None	None
	2/24/1998		6.20	176.28	None	None
	11/18/1997		9.26	173.22	None	None
	8/12/1997		9.06	173.42	None	None
	4/25/1997		8.10	174.38	None	None
	1/31/1997		7.22	175.26	None	None
	7/19/1996		8.57	173.91	None	None
	4/23/1996		7.85	174.63	None	None
	1/17/1996		8.94	173.54	None	None
	10/26/1995		9.68	172.80	None	None
	8/15/1995		8.91	173.57	None	None
	5/2/1995		8.17	174.31	None	None
	1/30/1995		8.68	173.80	None	None
	10/31/1994		10.99	171.49	None	None
	7/29/1994		10.34	172.14	None	None
	4/25/1994		10.04	172.44	None	None
	11/16/1993		11.10	171.38	None	None
	11/12/1993*		10.95	171.53	None	None

NOTES:

Elevations are in feet above Mean Sea Level (NAVD 1988).
Elevations are in feet above Mean Sea Level (NGVD 1929) prior to December 17, 2010 in all other reports.
(NAVD 1929 top of casing elevation for MW1, MW2, MW3 are 180.83, 179.70, and 178.98 feet, respectively.
ft. = Feet.
* = Depth to water measurements prior to groundwater monitoring well development.

TABLE 1

SUMMARY OF WELL MONITORING DATA

Well No.	Date Monitored	Top of Casing Elev. (ft.)	Depth to Water (ft.)	Water Table Elev. (ft.)	Sheen	Odor
MW3						
	12/20/2010	181.72#	7.07	174.65	None	Slight-Moderate
	6/17/2010		7.28	174.44	None	Slight
	11/25/2009		7.42	174.30	None	Slight-Moderate
	2/26/2009		7.85	173.87	None	Slight-Moderate
	8/13/2008		8.92	172.80	Yes	Moderate
	2/19/2008		7.99	173.73	Yes	Moderate
	8/16/2007		8.41	173.31	No	Slight-Moderate
	2/13/2007		7.21	174.51	Yes	Slight-Moderate
	8/9/2006		7.27	174.45	Yes	Yes
	1/31/2006		7.14	174.58	None	Moderate-Strong
	7/29/2005		7.68	174.04	None	Strong
	1/31/2005		7.86	173.86	None	Moderate
	7/14/2004		8.91	172.81	None	None
	12/18/2003		8.55	173.17	None	Slight
	6/19/2003		8.48	173.24	None	Moderate
	12/21/2002		7.88	173.84	None	Strong
	4/30/2002		8.56	173.16	None	Strong
	10/16/2001		10.14	171.58	Yes	Moderate
	11/8/2000		8.45	173.27	Yes	Moderate
	5/24/2000		7.62	174.10	None	Slight
	9/10/1999		8.34	173.38	None	Slight
	2/10/1999		7.12	174.60	None	Moderate
	2/24/1998		6.55	175.17	Yes	Not Described
	11/18/1997		8.97	172.75	None	None
	8/12/1997		8.85	172.87	None	Strong
	4/25/1997		7.99	173.73	None	None
	1/31/1997		7.30	174.42	None	Not Described
	7/19/1996		8.42	173.30	None	None
	4/23/1996		7.76	173.96	None	Not Described
	1/17/1996		8.61	173.11	None	None
	10/26/1995		9.39	172.33	None	Not Described
	8/15/1995		8.62	173.10	None	None
	5/2/1995		8.04	173.68	Yes	None
	1/30/1995		8.46	173.26	Yes	Not described
	10/31/1994		10.58	171.14	None	None
	7/29/1994		10.03	171.69	None	Yes
	4/25/1994		9.64	172.08	None	None
	11/16/1993		10.63	171.09	None	Not Described
	11/12/93*		10.66	171.06	None	Yes

NOTES:

Elevations are in feet above Mean Sea Level (NAVD 1988).
Elevations are in feet above Mean Sea Level (NGVD 1929) prior to December 17, 2010 in all other reports.
(NAVD 1929 top of casing elevation for MW1, MW2, MW3 are 180.83, 179.70, and 178.98 feet, respectively.
ft. = Feet.
* = Depth to water measurements prior to groundwater monitoring well development.

TABLE 1

SUMMARY OF WELL MONITORING DATA

Well No	Date	Top Of Casing Elevation (ft.)**	Depth To Water (ft.)	Water Table Elevation (ft.)	Change in Water Table Elevation (ft.)	Sheen	Odor
EW1	12/20/2010	175.51	1.59	173.92	0.51	None	Slight
	12/17/2010*		2.10	173.41			
EW2	12/20/2010	176.65	2.74	173.91	0.44	None	Very Slight
	12/17/2010*		3.18	173.47			
EW3	12/20/2010	181.02	6.08	174.94	0.49	None	No
	12/17/2010*		6.57	174.45			
OW1	12/20/2010	174.20	1.88	172.32	0.82	Yes	Very Slight
	12/17/2010*		2.70	171.50			
OW3	12/20/2010	176.70	3.46	173.24	0.59	None	No
	12/17/2010*		4.05	172.65			
OW4	12/20/2010	180.74	5.75	174.99	0.40	None	Slight
	12/17/2010*		6.15	174.59			
OW5	12/20/2010	180.52	5.82	174.70	0.50	Yes	Moderate - Strong
	12/17/2010*		6.32	174.20			
OW6	12/20/2010	177.02	2.86	174.16	0.48	Yes	Moderate - Strong
	12/17/2010*		3.34	173.68			
C1	12/20/2010	177.37	3.24	174.13	0.37	Yes	Moderate - Strong
	12/17/2010*		3.61	173.76			
C2	12/20/2010	177.72	3.84	173.88	0.37	Yes	Slight - Moderate
	12/17/2010*		4.21	173.51			
C3	12/20/2010	176.41	3.02	173.39	0.08	None	Very Slight
	12/17/2010*		3.10	173.31			
C4	12/20/2010	180.06	5.41	174.65	0.49	Yes	Moderate - Strong
	12/17/2010*		5.90	174.16			
F1	12/20/2010	181.35	7.98	173.37	0.29	N/A	N/A
	12/17/2010*		8.27	173.08			
F2	12/20/2010	181.56	7.16	174.40	0.37	N/A	N/A
	12/17/2010*		7.53	174.03			
F3	12/20/2010	180.08	5.45	174.63	0.50	N/A	N/A
	12/17/2010*		5.95	174.13			
F4	12/20/2010	177.14	3.26	173.88	-0.98	N/A	N/A
	12/17/2010*		2.28	174.86			

NOTES:

Elevations are in feet above Mean Sea Level (NAVD 1988).
* = Prior to well development.
N/A = Not Applicable.

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Sample ID	Sampling Date	TPH-D	TPH-G	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	EPA Method 8260B	EPA Method 8270C
MW1	12/20/2010	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	12/20/2010	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	12/20/2010	N/A	**1,000, a**	ND<20	**370**	5.5	28	**38**	All ND	All ND
MW1	6/17/2010	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	6/17/2010	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	6/17/2010	N/A	**1,200**	ND<45	**350**	9.7	**31**	**43**	All ND	All ND, except Naphthalene = 15
MW1	11/25/2009	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	11/25/2009	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	11/25/2009	N/A	**1,300**	ND<20	**320**	8.4	**36**	**41**	All ND	All ND, except Naphthalene = 12
MW1	2/26/2009	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	2/26/2009	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	2/26/2009	N/A	**2,400**	ND<50	**500**	14	**54**	**43**	All ND	All ND, except Naphthalene = **18**
MW1	8/13/2008	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	8/13/2008	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	8/13/2008	N/A	**8,700**	ND<90	**1,000**	31	**150**	**280**	All ND, except 1,2-DCA = **0.55**	All ND, except Naphthalene = **27**
MW1	2/19/2008	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	2/19/2008	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	2/19/2008	N/A	**4,200**	ND<100	**810**	28	**140**	**250**	All ND	All ND, except Naphthalene = **37**
MW1	8/16/2007	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	8/16/2007	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	8/16/2007	N/A	**4,300**	ND<50	**760**	30	**120**	**210**	All ND	All ND, except Naphthalene = **77**, Bis(2-ethylhexyl) Phthalate = **34**, 2-Methylnaphthalene = **35**
MW1	2/13/2007	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	2/13/2007	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	2/13/2007	N/A	**4,300**	ND<50	**610**	14	**94**	**130**	All ND, except Benzene = **790**, Ethylbenzene = **120**, Xylenes = **150**, Naphthalene = **22**, n-Butyl benzene = 28, n-Propyl benzene = 32, 1,2,4-Trimethylbenzene = 92, 1,3,5-Trimethylbenzene = 31	All ND, except Naphthalene = **22**
MW1	8/9/2006	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	8/9/2006	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	8/9/2006	N/A	**2,900**	ND<50	**580**	21	**100**	**130**	All ND	All ND, except Naphthalene = **29**, 2-Methylnaphthalene = **11**
MW1	1/31/2006	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	1/31/2006	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	1/31/2006	N/A	**2,000**	ND<15	**470**	14	**71**	**77**	All ND	All ND, except Naphthalene = 15,
MW1	7/29/2005	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	7/29/2005	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	7/29/2005	N/A	**11,000**	ND<110	**2,100**	**77**	**350**	**410**	All ND	All ND, except Naphthalene = **68**, 2-Methylnaphthalene = **23**

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Sample ID	Sampling Date	TPH-D	TPH-G	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	EPA Method 8260B	EPA Method 8270C
MW1	1/31/2005	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	1/31/2005	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	1/31/2005	N/A	**2,900**	ND<50	**960**	13	**37**	**89**	All ND, except Benzene = **1,600**, Toluene = 28, Ethylbenzene = **190**, Xylenes = **140**, Naphthalene = **62**, MTBE = **21**, n-Propyl benzene = 46, 1,2,4-Trimethylbenzene = 43, Isopropylbenzene = 18	NA, All ND using EPA Method 8270D
MW1	7/14/2004	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	7/14/2004	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	7/14/2004	N/A	**4,100**	ND<50	**980**	37	**120**	**150**	All ND	NA, All ND using EPA Method 8270D, except Naphthalene = **55**, 2-Methylnaphthalene = **16**
MW1	12/18/2003	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	12/18/2003	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	12/18/2003	N/A	**9,700**	ND<100	**2,300**	**93**	**280**	**350**	NA, All ND using EPA Method 8021B	NA, All ND using EPA Method 8270D, except Naphthalene = **63**, 2-Methylnaphthalene = **21**
MW1	6/19/2003	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	6/19/2003	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	6/19/2003	N/A	**16,000, a**	ND<250	**3,500**	**110**	**430**	**640**	NA, All ND using EPA Method 8021B	NA, All ND using EPA Method 8270D, except Naphthalene = **56**, 2-Methylnaphthalene = **27**, Phenol = **24**
MW1	12/21/2002	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	12/21/2002	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	12/21/2002	N/A	**15,000, a**	ND<450	**3,300**	**180**	**480**	**1,000**	NA, All ND using EPA Method 8021B, except 1,2-DCA = **11**	NA, All ND using EPA Method 8270D, except Naphthalene = **35**, 2-Methylnaphthalene = **14**
MW1	4/30/2002	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	4/30/2002	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	4/30/2002	N/A	**11,000**	ND<200	**2,200**	**120**	**370**	**590**	NA, All ND using EPA Method 8021B	NA, All ND using EPA Method 8270D, except Naphthalene = **53**
MW1	10/16/2001	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	10/16/2001	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	10/16/2001	N/A	**2,100**	ND<20	**520**	30	**77**	**130**	NA, All ND using EPA Method 8010	NA, All ND using EPA Method 8270
MW1	11/8/2000	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A N/A	N/A
MW2	11/8/2000	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	11/8/2000	N/A	**540**	ND<10	**150**	6.9	18	**29**	NA, All ND using EPA Method 8010, except 1,2-DCA = **1.3**	NA, All ND using EPA Method 8270
MW1	5/24/2000	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	5/24/2000	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	5/24/2000	N/A	**2,100**	**32**	**470**	27	**62**	**130**	NA, All ND using EPA Method 8010, except 1,2-DCA = **1.7**	NA, All ND using EPA Method 8270
MW1	9/10/1999	N/A	ND<50	**49**	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	9/10/1999	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	9/10/1999	N/A	**390**	ND<10	**98**	7.3	12	**28**	NA, All ND using EPA Method 8010, except 1,2-DCA = **2.0**	NA, All ND using EPA Method 8270
MW1	2/10/1999	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	2/10/1999	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	2/10/1999	N/A	**4,100**	ND<220	**1,700**	**96**	**270**	**420**	NA, All ND using EPA Method 8010, except 1,2-DCA = **2.8**	NA, All ND using EPA Method 8270, except Naphthalene = **21**
MW1	2/24/1998	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	2/24/1998	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	2/24/1998	N/A	**19,000, a**	ND<200	**4,600**	**330**	**650**	**1,800**	NA, All ND using EPA Method 8010, except 1,2-DCA = **11**	NA, All ND using EPA Method 8270B, except Naphthalene = **83**, 2-Methylnaphthalene = **19**, Phenol = **23**

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Sample ID	Sampling Date	TPH-D	TPH-G	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	EPA Method 8260B	EPA Method 8270C
MW1	11/18/1997	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW2	11/18/1997	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW3	11/18/1997	N/A	**2,100**	ND<55	**480**	**52**	**71**	**190**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 8270B, except
									1,2-DCA = **2.1**	Naphthalene = **58**,
										2-Methylnaphthalene = **26**
MW1	8/12/1997	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	8/12/1997	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	8/12/1997	N/A	**16,000**	ND<330	**4,200**	**450**	**540**	**1,900**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 8270B, except
									1,2-DCA = **9.1**	Naphthalene = **87**,
										Bis(2-ethylhexyl) Phthalate = **21**,
										2-Methylnaphthalene = **24**
MW1	4/25/1997	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW2	4/25/1997	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW3	4/25/1997	N/A	**30,000, a**	ND<440	**5,300**	**520**	**950**	**3,000**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 8270A, except
									1,2-DCA = **12**	Naphthalene = **66**,
										2-Methylnaphthalene = **15**,
										Phenol = 2.8,
										2,4-Dimethylphenol = 2.8,
										4-Methylphenol = 2.4
MW1	1/31/1997	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	1/31/1997	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	1/31/1997	N/A	**5,500**	**63**	**1,600**	**100**	**190**	**410**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 8270A, except
									1,2-DCA = **14**	Naphthalene = **31**,
										2-Methylnaphthalene = **4.8**,
										Phenol = **9.4**,
										2,4-Dimethylphenol = 2.8
MW1	7/19/1996	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW2	7/19/1996	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW3	7/19/1996	N/A	**18,000, b**	**210**	**4,800**	**610**	**760**	**2,800**	NA, All ND using EPA Method 8010	NA, All ND using EPA Method 8270, except
										Naphthalene = **100**,
										2-Methylnaphthalene = **22**,
										2,4-Dimethylphenol = 2.2
MW1	4/23/1996	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	4/23/1996	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	4/23/1996	N/A	**9,700**	**150**	**2,900**	**170**	**380**	**680**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 8270, except
									1,2-DCA = **5.1**	Naphthalene = **56**,
										Phenol = **25**
MW1	1/17/1996	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW2	1/17/1996	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW3	1/17/1996	N/A	**21,000**	**260**	**4,100**	**370**	**520**	**1,500**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 8270, except
									1,2-DCA = **11**	Naphthalene = **32**,
										Bis(2-ethylhexyl) Phthalate = **4.7**,
										2-Methylnaphthalene = **10**,
										Phenol = 2.2,
										2,4-Dimethylphenol = 2.9,
										4-Methylphenol = 5.1
MW1	10/26/1995	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	10/26/1995	N/A	ND<50	ND<5.0	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	10/26/1995	N/A	**19,000**	**240**	**4,000**	**480**	**640**	**1,800**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 8270, except
									1,2-DCA = **11**	Naphthalene = **43**
MW1	8/15/1995	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW2	8/15/1995	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW3	8/15/1995	N/A	**7,000**	N/A	**2,400**	**230**	**260**	**730**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 8270, except
									1,2-DCA = **9.1**	Naphthalene = **19**,
										2-Methylnaphthalene = **3.0**,
										2,4-Dimethylphenol = 5.0,
										4-Methylphenol = 3.0
MW1	5/2/1995	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	5/2/1995	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	5/2/1995	**840, c**	**18,000**	N/A	**5,400**	**390**	**650**	**1,700**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 3510, except
									1,2-DCA = **14**	Naphthalene = **62**,
										2-Methylnaphthalene = **10**
MW1	1/30/1995	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	1/30/1995	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	1/30/1995	**700, c**	**24,000**	N/A	**7,600**	**350**	**900**	**2,200**	NA, All ND using EPA Method 8010, except	NA, All ND using EPA Method 3510, except
									1,2-DCA = **18**	Naphthalene = **110**,
										2-Methylnaphthalene = **14**
MW1	10/31/1994	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Sample ID	Sampling Date	TPH-D	TPH-G	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	EPA Method 8260B	EPA Method 8270C
MW2	10/31/1994	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	10/31/1994	**600, c**	**8,700**	N/A	**2,600**	**260**	**320**	**920**	NA, All ND using EPA Method 8010, except 1,2-DCA = **19**	NA, All ND using EPA Method 3510, except Naphthalene = **47**, 2-Methylnaphthalene = **8**
MW1	7/29/1994	N/A	ND<50	N/A	**1.2**	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	7/29/1994	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	7/29/1994	**670, c**	**6,300**	N/A	**2,000**	**130**	**220**	**520**	NA, All ND using EPA Method 8010, except 1,2-DCA = **7.7**	NA, All ND using EPA Method 3510, except Naphthalene = **44**, 2-Methylnaphthalene = **8**
MW1	4/25/1994	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	4/25/1994	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	4/25/1994	**2,100, c**	**17,000**	NA	**4,800**	**470**	**290**	**1,600**	NA, All ND using EPA Method 8010, except 1,2-DCA = **280**	NA, All ND using EPA Method 8270, except Naphthalene = **84**, 2-Methylnaphthalene = **13**
MW1	11/16/1993	N/A	ND<50	N/A	**2.2**	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW2	11/16/1993	N/A	ND<50	N/A	ND<0.5	ND<0.5	ND<0.5	ND<0.5	N/A	N/A
MW3	11/16/1993	N/A	**12,000**	N/A	**3,300**	**660**	**240**	**1,600**	NA, All ND using EPA Method 8010, except 1,2-DCA = **27**	NA, All ND using EPA Method 625, except Naphthalene = **42**, 2-Methylnaphthalene = **15**, 2,4-Dimethylphenol = 7.0, Phenol = **9.0**, 4-Methylphenol = 5.0, 2-Methylphenol =6.0, Benzyl alcohol = 6.0
EW1	12/20/2010	N/A	**3,900, a**	ND<90	**770**	**58**	**220**	**440**	N/A	N/A
EW2	12/20/2010	N/A	99	ND<5.0	**6.5**	1.2	4.8	4.0	N/A	N/A
EW3	12/20/2010	N/A	**2,300**	ND<50	**190**	15	**31**	**72**	N/A	N/A
OW1	12/20/2010	N/A	**450**	ND<5.0	**17**	5.6	6.2	**29**	N/A	N/A
OW3	12/20/2010	N/A	**200, a**	ND<5.0	**2.1**	7.7	5.7	**35**	N/A	N/A
OW4	12/20/2010	N/A	**1,700, b,c**	ND<5.0	ND<0.5	8.2	60	**170**	N/A	N/A
OW5	12/20/2010	N/A	**47,000**	ND<500	**330**	**300**	**1,900**	**8,900**	N/A	N/A
OW6	12/20/2010	N/A	**18,000, a**	ND<250	**1,200**	**450**	**480**	**2,700**	N/A	N/A
C1	12/20/2010	N/A	**45,000**	ND<1,100	**5,600**	**1,900**	**1,600**	**10,000**	N/A	N/A
C2	12/20/2010	N/A	**20,000**	ND<100	**83**	**190**	**600**	**3,800**	N/A	N/A
C3	12/20/2010	N/A	**1,500**	ND<50	**280**	7.3	**47**	**72**	N/A	N/A
C4	12/20/2010	N/A	**47,000**	ND<800	**900**	**480**	**2,200**	**10,000**	N/A	N/A
F1	12/20/2010	Not Sampled.								
F2	12/20/2010	Not Sampled.								
F3	12/20/2010	Not Sampled.								
F4	12/20/2010	Not Sampled.								
ESL_1		*100*	*100*	*5.0*	*1.0*	*40*	*30*	*20*	*1,2-DCA = 0.5, Benzene = 1.0, Toluene = 40, Ethylbenzene = 30, Xylenes =20, Naphthalene = 17, MTBE = 5.0, n-Butyl benzene = None, n-Propyl benzene = None, 1,2,4-Trimethylbenzene = None, 1,3,5-Trimethylbenzene = None, Isopropylbenzene = None*	*Naphthalene = 17, 2-Methylnaphthalene = 2.1, 2,4-Dimethylphenol = 100, Phenol = 5.0, Bis(2-ethylhexyl) Phthalate = 4, 4-Methylphenol = None, 2-Methylphenol = None, Benzyl alcohol = None*
ESL_2		*Use Soil Gas*	*Use Soil Gas*	*24,000*	*540*	*380,000*	*170,000*	*160,000*	*1,2-DCA = 200 Benzene = 540, Toluene = 380,000, Ethylbenzene = 170,000, Xylenes =160,000, Naphthalene = 3,200, MTBE = 24,000, n-Butyl benzene = None, n-Propyl benzene = None, 1,2,4-Trimethylbenzene = None, 1,3,5-Trimethylbenzene = None, Isopropylbenzene = None*	*Naphthalene = 3,200, 2-Methylnaphthalene = 260,000, 2,4-Dimethylphenol = 2,500,000, Phenol = None, Bis(2-ethylhexyl) Phthalate = None, 4-Methylphenol = None, 2-Methylphenol = None, Benzyl alcohol = None*

NOTES:
TPH-D = Total Petroleum Hydrocarbons as Diesel.
TPH-G = Total Petroleum Hydrocarbons as Gasoline.
MTBE = Methyl-tert butyl Ether.
ND = Not Detected.
N/A = Not Analyzed.
1,2-DCA = 1,2-Dichloroethane.
a = Laboratory analytical note: lighter than water immiscible sheen/product present.
b = Laboratory analytical note: consists of strongly aged diesel or gasoline range compounds.
c = Laboratory analytical note: consistes of gasoline range compounds.
ESL_1 = Environmental Screening Level, developed by San Francisco Bay – Regional Water Quality Control Board (SF-RWQCB) updated May 2008, from Table A–Groundwater Screening Levels, Groundwater is a current or potential source of drinking water.
ESL_2 = Environmental Screening Level, developed by San Francisco Bay – Regional Water Quality Control Board (SF-RWQCB) updated May 2008, from Table E-1–Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion Concerns, Residential Land Use.
BOLD = Concentration in excess of applicable ESL_1 value.
Underlined = Concentration in excess of applicable ESL_2 value.
Results are in µg/L (micrograms per liter), unless otherwise indicated.

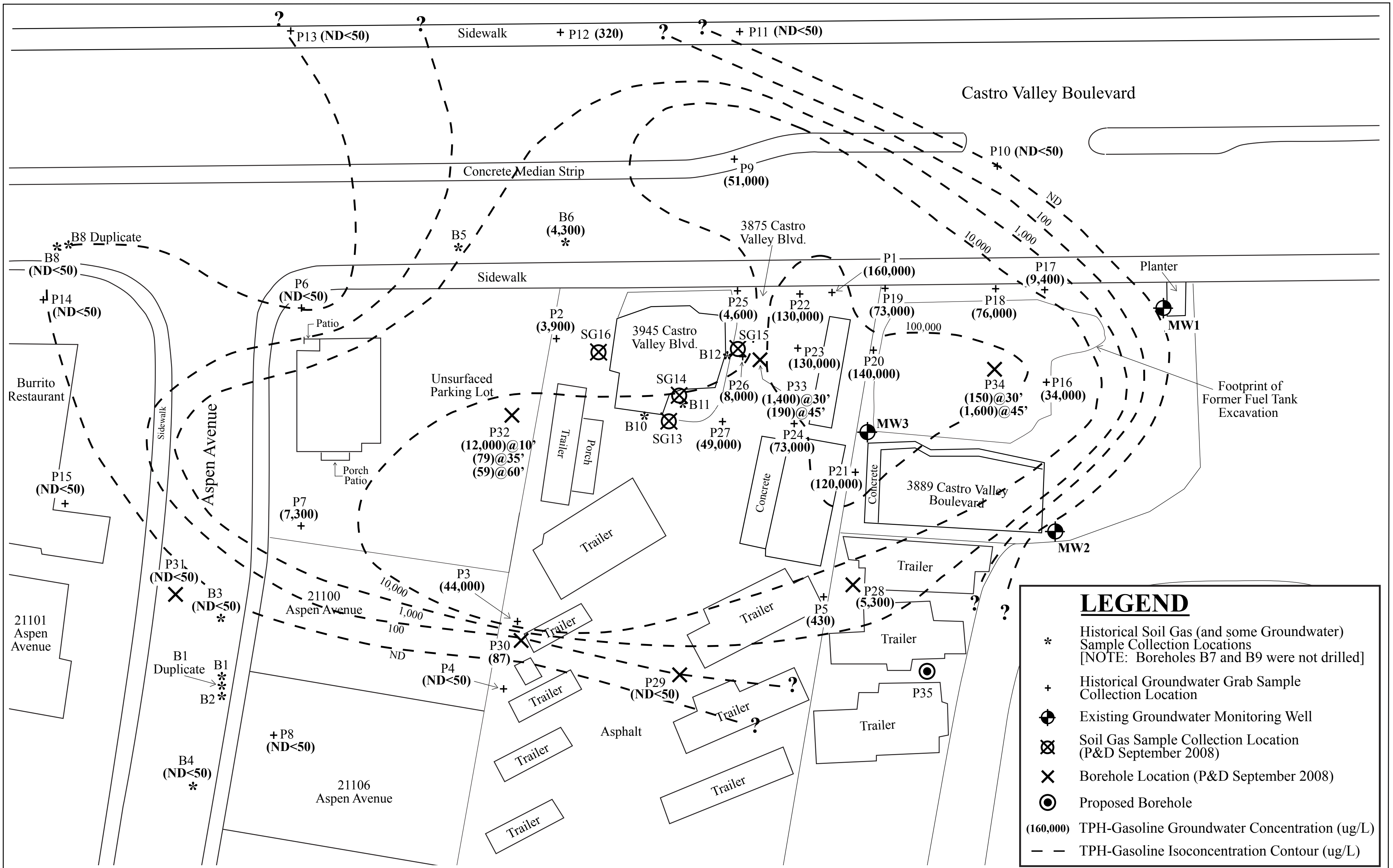


Figure 3
Site Vicinity Map Showing TPH-G Concentrations in First Encountered Groundwater
3889 Castro Valley Boulevard
Castro Valley, California

Base Map from: P&D Environmental October 1993, January and June 1995, September 2008; Kier & Wright Inc. Survey, September 2001; and Google Earth, June 2007	P&D Environmental, Inc. 55 Santa Clara Ave., Suite 240 Oakland, CA 94610	0 25 50 Scale in Feet

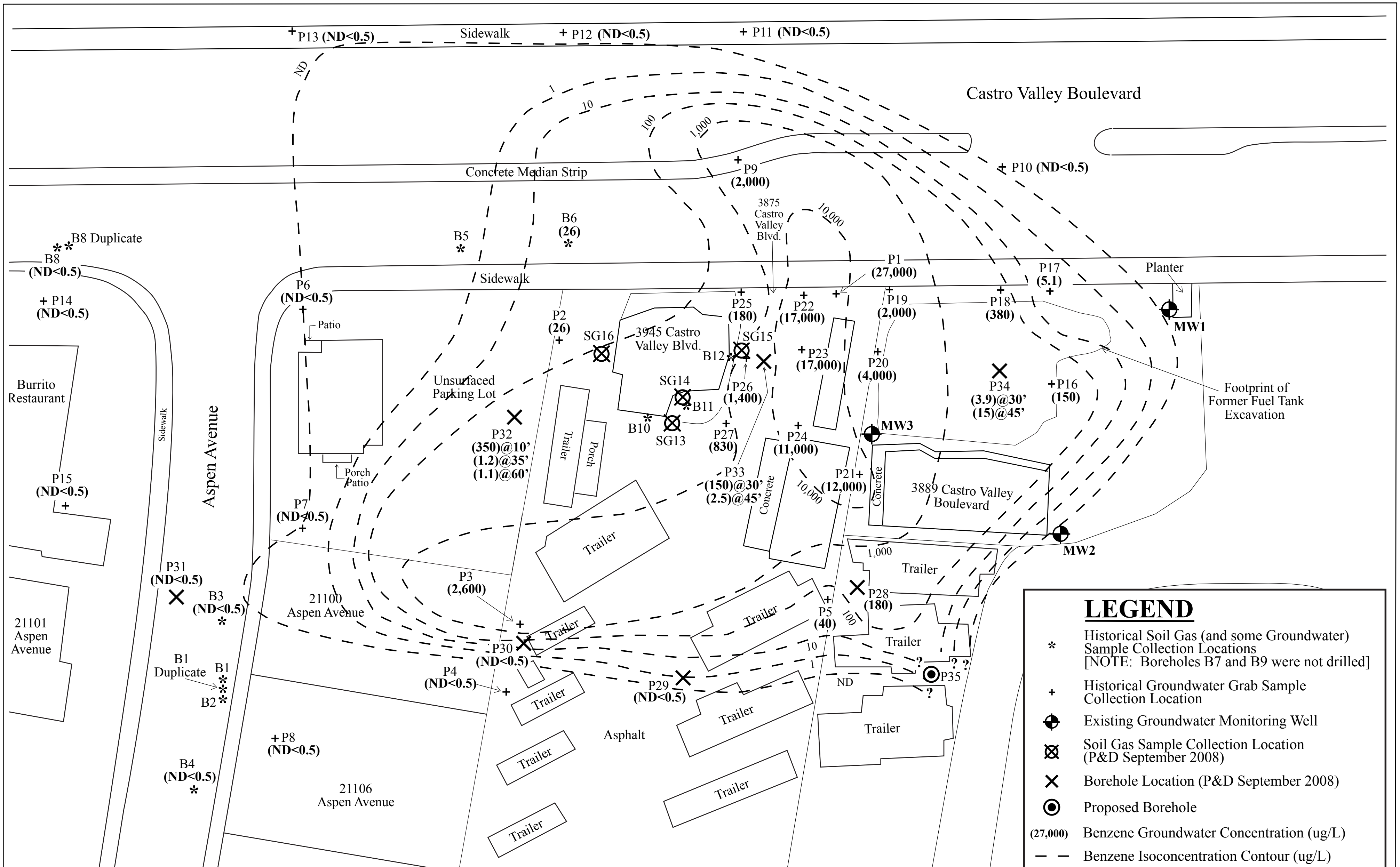
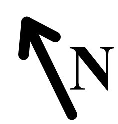
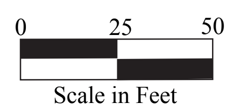


Figure 4
Site Vicinity Map Showing Benzene Concentrations in First Encountered Groundwater
3889 Castro Valley Boulevard
Castro Valley, California



Base Map from:
P&D Environmental
October 1993, January and June 1995, September 2008;
Kier & Wright Inc. Survey, September 2001;
and Google Earth, June 2007

P&D Environmental, Inc.
55 Santa Clara Ave., Suite 240
Oakland, CA 94610



APPENDIX B

Soil Boring Log

P&D ENVIRONMENTAL, INC.

BORING NO.: P35	PROJECT NO.: 0047	PROJECT NAME: VIP Service, Castro Valley				
BORING LOCATION: Planter at SE corner of Trailer # 4, Chetwood Crest Trailer Park			ELEVATION AND DATUM: None			
DRILLING AGENCY: Vironex, Inc.		DRILLER: John	DATE & TIME STARTED: 11/30/10 1120	DATE & TIME FINISHED: 11/30/10 1230		
DRILLING EQUIPMENT: 3.5-inch O.D. Hand Auger						
COMPLETION DEPTH: 12.0 Feet		BEDROCK DEPTH: Not Encountered	LOGGED BY: MLD	CHECKED BY: PHK		
FIRST WATER DEPTH: 8.5 Feet		NO. OF SAMPLES: 1 Water				

DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	BLOW COUNT PER 6"	WELL CONSTRUCTION LOG	PID	REMARKS
	0.0 to 4.5 ft. Dark brown clay (CL); stiff, moist, with minor gravel to 0.25-inch diameter. No Petroleum Hydrocarbon (PHC) odor.	CL		No Well Constructed	0	Borehole hand augered using a 3.5-inch O.D. Hand Auger. First water encountered during drilling at 8.5 ft. Borehole terminated at 12.0 ft. on 11/30/10. Temporary 1-inch diameter slotted PVC casing placed in borehole, and sample P35-W collected at 1235. Strong PHC odor and sheen on sample. Borehole grouted on 11/30/10 using neat cement grout.
5	4.5 to 9.0 ft. Brown silty clay (CL); medium stiff, moist to wet, with olive-green mottling. 6.0 ft. Color change to olive-green. Wet at 8.5 ft.	CL		▽	7	
10	9.0 to 10.5 ft. Greenish-brown clayey fine sand (SC); soft, saturated, with minor subrounded gravel to 0.25-inch diameter. Strong PHC odor.	SC			249	
	10.5 to 12.0 ft. Greenish-brown clay (CL); soft, saturated. Strong PHC odor.	CL			293	
15						
20						
25						
30						

APPENDIX C

Weather Data

http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KCACASTR7&graphspan=day&month=11&day=30&year=2010

History for KCACASTR7

Agualinda Pool, Castro Valley, CA —

About This Station

Lat: N 37 ° 42 ' 37 " (37.711 °)
Lon: W 122 ° 4 ' 38 " (-122.077 °)
Elevation (ft): 278
Hardware: WMR-968
Weather Station Software: wview-5.15.0

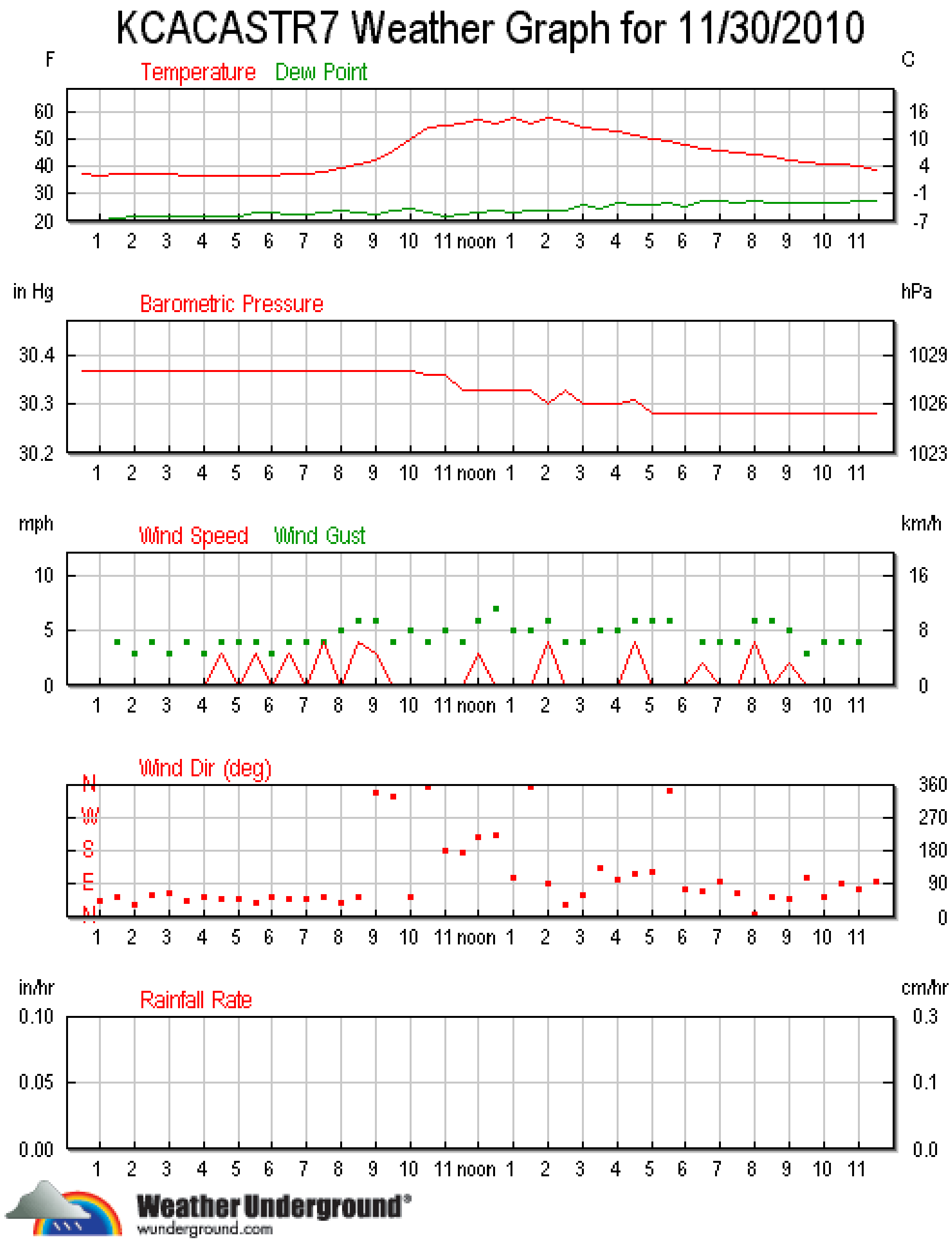
« Previous Day November 30 2010 View Next Day »

Daily Weekly Monthly Yearly Custom

	Current:	High:	Low:	Average:
Temperature:	**56.8** °F	**58.1** °F	**36.3** °F	**44.5** °F
Dew Point:	**29.4** °F	**25.9** °F	**20.0** °F	**22.7** °F
Humidity:	35%	57%	26%	44%
Wind Speed:	**4.0**mph	**4.0**mph	-	**0.8**mph
Wind Gust:	**6.0**mph	**7.0**mph	-	-
Wind:	North	-	-	NE
Pressure:	**30.09**in	**30.40**in	**30.30**in	-
Precipitation:	**0.00**in			

Statistics for the rest of the month

	High:	Low:	Average:
Temperature:	**85.4** °F	**30.2** °F	**52.6** °F
Dew Point:	**49.1** °F	**12.1** °F	**32.8** °F
Humidity:	78.0%	18.0%	50.2%
Wind Speed:	**9.0**mph from the WNW	-	**1.3**mph
Wind Gust:	**17.0**mph from the NNW	-	-
Wind:	-	-	SSW
Pressure:	**30.40**in	**29.59**in	-
Precipitation:	**3.11**in		


KCACASTR7 Weather Graph for 11/30/2010
F
C
Temperature
Dew Point
60 50 40 30 20
16 10 4 -1 -7
1 2 3 4 5 6 7 8 9 10 11 noon 1 2 3 4 5 6 7 8 9 10 11
in Hg
hPa
Barometric Pressure
30.4 30.3 30.2
1029 1026 1023
mph
km/h
Wind Speed
Wind Gust
10 5 0
16 8 0
Wind Dir (deg)
N W S E N
360 270 180 90 0
in/hr
cm/hr
Rainfall Rate
0.10 0.05 0.00
0.3 0.1 0.0
Weather Underground
wunderground.com

http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KCACASTR7&graphspan=month&month=11&day=1&year=2010

History for KCACASTR7

Agualinda Pool, Castro Valley, CA

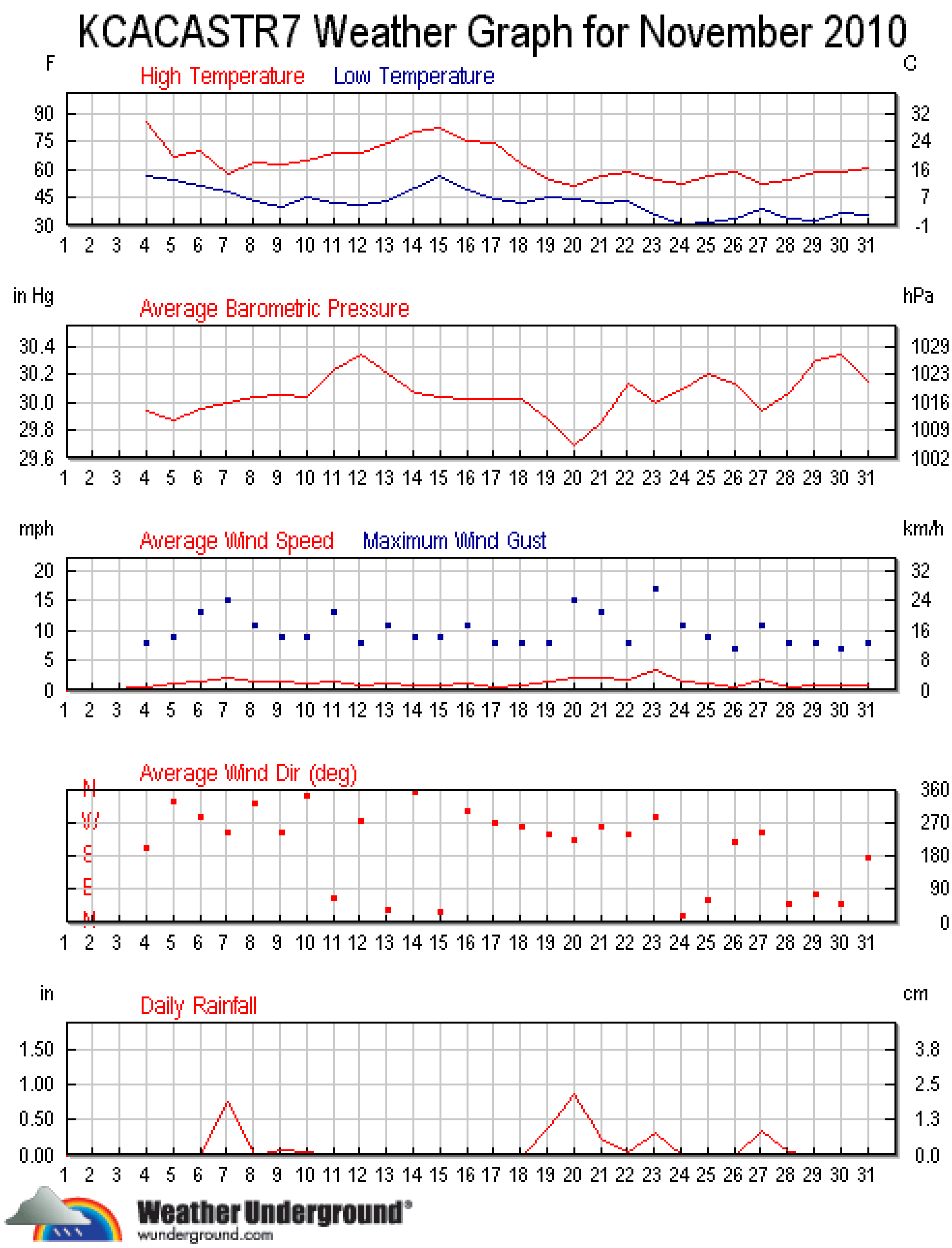
About This Station

Lat: N 37 ° 42 ' 37 " (37.711 °)
Lon: W 122 ° 4 ' 38 " (-122.077 °)
Elevation (ft): 278
Hardware: WMR-968

« Previous Month | November | 1 | 2010 | View | Next Month »

Daily Weekly **Monthly** Yearly Custom

	High:	Low:	Average:
Temperature:	**85.4** °F	**30.2** °F	**52.6** °F
Dew Point:	**49.1** °F	**12.1** °F	**32.8** °F
Humidity:	78.0%	18.0%	50.2%
Wind Speed:	**9.0**mph from the WNW	-	**1.3**mph
Wind Gust:	**17.0**mph from the NNW	-	-
Wind:	-	-	SSW
Pressure:	**30.40**in	**29.59**in	-
Precipitation:	**3.11**in		


KCACASTR7 Weather Graph for November 2010
F
C
High Temperature
Low Temperature
in Hg
hPa
Average Barometric Pressure
mph
km/h
Average Wind Speed
Maximum Wind Gust
Average Wind Dir (deg)
N
W
S
E
N
in
cm
Daily Rainfall
Weather Underground
wunderground.com

http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KCACASTR7&graphspan=custom&month=12&day=1&year=2010&monthend=12&dayend=14&yearend=2010

History for KCACASTR7

Agualinda Pool, Castro Valley, CA

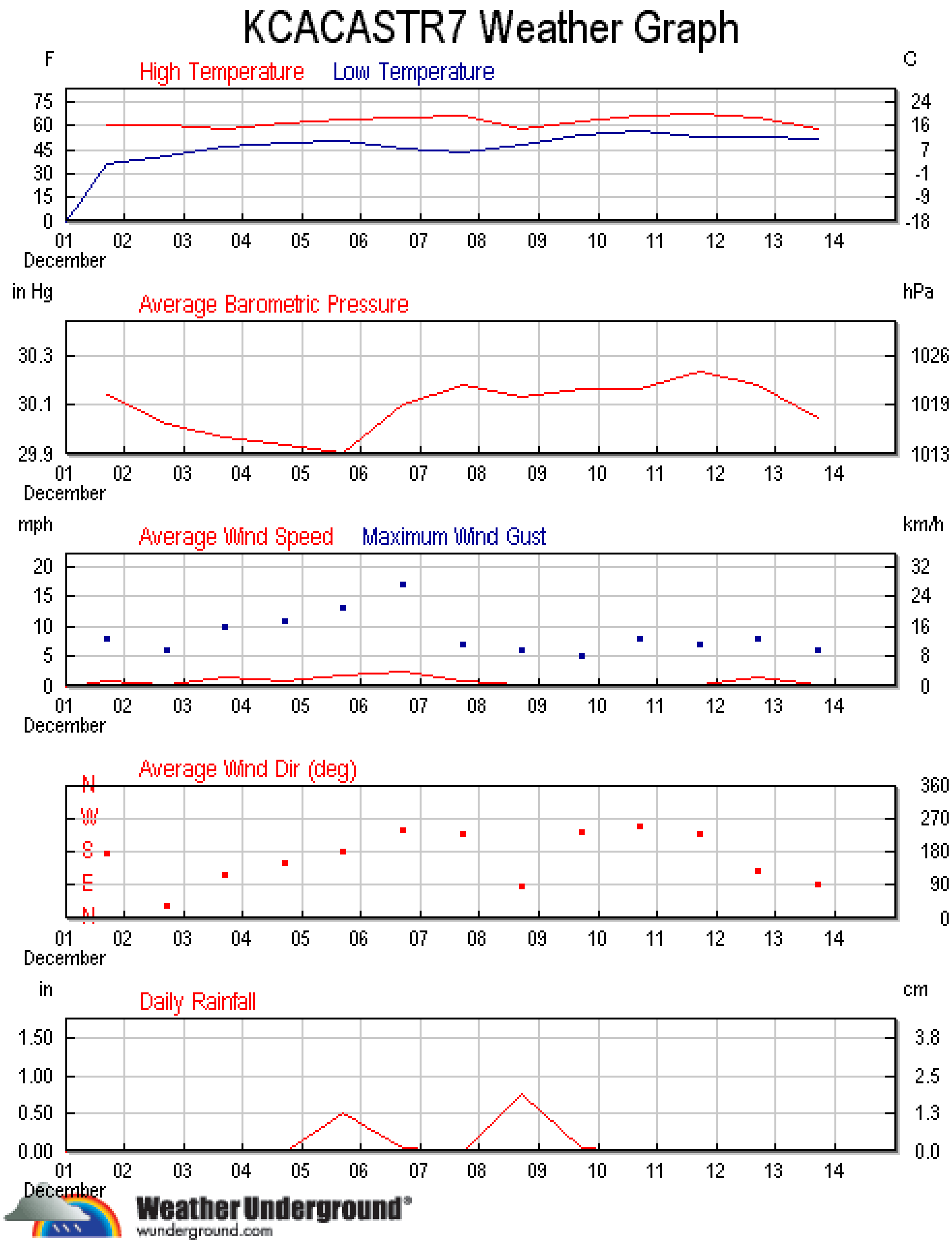
About This Station

Lat: N 37 ° 42 ' 37 " (37.711 °)
Lon: W 122 ° 4 ' 38 " (-122.077 °)
Elevation (ft): 278
Hardware: WMR-968

December 1 2010 - TO - December 14 2010 Go

Daily Weekly Monthly Yearly **Custom**

	High:	Low:	Average:
Temperature:	**67.8** °F	**35.7** °F	**54.1** °F
Dew Point:	**51.3** °F	**24.4** °F	**40.1** °F
Humidity:	77.0%	26.0%	60.6%
Wind Speed:	**8.0**mph from the SSW	-	**0.9**mph
Wind Gust:	**17.0**mph from the WSW	-	-
Wind:	-	-	South
Pressure:	**30.27**in	**29.79**in	-
Precipitation:	**1.85**in		


KCACASTR7 Weather Graph
F
High Temperature
Low Temperature
C
75
60
45
30
15
0
24
16
7
-1
-9
-18
01
02
03
04
05
06
07
08
09
10
11
12
13
14
December
in Hg
Average Barometric Pressure
hPa
30.3
30.1
29.9
1026
1019
1013
mph
Average Wind Speed
Maximum Wind Gust
km/h
20
15
10
5
0
32
24
16
8
0
Average Wind Dir (deg)
N
W
S
E
N
360
270
180
90
0
in
Daily Rainfall
cm
1.50
1.00
0.50
0.00
3.8
2.5
1.3
0.0
Weather Underground
wunderground.com

APPENDIX D

Soil Gas Purge Volume Calculations and Sampling Data Sheets

Soil Gas Purge Volume Calculations

One Purge Volume is calculated as the volume of the tubing interior plus the volume of the sand interval of the borehole.

The tubing interior volume is calculated as follows:

V tubing = pi x (r x r) x h, where pi = 3.14, r = 0.187 in./2, and h = 7 ft.

V tubing = 3.14 x (0.0935 x 0.0935) x (7 ft. x 12 in./ft.) =	2.31	cubic inches

The sand interval volume is calculated as follows:

V sand interval = pi x (r x r) x h x porosity, where pi = 3.14, r = 1.0 in./2, h = 8 in., and porosity = 0.35

V sand interval = 3.14 x (0.5 x 0.5) x 8 x 0.35 =	2.20	cubic inches

The total volume for one purge volume is V tubing + V sand interval, where

V total = 2.31 cubic inches + 2.20 cubic inches =	4.50	cubic inches

To convert to cubic centimeters:

V total = 4.50 cubic inches x 16.39 cubic centimeters/cubic inches =	73.8	cubic centimeters

The total volume to be purged is 3 purge volumes.

V purge total = 73.8 cubic centimeters x 3 =	221	cubic centimeters

The flow controller has a nominal flow rate of 200 cubic centimeters per minute.

The purge time is calculated as follows:

T purge = 221 cubic centimeters/200 cubic centimeters per minute =	1.11	minutes
Converting the purge time to seconds,1.11 minutes x 60seconds/ minute =	66	seconds

SOIL GAS SAMPLING DATA SHEET

Address

Job # 0947

Date 11/30/10

P&D Sampler MLP

Drilling Company VIRONEX

Probe Method (check one)

o PRT

x Temp Well

Soil Gas Location Designation	Probe Depth (Ft.)	Time Probe Installed	Canister #	Sample Canister Initial Vacuum Check (In. Hg) and time	Start leak check vacuum (In. Hg) and time	End leak check vacuum (In. Hg) and time	ADDITIONAL leak check vacuum (In. Hg) and time	Start PURGE time	End PURGE time	Start of tracer gas equilibration time	Time and conc. (ppm) of tracer gas equilibration	Begin sample collection vacuum (In. Hg) and time	End sample collection vacuum (In. Hg) and time	NOTES
SG 17	5.5	0910	34608	vac -29	vac -28	vac -28	vac	095300	095407	095600	conc. 27	vac -29	vac -5	
				time 0900	time 0940	time 0950	time	time	time	time	time 1002	time 100300	time 101620	101800 0 PPM
SG 17				vac	vac	vac	vac				conc.	vac	vac	
DUP			30825	time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	

SOIL GAS SAMPLING DATA SHEET

Address

Job # 0047

Date 11/30/10

P&D Sampler MLD

Drilling Company VIRONEX

Probe Method (check one)

o PRT

✓ Temp Well

Soil Gas Location Designation	Probe Depth (Ft.)	Time Probe Installed	Canister #	Sample Canister Initial Vacuum Check (In. Hg) and time	Start leak check vacuum (In. Hg) and time	End leak check vacuum (In. Hg) and time	ADDITIONAL leak check vacuum (In. Hg) and time	Start PURGE time	End PURGE time	Start of tracer gas equilibration time	Time and conc. (ppm) of tracer gas equilibration	Begin sample collection vacuum (In. Hg) and time	End sample collection vacuum (In. Hg) and time	NOTES
SG 17			Mi130336	vac	vac	vac	vac				conc. 26	vac	vac	
				time	time	time	time	time	time	time 102200	time 102700	time 102800	time 103300	103400 0 PPM
SG 17 REP			Mi153270	vac	vac	vac	vac				conc 28	vac 104000	vac 104500	104600 0 PPM
				time	time	time	time	time	time	time 103400	time 103900	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	
SG				vac	vac	vac	vac				conc.	vac	vac	
				time	time	time	time	time	time	time	time	time	time	

APPENDIX E

Laboratory Analytical Reports and Chain of Custody Documentation

- **Field Date 11/30/2010 Groundwater grab sample P35-W McCampbell Work Order # 1012007**
- **Field Date 11/30/2010 Soil Gas sampleSG17 and field duplicate SG17-DUP Modified TO-15 Air Toxics Work Order # 1012047**
- **Field Date 11/30/2010 Soil Gas sample SG17 and field duplicate SG17 Rep Modified TO-17 Air Toxics Work Order # 1012046**

McCampbell Analytical, Inc.
"When Quality Counts"

1534 Willow Pass Road, Pittsburg, CA 94565-1701
Web: www.mccampbell.com E-mail: main@mccampbell.com
Telephone: 877-252-9262 Fax: 925-252-9269

P & D Environmental	Client Project ID: #0047; VIP Service	Date Sampled: 11/30/10
55 Santa Clara, Ste.240		Date Received: 12/01/10
	Client Contact: Michael Deschenes	Date Reported: 12/06/10
Oakland, CA 94610	Client P.O.:	Date Completed: 12/06/10

WorkOrder: 1012007

December 06, 2010

Dear Michael:

Enclosed within are:

1) The results of the **1** analyzed sample from your project: **#0047; VIP Service,**
2) A QC report for the above sample,
3) A copy of the chain of custody, and
4) An invoice for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits.

If you have any questions or concerns, please feel free to give me a call. Thank you for choosing

McCampbell Analytical Laboratories for your analytical needs.

Best regards,

Angela Rydelius
Laboratory Manager
McCampbell Analytical, Inc.

P & D ENVIRONMENTAL, INC.
55 Santa Clara Ave, Suite 240
Oakland, CA 94610
(510) 658-6916

1012007

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJECT NUMBER: 0047

PROJECT NAME: V/IP SERVICE 3889 CASTRO VALLEY BLVD CASTRO VALLEY

SAMPLED BY: (PRINTED AND SIGNATURE) MICHAEL DESCHENES Michael Deschenes

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION	NUMBER OF CONTAINERS	ANALYSIS(ES): TPH-G, MBTEX BY 8021						PRESERVATIVE	REMARKS
140	P35-W	11/30/10	1235	H20		5	X						ICE	NORMAL TURN AROUND

ICE / t° 3.6°C
GOOD CONDITION ✓ APPROPRIATE
HEAD SPACE ABSENT ✓ CONTAINERS ✓
DECHLORINATED IN LAB ____ PRESERVED IN LAB ____
VOAS | O & G | METALS | OTHER
PRESERVATION ✓

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)
Michael Deschenes	12/1/10	1112	[signature]
RELINQUISHED BY: (SIGNATURE) [signature]	12/1/10	1240	RECEIVED BY: (SIGNATURE) [signature]
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)

TOTAL NO. OF SAMPLES (THIS SHIPMENT): 1
TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 5
LABORATORY: McCAMPBELL ANALYTICAL
LABORATORY CONTACT: ANGELA RYDELIUS
LABORATORY PHONE NUMBER: (877) 252-9262
SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( ) YES (X) NO

Results and billing to:
P&D Environmental, Inc.
lab@pdenviro.com

REMARKS: ALL BOTTLES PRESERVED WITH HCL

McCampbell Analytical, Inc.

1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 1012007 **ClientCode: PDEO**

☐ WaterTrax ☐ WriteOn ☐ EDF ☐ Excel ☐ Fax ☑ Email ☐ HardCopy ☐ ThirdParty ☐ J-flag

Report to:
Michael Deschenes
P & D Environmental
55 Santa Clara, Ste.240
Oakland, CA 94610
(510) 658-6916 FAX 510-834-0152

Email: lab@pdenviro.com
cc:
PO:
ProjectNo: #0047; VIP Service

Bill to:
Accounts Payable
P & D Environmental
55 Santa Clara, Ste.240
Oakland, CA 94610

Requested TAT: **5 days**

Date Received: **12/01/2010**
Date Printed: **12/01/2010**

					Requested Tests (See legend below)											
Lab ID	**Client ID**	**Matrix**	**Collection Date**	**Hold**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1012007-001	P35-W	Water	11/30/2010 12:35	☐	A											

Test Legend:

1	G-MBTEX_W	2		3		4		5	
6		7		8		9		10	
11		12							

Prepared by: Melissa Valles

Comments:

NOTE: Soil samples are discarded 60 days after results are reported unless other arrangements are made (Water samples are 30 days).
Hazardous samples will be returned to client or disposed of at client expense.

McCampbell Analytical, Inc.
"When Quality Counts"
1534 Willow Pass Road, Pittsburg, CA 94565-1701
Web: www.mccampbell.com E-mail: main@mccampbell.com
Telephone: 877-252-9262 Fax: 925-252-9269

Sample Receipt Checklist

Client Name:	**P & D Environmental**	Date and Time Received:	**12/1/2010 12:43:07 PM**
Project Name:	**#0047; VIP Service**	Checklist completed and reviewed by:	Melissa Valles
WorkOrder N°:	**1012007** Matrix Water	Carrier:	Rob Pringle (MAI Courier)

Chain of Custody (COC) Information

Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Sample IDs noted by Client on COC?	Yes ☑	No ☐	
Date and Time of collection noted by Client on COC?	Yes ☑	No ☐	
Sampler's name noted on COC?	Yes ☑	No ☐	

Sample Receipt Information

Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	NA ☑
Shipping container/cooler in good condition?	Yes ☑	No ☐	
Samples in proper containers/bottles?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	

Sample Preservation and Hold Time (HT) Information

All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature	Cooler Temp: 3.6°C		NA ☐
Water - VOA vials have zero headspace / no bubbles?	Yes ☑	No ☐	No VOA vials submitted ☐
Sample labels checked for correct preservation?	Yes ☑	No ☐	
Metal - pH acceptable upon receipt (pH<2)?	Yes ☐	No ☐	NA ☑
Samples Received on Ice?	Yes ☑	No ☐	

(Ice Type: WET ICE)

** NOTE: If the "No" box is checked, see comments below.*

Client contacted: Date contacted: Contacted by:

Comments:

McCampbell Analytical, Inc.
"When Quality Counts"
1534 Willow Pass Road, Pittsburg, CA 94565-1701
Web: www.mccampbell.com E-mail: main@mccampbell.com
Telephone: 877-252-9262 Fax: 925-252-9269

P & D Environmental	Client Project ID: #0047; VIP Service	Date Sampled: 11/30/10
55 Santa Clara, Ste.240		Date Received: 12/01/10
	Client Contact: Michael Deschenes	Date Extracted: 12/02/10
Oakland, CA 94610	Client P.O.:	Date Analyzed: 12/02/10

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline with BTEX and MTBE*

Extraction method: SW5030B Analytical methods: SW8021B/8015Bm Work Order: 1012007

Lab ID	Client ID	Matrix	TPH(g)	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	DF	% SS	Comments
001A	P35-W	W	99,000	ND<100	93	440	990	2800	20	106	d1,b6,b1

Reporting Limit for DF =1; ND means not detected at or above the reporting limit		TPH(g)	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	Units
	W	50	5.0	0.5	0.5	0.5	0.5	µg/L
	S	1.0	0.05	0.005	0.005	0.005	0.005	mg/Kg

* water and vapor samples are reported in ug/L, soil/sludge/solid samples in mg/kg, wipe samples in µg/wipe, product/oil/non-aqueous liquid samples and all TCLP & SPLP extracts in mg/L.

cluttered chromatogram; sample peak coelutes w/surrogate peak; low surrogate recovery due to matrix interference.

%SS = Percent Recovery of Surrogate Standard; DF = Dilution Factor

+The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation:

b1) aqueous sample that contains greater than ~1 vol. % sediment
b6) lighter than water immiscible sheen/product is present
d1) weakly modified or unmodified gasoline is significant

DHS ELAP Certification 1644

Angela Rydelius, Lab Manager

McCampbell Analytical, Inc.
"When Quality Counts"
1534 Willow Pass Road, Pittsburg, CA 94565-1701
Web: www.mccampbell.com E-mail: main@mccampbell.com
Telephone: 877-252-9262 Fax: 925-252-9269

QC SUMMARY REPORT FOR SW8021B/8015Bm

W.O. Sample Matrix: Water QC Matrix: Water BatchID: 54722 WorkOrder 1012007

EPA Method SW8021B/8015Bm	Extraction SW5030B							Spiked Sample ID: 1011822-003A			
Analyte	Sample	Spiked	MS	MSD	MS-MSD	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)			
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	MS / MSD	RPD	LCS/LCSD	RPD
TPH(btex)£	ND	60	106	104	1.43	105	106	1.09	70 - 130	20	70 - 130	20
MTBE	ND	10	106	109	2.50	103	112	7.98	70 - 130	20	70 - 130	20
Benzene	ND	10	92.6	96.6	4.20	92.4	95.6	3.49	70 - 130	20	70 - 130	20
Toluene	ND	10	93.1	96.2	3.23	92.1	96	4.18	70 - 130	20	70 - 130	20
Ethylbenzene	ND	10	92.4	94.4	2.12	91	94.5	3.70	70 - 130	20	70 - 130	20
Xylenes	ND	30	94.8	96.6	1.85	93.7	97.4	3.85	70 - 130	20	70 - 130	20
%SS:	99	10	95	97	1.62	96	95	1.11	70 - 130	20	70 - 130	20

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
NONE

BATCH 54722 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
1012007-001A	11/30/10 12:35 PM	12/02/10	12/02/10 2:30 PM				

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 * (MS-Sample) / (Amount Spiked); RPD = 100 * (MS - MSD) / ((MS + MSD) / 2).

MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

£ TPH(btex) = sum of BTEX areas from the FID.

cluttered chromatogram; sample peak coelutes with surrogate peak.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.

NR = matrix interference and/or analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content, or inconsistency in sample containers.

DHS ELAP Certification 1644 QA/QC Officer

12/14/2010
Mr. Paul King
P & D Environmental
55 Santa Clara
Suite 240
Oakland CA 94610

Project Name: VIP SERVICE 3889 CASTRO VALLEY BLVD
Project #: 0047
Workorder #: 1012047

Dear Mr. Paul King

The following report includes the data for the above referenced project for sample(s) received on 12/2/2010 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kyle Vagadori at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kyle Vagadori
Project Manager

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 .FAX (916) 985-1020
Hours 6:30 A.M to 5:30 PST

WORK ORDER #: 1012047

Work Order Summary

CLIENT:	Mr. Paul King P & D Environmental 55 Santa Clara Suite 240 Oakland, CA 94610	**BILL TO:**	Mr. Paul King P & D Environmental 55 Santa Clara Suite 240 Oakland, CA 94610
PHONE:	510-658-6916	**P.O. #**	
FAX:	510-834-0772	**PROJECT #**	0047 VIP SERVICE 3889 CASTRO VALLEY BLVD
DATE RECEIVED:	12/02/2010	**CONTACT:**	Kyle Vagadori
DATE COMPLETED:	12/14/2010		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SG-17	Modified TO-15	3.0 "Hg	15 psi
02A	SG-17-DUP	Modified TO-15	2.5 "Hg	15 psi
03A	Lab Blank	Modified TO-15	NA	NA
04A	CCV	Modified TO-15	NA	NA
05A	LCS	Modified TO-15	NA	NA
05AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Linda d. Fruman DATE: 12/14/10

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763,
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/09, Expiration date: 06/30/11
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
EPA Method TO-15
P & D Environmental
Workorder# 1012047

Two 1 Liter Summa Canister samples were received on December 02, 2010. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

A single point calibration for TPH referenced to Gasoline was performed for each daily analytical batch. Recovery is reported as 100% in the associated results for each CCV.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the reporting limit.
UJ- Non-detected compound associated with low bias in the CCV
N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SG-17

Lab ID#: 1012047-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Propanol	4.5	97	11	240
Benzene	1.1	1.2	3.6	3.9
Toluene	1.1	2.1	4.2	8.0
m,p-Xylene	1.1	1.1	4.9	4.8
TPH ref. to Gasoline (MW=100)	56	160	230	670

Client Sample ID: SG-17-DUP

Lab ID#: 1012047-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Propanol	4.4	12	11	28
Benzene	1.1	2.1	3.5	6.8
Toluene	1.1	4.2	4.1	16
m,p-Xylene	1.1	2.1	4.8	9.2
TPH ref. to Gasoline (MW=100)	55	210	220	870

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: SG-17

Lab ID#: 1012047-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**6120623**	**Date of Collection: 11/30/10 10:20:00 A**
Dil. Factor:	**2.24**	**Date of Analysis: 12/6/10 11:25 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Propanol	4.5	97	11	240
Methyl tert-butyl ether	1.1	Not Detected	4.0	Not Detected
Benzene	1.1	1.2	3.6	3.9
Toluene	1.1	2.1	4.2	8.0
Ethyl Benzene	1.1	Not Detected	4.9	Not Detected
m,p-Xylene	1.1	1.1	4.9	4.8
o-Xylene	1.1	Not Detected	4.9	Not Detected
TPH ref. to Gasoline (MW=100)	56	160	230	670

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	119	70-130
4-Bromofluorobenzene	104	70-130

Client Sample ID: SG-17-DUP

Lab ID#: 1012047-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**6120624**	**Date of Collection: 11/30/10 10:20:00 A**
Dil. Factor:	**2.20**	**Date of Analysis: 12/6/10 11:47 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Propanol	4.4	12	11	28
Methyl tert-butyl ether	1.1	Not Detected	4.0	Not Detected
Benzene	1.1	2.1	3.5	6.8
Toluene	1.1	4.2	4.1	16
Ethyl Benzene	1.1	Not Detected	4.8	Not Detected
m,p-Xylene	1.1	2.1	4.8	9.2
o-Xylene	1.1	Not Detected	4.8	Not Detected
TPH ref. to Gasoline (MW=100)	55	210	220	870

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	114	70-130
4-Bromofluorobenzene	104	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 1012047-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**6120606**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/6/10 10:54 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
2-Propanol	2.0	Not Detected	4.9	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
TPH ref. to Gasoline (MW=100)	25	Not Detected	100	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	116	70-130
4-Bromofluorobenzene	96	70-130

Client Sample ID: CCV

Lab ID#: 1012047-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**6120602**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 12/6/10 08:40 AM**

Compound	%Recovery
2-Propanol	114
Methyl tert-butyl ether	120
Benzene	96
Toluene	96
Ethyl Benzene	101
m,p-Xylene	104
o-Xylene	108
TPH ref. to Gasoline (MW=100)	100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	116	70-130
4-Bromofluorobenzene	102	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 1012047-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**6120603**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 12/6/10 09:17 AM**

Compound	%Recovery
2-Propanol	107
Methyl tert-butyl ether	107
Benzene	86
Toluene	83
Ethyl Benzene	88
m,p-Xylene	90
o-Xylene	94
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	111	70-130
4-Bromofluorobenzene	100	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCSD

Lab ID#: 1012047-05AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**6120604**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 12/6/10 09:36 AM**

Compound	%Recovery
2-Propanol	101
Methyl tert-butyl ether	104
Benzene	81
Toluene	80
Ethyl Benzene	84
m,p-Xylene	89
o-Xylene	90
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	114	70-130
4-Bromofluorobenzene	102	70-130

P & D ENVIRONMENTAL, INC.

55 Santa Clara Ave, Suite 240
Oakland, CA 94610
(510) 658-6916

1012047

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJECT NUMBER: 0047

PROJECT NAME: VIP SERVICE, 3889 CASTRO VALLEY BLVD, CASTRO VALLEY

SAMPLED BY: (PRINTED AND SIGNATURE) MICHAEL DESCHENES [signature]

ANALYSIS(ES): TPH-G, MBTEX, 2-PROPANOL BY TO-15

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION (INIT. VAC / SUMMA # / FINAL VAC / PID)	NUMBER OF CONTAINERS	TPH-G, MBTEX, 2-PROPANOL BY TO-15						PRESERVATIVE	REMARKS
01A	SG-17	11/30/10	101620	SOIL GAS	-29 / 34608 / -5 / 0ppm	1	X							NORMAL TURN AROUND SUMMA
02A	SG-17-DUP	11/30/10	101620	"	-29 / 30825 / -5 / 0ppm	1	X							" " "

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)		
[signature]	12/1/10		Fed Ex	TOTAL NO. OF SAMPLES (THIS SHIPMENT): 2; TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 2	LABORATORY: AIR TOXICS, LTD
RELINQUISHED BY: (SIGNATURE)	DATE 12/2/10	TIME 09:15	RECEIVED BY: (SIGNATURE) [signature] ATL 12/2/10 09:15	LABORATORY CONTACT: KYLE VAGADORI	LABORATORY PHONE NUMBER: (916) 985-1000
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( ) YES (X) NO	

Results and billing to:
P&D Environmental, Inc.
lab@pdenviro.com

REMARKS: 2-PROPANOL WAS OUR TRACER GAS

CUSTODY SEAL INTACT
Y N NONE TEMP NA

Fed-Ex

12/15/2010
Mr. Paul King
P & D Environmental
55 Santa Clara
Suite 240
Oakland CA 94610

Project Name: VIP SERVICE 3889 CASTRO VALLEY BLVD
Project #: 0047
Workorder #: 1012046

Dear Mr. Paul King

The following report includes the data for the above referenced project for sample(s) received on 12/2/2010 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-17 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kyle Vagadori at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kyle Vagadori
Project Manager

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 .FAX (916) 985-1020
Hours 6:30 A.M to 5:30 PST

WORK ORDER #: 1012046

Work Order Summary

CLIENT:	Mr. Paul King P & D Environmental 55 Santa Clara Suite 240 Oakland, CA 94610	**BILL TO:**	Mr. Paul King P & D Environmental 55 Santa Clara Suite 240 Oakland, CA 94610
PHONE:	510-658-6916	**P.O. #**	
FAX:	510-834-0772	**PROJECT #**	0047 VIP SERVICE 3889 CASTRO VALLEY BLVD
DATE RECEIVED:	12/02/2010	**CONTACT:**	Kyle Vagadori
DATE COMPLETED:	12/15/2010		

FRACTION #	NAME	TEST
01A	SG17	Modified TO-17
02A	SG17 REP	Modified TO-17
03A	Lab Blank	Modified TO-17
04A	CCV	Modified TO-17
05A	LCS	Modified TO-17
05AA	LCSD	Modified TO-17

CERTIFIED BY: Linda L. Freeman DATE: 12/15/10

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763,
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/09, Expiration date: 06/30/11
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
EPA Method TO-17
P & D Environmental
Workorder# 1012046

Two TO-17 Tube (Tenax-TA) samples were received on December 02, 2010. The laboratory performed the analysis via EPA Method TO-17 using GC/MS in the full scan mode. TO-17 sorbent tubes are thermally desorbed onto a secondary trap. The trap is thermally desorbed to elute the components into the GC/MS system for further separation.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

A sampling volume of 1.00 L was used to convert ng to ug/m3 for the associated Lab Blank.

The reported CCV and LCS for each daily batch may be derived from more than one analytical file.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED METHOD TO-17

Client Sample ID: SG17

Lab ID#: 1012046-01A

No Detections Were Found.

Client Sample ID: SG17 REP

Lab ID#: 1012046-02A

No Detections Were Found.

Air Toxics LTD. Laboratory Services Since 1989

Client Sample ID: SG17

Lab ID#: 1012046-01A

MODIFIED METHOD TO-17

File Name:	**j120618a**	**Date of Extraction: NA**	**Date of Collection: 11/30/10 10:33:00 A**
Dil. Factor:	**1.00**		**Date of Analysis: 12/6/10 07:46 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	5.0	5.0	Not Detected	Not Detected
2-Propanol	50	50	Not Detected	Not Detected

Air Sample Volume(L): 1.00
Container Type: TO-17 Tube (Tenax-TA)

Surrogates	%Recovery	Method Limits
Naphthalene-d8	96	70-130

Laboratory Services Since 1989

Client Sample ID: SG17 REP

Lab ID#: 1012046-02A

MODIFIED METHOD TO-17

File Name:	**j120619a**	**Date of Extraction: NA** **Date of Collection: 11/30/10 10:45:00 A**
Dil. Factor:	**1.00**	**Date of Analysis: 12/6/10 08:17 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	5.0	5.0	Not Detected	Not Detected
2-Propanol	50	50	Not Detected	Not Detected

Air Sample Volume(L): 1.00
Container Type: TO-17 Tube (Tenax-TA)

Surrogates	%Recovery	Method Limits
Naphthalene-d8	105	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 1012046-03A

MODIFIED METHOD TO-17

File Name:	**j120617a**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 12/6/10 07:16 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	5.0	5.0	Not Detected	Not Detected
2-Propanol	50	50	Not Detected	Not Detected

Air Sample Volume(L): 1.00
Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Naphthalene-d8	89	70-130

Client Sample ID: CCV

Lab ID#: 1012046-04A

MODIFIED METHOD TO-17

File Name:	**j120614**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 12/6/10 04:57 PM**

Compound	%Recovery
Naphthalene	89
2-Propanol	112

Air Sample Volume(L): 1.00
Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Naphthalene-d8	97	70-130

Client Sample ID: LCS

Lab ID#: 1012046-05A

MODIFIED METHOD TO-17

File Name:	**j120615**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 12/6/10 05:25 PM**

Compound	%Recovery
Naphthalene	101
2-Propanol	116

Air Sample Volume(L): 1.00
Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Naphthalene-d8	135	70-130

Client Sample ID: LCSD

Lab ID#: 1012046-05AA

MODIFIED METHOD TO-17

File Name:	**j120612a**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 12/6/10 03:00 PM**

Compound	%Recovery
Naphthalene	100
2-Propanol	Not Spiked

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Naphthalene-d8	128	70-130

Original COC in box w/ associated Summas

P & D ENVIRONMENTAL, INC.

55 Santa Clara Ave, Suite 240
Oakland, CA 94610
(510) 658-6916

CHAIN OF CUSTODY RECORD

1012046

PROJECT NUMBER: 0047

PROJECT NAME: VIP SERVICE 3889 CASTRO VALLEY BLVD CASTRO VALLEY

SAMPLED BY: (PRINTED AND SIGNATURE) MICHAEL DESCHENES [signature]

SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION: START TIME	SAMPLE #	END TIME	NUMBER OF CONTAINERS	ANALYSIS(ES): NAPTHALENE 2-PROPANOL BY TO-17						PRESERVATIVE	REMARKS
SG17	11/30/10	103300	SOIL/GAS	102200	Mi130236	103300	1	X						ICE	NORMAL TURN AROUND SORBENT TUBE
SG17 REP.	11/30/10	104500	SOIL/GAS	104000	Mi153270	104500	1	X						ICE	" "

Good
CUSTODY SEAL INTACT?
Y N NONE TEMP 2.0°C
Fedex

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)		
[signature]	12/1/10		Fed Ex	TOTAL NO. OF SAMPLES (THIS SHIPMENT): 2	LABORATORY: AIR TOXICS LTD
				TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 2	
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE) Bryan Whittaker ATL	LABORATORY CONTACT: KYLE VAGADORI	LABORATORY PHONE NUMBER: (916) 985-1000
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE) 12/2/10 915	SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( ) YES (X) NO	

Results and billing to:
P&D Environmental, Inc.
lab@pdenviro.com

REMARKS: 2-PROPANOL WAS OUR TRACER GAS

APPENDIX F

Soil Gas Risk and Hazard Calculation Work Sheets

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
Benzene 6.8 ug/m^3

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	6.80E+00			Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

MORE ↓

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	350

END

Report 0047.R46
Appendix F

SG17-Dup
Benzene 6.8 ug/m^3

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	6.80E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)
15	6.80E+00	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	1.79E-03	1.22E-02

Unit risk factor, URF (µg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

Report 0047.R46
Appendix F

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

SG17-Dup

Benzene 6.8 ug/m^3

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.5E-07	3.9E-04

MESSAGE SUMMARY BELOW:

END

Report 0047.R46
Appendix F

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
Toluene 16 ug/m^3

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	1.60E+01			Toluene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

MORE ↓

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	350

END

Report 0047.R46
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SG17-Dup
Toluene 16 ug/m^3

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	1.60E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,001	6.29E-03	2.58E-01	1.80E-04	6.79E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	1.60E+01	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	1.79E-03	2.86E-02

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-01

END

Report 0047.R46
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RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

SG17-Dup
Toluene 16 ug/m^3

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	9.1E-05

MESSAGE SUMMARY BELOW:

END

Report 0047.R46
Appendix F

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
m,p-Xylene 9.2 ug/m^3

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	9.20E+00			p-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

MORE ↓

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	350

END

Report 0047.R46
Appendix F

SG17-Dup
m,p-Xylene 9.2 ug/m^3

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	9.20E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	10,083	7.22E-03	2.96E-01	1.80E-04	6.00E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)
15	9.20E+00	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	1.72E-03	1.59E-02

Unit risk factor, URF (µg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.0E-01

END

RESULTS SHEET

SG17-Dup

m,p-Xylene 9.2 ug/m^3

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.5E-04

MESSAGE SUMMARY BELOW:

END

Report 0047.R46
Appendix F

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17
Benzene 3.9 ug/m^3

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	3.90E+00			Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

MORE ↓

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	350

END

Report 0047.R46
Appendix F

SG17

Benzene 3.9 ug/m^3

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	3.90E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)
15	3.90E+00	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	1.79E-03	6.99E-03

Unit risk factor, URF (µg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

Report 0047.R46
Appendix F

SG17
Benzene 3.9 ug/m^3

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
8.3E-08	2.2E-04

MESSAGE SUMMARY BELOW:

END

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17
Toluene 8.0 ug/m^3

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	8.00E+00			Toluene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

MORE ↓

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	350

END

Report 0047.R46
Appendix F

SG17

Toluene 8.0 ug/m^3

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	8.00E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,001	6.29E-03	2.58E-01	1.80E-04	6.79E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	8.00E+00	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	1.79E-03	1.43E-02

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-01

END

rt 0047.R46

ıpendix F

RESULTS SHEET

SG17

Toluene 8.0 ug/m^3

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.6E-05

MESSAGE SUMMARY BELOW:

END

Report 0047.R46
Appendix F

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17
m,p-Xylene 4.8 ug/m³

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	4.80E+00			p-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

MORE ↓

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	350

END

Report 0047.R46
Appendix F

SG17
m,p-Xylene 4.8 ug/m^3

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	4.80E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	10,083	7.22E-03	2.96E-01	1.80E-04	6.00E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	4.80E+00	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	1.72E-03	8.27E-03

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.0E-01

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	7.9E-05

MESSAGE SUMMARY BELOW:

END

APPENDIX G

Soil Gas Model Sensitivity Analysis Risk and Hazard Calculation Work Sheets

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 1

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	6.80E+00			Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

Lookup Soil Parameters

MORE ↓

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	350

END

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Appendix G

SG17-Dup
Benzene 6.8 ug/m3
Scenario 1

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	6.80E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	6.80E+00	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	1.79E-03	1.22E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.5E-07	3.9E-04

MESSAGE SUMMARY BELOW:

END

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 2

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	6.80E+00			Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	15	SI		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

Lookup Soil Parameters

MORE ↓

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	350

END

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RESULTS SHEET

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 2

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.5E-07	3.9E-04

MESSAGE SUMMARY BELOW:

END

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SG17-Dup
Benzene 6.8 ug/m^3
Scenario 2

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.80E-09	0.833	5.67E-09	4,000	6.80E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	8,071	3.45E-03	1.46E-01	1.77E-04	6.86E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	6.80E+00	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	1.79E-03	1.22E-02

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 3

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	6.80E+00			Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	CL		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
CL	1.5	0.43	0.15	5

MORE ↓

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	350

END

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Appendix G

INTERMEDIATE CALCULATIONS SHEET

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 3

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.202	1.29E-09	0.891	1.15E-09	4,000	6.80E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	6.80E+00	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	1.79E-03	1.22E-02

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

RESULTS SHEET

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 3

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.5E-07	3.9E-04

MESSAGE SUMMARY BELOW:

END

Report 0047.R46
Appendix G

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 4

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	6.80E+00			Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	S		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.5	0.43	0.15	5

MORE ↓

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	350

END

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Appendix G

INTERMEDIATE CALCULATIONS SHEET

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 4

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.257	1.02E-07	0.703	7.15E-08	4,000	6.80E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	6.80E+00	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	1.79E-03	1.22E-02

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

RESULTS SHEET

SG17-Dup

Benzene 6.8 ug/m^3

Scenario 4

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.5E-07	3.9E-04

MESSAGE SUMMARY BELOW:

END

Report 0047.R46
Appendix G

SG-SCREEN
'A Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 5

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	6.80E+00			Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
	1.5	0.43	0.15	5

MORE ↓

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	350

END

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 5

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	6.80E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)
15	6.80E+00	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	6.27E-03

Unit risk factor, URF (µg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

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RESULTS SHEET

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 5

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
7.5E-08	2.0E-04

MESSAGE SUMMARY BELOW:

END

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DATA ENTRY SHEET

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 6

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

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	6.80E+00			Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	304.8	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

MORE ↓

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	350

END

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Appendix G

SG17-Dup
Benzene 6.8 ug/m^3
Scenario 6

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
289.8	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	6.80E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	6.80E+00	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	5.44E-04	3.70E-03

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

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RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
4.4E-08	1.2E-04

MESSAGE SUMMARY BELOW:

END

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
Benzene 100 ug/m^3
Scenario 7

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	1.00E+02			Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	SI		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

MORE ↓

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	350

END

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SG17-Dup
Benzene 100 ug/m^3
Scenario 7

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	1.00E+02	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)
15	1.00E+02	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	1.79E-03	1.79E-01

Unit risk factor, URF (µg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

SG17-Dup

Benzene 100 ug/m^3

Scenario 7

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.1E-06	5.7E-03

MESSAGE SUMMARY BELOW:

END

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SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

SG17-Dup
Benzene 1,000
ug/m^3 Scenario 8

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)		ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	1.00E+03	OR		Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	45.72	24	SI	OR	

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SI	1.5	0.43	0.15	5

MORE ↓

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	350

END

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SG17-Dup
Benzene 1,000 ug/m^3 Scenario 8

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (µg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
30.72	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	1.00E+03	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	30.72

Convection path length, L_p (cm)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)
15	1.00E+03	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	1.79E-03	1.79E+00

Unit risk factor, URF (µg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
2.9E-05	3.0E-02

END

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RESULTS SHEET

SG17-Dup
Benzene 1,000
ug/m^3 Scenario 8

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.1E-05	5.7E-02

MESSAGE SUMMARY BELOW:

END