V I P SERVICE STATION
385 Century Circle
Danville, CA 94526
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October 27, 2009

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 (P28 through P34 and SG13 through SG16) dated October 27, 2009 (document 0047.R42).

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.L103

P&D ENVIRONMENTAL, INC.

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

October 27, 2009
Report 0047.R42

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

SUBJECT: GROUNDWATER AND SOIL GAS SUBSURFACE INVESTIGATION REPORT
(P28 THROUGH P34 AND SG13 THROUGH SG16)
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 drilling and collection of seven groundwater samples at locations P28 through P34 and four soil gas samples designated as SG13 through SG16 at properties neighboring the subject site. Drilling and sample collection activities were performed between September 2 through 11, 2008. The boreholes were drilled for the collection of groundwater samples to define the horizontal and vertical extent of petroleum hydrocarbons in groundwater adjacent to the subject site. The soil gas samples were 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.

Groundwater investigation was performed in accordance with activities identified in P&D's Remedial Investigation and Feasibility Study (RI/FS) Work Plan dated May 17, 2005 (document 0047.W5), and P&D's Remedial Investigation and Feasibility Study (RI/FS) Work Plan Addendum dated August 13, 2007 (document 0047.W5A).

Soil gas samples have historically been collected at locations downgradient from the subject site, including samples B10, B11 and B12 which were collected on September 9, 1999 from locations adjacent to the downgradient residence located at 3875 Castro Valley Boulevard which has a slab-on-grade foundation. In a letter dated April 18, 2008 from the Alameda County Department of Environmental Health (ACDEH), interim remedial action appeared warranted based upon the previous soil gas sample results. Based on a subsequent telephone conversation with the caseworker Mr. Paresh Khatri, it was determined that because of the time elapsed since the 1999 soil gas sample collection, and because the samples collected in 1999 were collected prior to establishment of industry-accepted protocol, petroleum hydrocarbon soil gas concentrations detected in 1999 were to be re-evaluated using current industry-accepted protocol. A work plan for collection of additional soil gas samples to evaluate present day soil gas concentrations was

identified as the next step necessary for the interim remedial action discussed in the April 18, 2008 letter. Soil gas investigation documented in this report was performed in accordance with P&D's Soil Gas Sample Collection Work Plan (SG13 Through SG16) dated August 6, 2008 (document 0047.W6).

All work was performed under the direct supervision of a professional geologist, and in accordance with the following regulatory guidance documents.

- San Francisco Bay Regional Water Quality Control Board (SFRWQCB) "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater" dated May 2008,
- Department of Toxic Substances Control (DTSC) January 13, 2003 "Advisory - Active Soil Gas Investigations" dated January 13, 2003,
- DTSC "Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air" revised February 7, 2005.

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.

A detailed site background discussion is provided in P&D's Remedial Investigation and Feasibility Study (RI/FS) Work Plan dated May 17, 2005 (document 0047.W5). The May 17, 2005 document includes historic soil, soil gas and groundwater sample results. Historic borehole groundwater grab sample results are attached with this work plan as Appendix A, and historic soil gas sample results are attached with this work plan as Appendix B.

FIELD ACTIVITIES

Prior to drilling, Alameda County Public Works Agency (ACPWA) permit W2008-0597 was obtained for the drilling of boreholes P28 through P34 and soil gas sample locations SG13 through SG16. An encroachment permit was also obtained from ACPWA for borehole P31 in the public right-of-way on the west side of Aspen Avenue. In addition, the drilling locations were marked with white paint, Underground Service Alert was notified for underground utility location, a health and safety plan was prepared, a traffic control plan was prepared, and notification of the scheduled drilling date was provided to ACPWA and ACDEH.

Drilling activities were performed between September 2 through 8, 2008. All subsurface exploration (continuous coring, hand augering, soil conductivity logging, first-encountered

groundwater sample collection, and Hydropunch sample collection) was performed by Vironex, Inc. of Pacheco, California.

Hand-Augering, Continuous Coring, and First-Encountered Groundwater Sample Collection

On September 2, 4, and 8, 2008 P&D personnel oversaw the hand-augering of borings P28 through P32 to a maximum depth of 12 feet below the ground surface (bgs), continuous coring at location P34 to a total depth of 34 feet bgs, soil conductivity logging at locations B32, B33, and B34, to depths of 65, 54, and 52 feet bgs, and collection of four soil gas samples SG13 through SG16 at a depth of 5 feet bgs. The sample collection locations are shown in Figure 2.

Borings P28 through P32 were hand-augered to depths of 12.0, 10.0, 7.0, 10.0, and 9.0 feet bgs, respectively, using a 3.5-inch outside diameter stainless steel hand auger. Boring P34 was continuously cored using GeoProbe direct push technology to a depth of 38.0 feet bgs (drilling refusal) with a Macrocore barrel sampler lined with transparent PVC sleeves. The soil from the boreholes 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. The soil was also evaluated for other evidence of petroleum hydrocarbon contamination such as odors, staining, and discoloration. No soil samples were retained for laboratory analysis.

No odors, elevated PID values, staining, or discoloration were detected in boreholes P28 through P30. In boreholes P31, P32 and P34, discoloration and detectable PID readings were recorded as follows.

- P31: blue-gray discoloration in clayey sand, accompanied by a slight petroleum hydrocarbon odor and a PID reading of 17 ppm, was detected from 5.0 to 7.5 feet bgs.
- P32: blue-gray discoloration in clayey sand was accompanied by a strong petroleum hydrocarbon odor and a PID reading of 22 ppm between 7 and 9 (total borehole depth) feet bgs.
- P34: slight petroleum hydrocarbon odors were detected from 11.0 to 16.0 feet bgs. The odors were accompanied by PID readings of 13 and 17 ppm, in sandy clay from 11.0 to 13.0 feet and gravel from 15.0 to 16.0 feet bgs, respectively, while no elevated PID readings accompanied the odors detected between 13.0 and 15.0 feet. Between 16.0 and 17.0 feet depth, a PID reading of 22 ppm was observed in sand without accompanying odor, and between 20.0 and 21.0 feet a slight petroleum hydrocarbon odor and a PID reading of 55 ppm were detected in sandy gravel.

Groundwater was initially encountered while hand augering boreholes B28 through B32 at depths of 7.5, 8.5, 6.2, 9.0 and 9.0 feet bgs, respectively, and was subsequently measured in the boreholes at depth of 7.1, 6.4, 5.7, 4.9 and 6.8 feet bgs, respectively. In continuously cored borehole B34, groundwater was initially encountered during drilling at a depth of 13.0 feet bgs, and was not subsequently measured in the borehole. Copies of the boring logs are attached with this report as Appendix C.

One groundwater grab sample was collected from each of hand augered boreholes P28 through P32. The groundwater grab samples were collected from the boreholes using a temporary slotted PVC pipe and a polyethylene tube with a stainless steel check valve. The samples were 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 samples were 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 cleaned with an Alconox solution followed by a clean water rinse prior to use in each borehole. Following completion of sample collection activities, the boreholes were filled with neat cement grout. Mr. Ron Smalley of the ACPWA was on site to observe grouting procedures on September 2, 4, and 8, 2009. Soil and water generated during drilling was stored in drums at the site pending characterization and disposal.

Soil Conductivity Logging

Soil conductivity logging was performed at locations P32 through P34 to depths of 64.8, 54.0, and 52.6 feet bgs, respectively. Soil conductivity values were continuously measured and recorded and printed as a log. Increased conductivity values indicate finer grained materials. Correlation of the log values with actual earth materials is performed by evaluation and comparison of the conductivity logs with the lithology recorded during the completion of continuously cored borehole P34. GeoProbe has suggested the following correlation between soil type and soil conductivity.

Coarse Sand = 75 Milli-Siemens per meter (ms/m)

Silty Sand = 76-150 ms/m

Silty Clay = 151-200 ms/m

Clay = 200 and greater ms/m

The soil conductivity logs are discussed in greater detail below in the Geology and Hydrogeology section. Please note that the vertical and horizontal scales for each of the logs are different. Copies of the soil conductivity logs for P32, P33, and P34 are attached with this report as Appendix D.

Hydropunch Groundwater Sample Collection

Following review of subsurface conditions identified in the soil conductivity logs, groundwater grab samples were collected at drilling locations P32 through P34 by driving a Hydropunch at locations approximately two feet away from the corresponding soil conductivity log boreholes. The Hydropunch was driven at locations P32 through P34 to depths of 39.0, 34.0 and 34.0 feet bgs, respectively. Prior to retracting the drilling rods to expose the Hydropunch screen, the interior of the drilling rods for each Hydropunch were evaluated to determine if water was present inside the drilling rods. No water was measured in any of the drilling rods prior to retracting the drilling rods to expose the Hydropunch screen.

Following retraction of the Hydropunch exterior rods to expose each Hydropunch screen, groundwater samples were collected from the Hydropunch rods using a polyethylene tube with a stainless steel check valve. The samples were transferred to VOA vials and handled as described above. The Hydropunch rods were removed at each location and a different Hydropunch was driven in the same borehole as the previous Hydropunch at each of locations P32 through P34 to depths of 64.0, 49.0 and 49.0 feet bgs, respectively. After verifying that groundwater had not entered the drilling rods, Hydropunch groundwater sample collection was then repeated at each location as described above for the shallow Hydropunch sample collection.

Soil Gas Sample Collection

A total of four soil gas samples designated as SG13 through SG16 and SG15-Dup were collected on September 8 and 11, 2009 at locations shown on Figure 2. All of the soil gas samples were collected at a depth of 5 feet bgs. The ground surface at each location was covered with asphalt. Although efforts to collect samples at locations SG13 and SG14 were made on September 8, 2008 high vacuum conditions were encountered at these locations, and it was necessary to return to the site on September 11, 2009 to collect samples at these locations.

All of the soil gas samples were collected using temporary soil gas sampling wells. The temporary wells were constructed by driving a hollow 1-inch diameter Geoprobe rod with an expendable tip to a depth of 5 feet, dislodging the expendable tip, and then inserting a 0.250-inch outside diameter (0.187-inch inside diameter) Teflon tube to the bottom of the hollow rod.

A 7-foot length of Teflon tubing was used. Prior to inserting the Teflon tubing the lowermost 6 inches of the Teflon tube was perforated at several locations by notching the sides of the tube with a clean razor blade. 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 the size of kitty litter) was placed in the annular space above the sand to the ground surface. The bentonite was hydrated and 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 7. At the time that the sampling manifold was assembled, the vacuum for the sample canister was checked with a vacuum gauge and recorded. The temporary well was then undisturbed for a minimum of 30 minutes prior to purging for sample collection to allow soil gas equilibration.

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 7). Following successful verification of the manifold leak check, the purge volume was calculated. No purge testing for purge volume determination was done because no mobile laboratory was at the site. A default of three purge volumes was extracted prior to sample collection. The purge time was calculated using a nominal flow rate provided by the flow controller of 200 milliliters per minute. Purge volume calculations are provided in Appendix E of this report.

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, and the 1-liter sample canister. The vapor concentration of the 2-Propanol was monitored with a 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 valve and the bin was then be replaced over the sampling equipment and the 2-Propanol vapor concentrations were then monitored again with the PID. Once the vacuum for the sample canister valve decreased to 5 inches of mercury, the Rubbermaid lid was removed and the sample canister valve closed.

A total of one replicate soil gas sample (designated as Dup) was collected into a one-liter Summa canister using procedures described above immediately after the collection of the corresponding original sample. The void space and tubing was not purged of three purge volumes prior to collection of the replicate sample. 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 soil gas samples were then stored in a box and promptly shipped to the laboratory for extraction and analysis. Soil gas sampling was not performed during or following a precipitation event. Measurements of vacuums, purging and equilibration time intervals, and PID readings were recorded on Soil Gas Sampling Data Sheets that are provided in Appendix F of this report.

All drilling rods and associated drilling fittings were cleaned with an Alconox solution wash followed by a clean water rinse. New Teflon tubing was used at each sample collection location. Clean, unused vacuum gages and stainless steel sampling manifolds containing flow restrictors were used at each sample collection location. Following soil gas sample collection the Teflon tubing was pulled from each temporary soil gas sampling well 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.

Lithologic information was visually recorded in boring logs for six of the seven boreholes drilled in this investigation (P28 through P32 to total depths of 7.0 to 12.0 feet, and P34 to a total depth of 38.0 feet bgs). The subsurface materials encountered in the boreholes consisted predominantly of interlayered clay and coarse-grained materials made up predominantly of clayey and silty sand, but also including gravel and clayey gravel in boreholes P30 and P34. Coarse-grained layers were encountered in the visually logged boreholes as follows.

P28 – 0.0 to 3.0 and 9.0 to 11.0 feet bgs.
P29 – 0.5 to 2.0 feet bgs.
P30 – 0.0 to 4.0 and 6.0 to 7.0 (clayey gravel) feet bgs with a total depth explored of 7.0 feet bgs.

P31 – 0.5 to 1.5 and 5.0 to 7.5 feet bgs.
P32 – 0.0 to 2.0 and 6.0 to 9.0 feet bgs with a total depth explored of 9.0 feet bgs.
P34 – 9.0 to 11.0, 13.0 to 17.0 (interlayered gravel and sand), 20.0 to 21.0 (sandy gravel), 25.0 to 29.0 (sandy clayey gravel and clayey sand), 30.0 to 32.5 (sandy gravel), and 35.0 to 38.0 (clayey gravel) with a total depth explored of 38.0 feet.

Review of the soil conductivity logs for boreholes P32 (to 64.8 feet), P33 (to 54.0 feet), and P34 to (52.6 feet) shows that between approximately 11.0 and 25.0 feet in P32, 13 and 25 feet in P33, and 15 and 27 feet in P34, two clay intervals are present, separated by an interval of silty clay or silty sand up to 2 to 3 feet thick. At location P32, additional fine-grained materials are encountered to a depth of approximately 32.0 feet bgs. Underlying this sequence, coarser-grained materials predominate in all three borings, which include relatively thin interbeds of silty clay. Comparison of the soil conductivity and visually described lithologic logs for borehole B32 (to a depth of 9.0 feet bgs) and B34 (to a depth of 38.0 feet bgs) shows reasonable correlation.

The conductivity logs indicate that the water samples collected by Hydropunch from 30.0 and 34.0 feet bgs in boreholes P33 and P34 were collected from sand, and silty sand in the upper part of the relatively coarse-grained zone that is encountered beneath the clay layers that extend to a depth of approximately 25.0 feet bgs. Similarly, the water samples collected from P33 and P34 by Hydropunch from 45.0 to 49.0 feet bgs were from zones consisting mainly of sand and silty sand, which were separated from the shallower Hydropunch samples by at least one interval of fine-grained materials. This was also the case for the water samples collected from P32 at depths of 35.0 to 39.0 and 60.0 to 64.0 feet bgs.

Groundwater was initially encountered while hand augering boreholes B28 through B32 at depths of 7.5, 8.5, 6.2, 9.0 and 9.0 feet bgs, respectively, and was subsequently measured in the boreholes at depth of 7.1, 6.4, 5.7, 4.9 and 6.8 feet bgs, respectively. In continuously cored borehole B34, groundwater was initially encountered during drilling at a depth of 13.0 feet bgs, and was not subsequently measured in the borehole. The groundwater flow direction at the site has been historically to the southwest.

LABORATORY ANALYSIS

The groundwater samples collected from boreholes P28 through P34 were analyzed at McCampbell Analytical, Inc. in Pittsburg, California. McCampbell Analytical, Inc. is a state-accredited hazardous waste testing laboratory. The groundwater samples were analyzed 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 8015C.

The soil gas samples collected from boreholes SG13 through SG16 and a field duplicate for sample SG15 identified as SG15 DUP were analyzed at Air Toxics Limited of Folsom California for TPH-G and MBTEX using modified EPA Method TO-15. The laboratory also performed a duplicate sample analysis for sample SG14 identified as SG14 Lab Duplicate.

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 G.

SOIL GAS RISK AND HAZARD EVALUATION

The SFRWQCB May 2008 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) model be used (USEPA Vapor Intrusion Model, 2003). The DTSC has developed a California-specific spreadsheet for calculation of risk and hazard associated with exposure to chemicals which include the VOCs encountered in the soil gas samples collected during the current investigation. The DTSC has most recently updated the spreadsheet on February 4, 2009.

The February 2009 DTSC 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 were calculated using spreadsheet default values for a residential exposure scenario 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 were evaluated by using the highest concentration for each detected chemical from all of the samples and duplicate samples (SG13, SG14, and SG15), and the cumulative risk and hazard for indoor air were also calculated for each sample.

The DTSC vapor intrusion model spreadsheet output results are summarized in Table 3, along with the calculated cumulative risk and hazard for the highest concentration scenario and for each sample. The model input, intercalcs and output sheets for each calculation are attached with this report as Appendix H. The cumulative hazard quotient was calculated to be less than one for the highest concentration scenario and for all of the samples. The cumulative risk for the highest concentration scenario and for each sample was calculated to be as follows.

Highest concentration scenario – 48 per million.
SG13 – 1.9 per million.
SG14 – 5.4 per million.
SG15 – 43 per million.
SG16 – 0.76 per million.

The evaluation results are summarized in Table 3. Review of Table 3 shows that the majority of the risk in sample SG15 and in the highest concentration scenario is from the benzene concentration in sample SG15. Copies of the Cal/EPA screening-level model work sheet print outs are attached as Appendix H.

DISCUSSION AND RECOMMENDATIONS

Based on the first encountered groundwater sample results, the horizontal extent of petroleum hydrocarbons in groundwater appears to be defined with the exception of the vicinity of P28 (see Figures 3 and 4). P&D recommends that one additional groundwater sample be collected from first encountered groundwater at proposed location P35 to complete delineation of the horizontal extent of petroleum hydrocarbons in first encountered groundwater. Based on the soil conductivity logs and the Hydropunch groundwater grab samples from boreholes P32 through P34, and the boring log from P34, the subsurface materials deeper than approximately 25.0 feet bgs consist predominantly of interlayered clay and coarse-grained materials made up predominantly of clayey and silty sand, but also including gravel and clayey gravel. The vertical extent of petroleum hydrocarbons appears to be defined by groundwater concentrations below SFRWQCB Table A May 2008 ESLs at downgradient location P32, but not at the former UST pit at location P34. Based on the sample results, P&D recommends that no further vertical evaluation of petroleum hydrocarbons in groundwater be performed.

Based on the soil gas sample results, none of the calculated hazard quotients exceeded 1. However, the calculated risk at location SG15 was 43 per million and the calculated risk for all of the highest detected concentrations from all of the samples was also 48 per million. Based on the calculated risk, P&D recommends that an additional sub-slab sample be collected adjacent to location SG15.

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

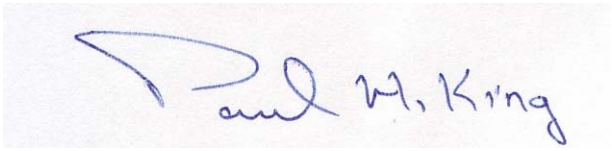
appropriate regulatory agencies, where required by law. Additionally, it is the sole responsibility of the owner to properly dispose of any hazardous materials or hazardous wastes left onsite, in accordance with existing laws and regulations.

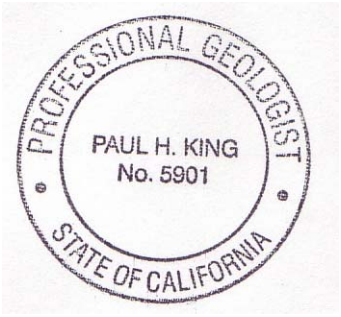
This report has been prepared in accordance with generally accepted practices using standards of care and diligence normally practiced by recognized consulting firms performing services of a similar nature. P&D is not responsible for the accuracy or completeness of information provided by other individuals 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.

October 27, 2009
Report 0047.R42

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

Sincerely,
P&D Environmental, Inc.





Paul H. King
President
Professional Geologist # 5901
Expires: 12/31/09

Attachments:

Table 1: Summary of Groundwater Grab Sample Results
Table 2: Summary of Soil Gas Sample Results
Table 3: Summary of Soil Gas Risk and Hazard Analysis

Figure 1: Site Location Map
Figure 2: Site Vicinity Map Showing Groundwater and Soil Gas Sampling Locations
Figure 3: Site Vicinity Map Showing TPH-G Concentrations in First Encountered Groundwater
Figure 4: Site Vicinity Map Showing Benzene Concentrations in First Encountered Groundwater
Figure 5: Site Vicinity Map Showing TPH-G Concentrations in Soil Gas
Figure 6: Site Vicinity Map Showing Benzene Concentrations in Soil Gas
Figure 7: Typical Soil Gas Sampling Manifold

Appendix A – Historic Borehole Groundwater Grab Sample Results
Appendix B – Historic Soil Gas Sample Results
Appendix C – Soil Boring Logs
Appendix D – Soil Electric Conductivity Logs
Appendix E – Soil Gas Purge Volume Calculations
Appendix F – Soil Gas Sampling Data Sheets
Appendix G – Laboratory Analytical Reports and Chain of Custody Documentation
Appendix H – Soil Gas Risk and Hazard Calculation Work Sheets

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0047.R42

TABLES

Table 1
Summary of Borehole
Groundwater Grab Sample Results

Sample ID	Sample Date	TPH-G	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes
P28W	9/02/08	**5,300**	ND<**50**	**180**	33	**390**	**500**
P29-10	9/08/08	ND<50	ND<5.0	ND<0.5	0.60	ND<0.5	ND<0.5
P30W	9/02/08	87, a	ND<5.0	ND<0.5	3.3	ND<0.5	ND<0.5
P31-10	9/08/08	ND<50	ND<5.0	ND<0.5	1.2	ND<0.5	1.3
P32-10	9/08/08	**12,000**	ND<**100**	**350**	36	**180**	**68**
P32-35	9/05/08	79	ND<5.0	**1.2**	5.0	1.3	2.6
P32-60	9/05/08	59	ND<5.0	**1.1**	1.8	1.1	2.2
P33-30	9/05/08	**1,400**	ND<**50**	**150**	**51**	**41**	**240**
P33-45	9/05/08	**190**	ND<5.0	**2.5**	2.6	3.1	17
P34W-30	9/11/08	**150**	ND<5.0	**3.9**	2.5	3.1	12
P34W-45	9/11/08	**1,600**	ND<5.0	**15**	13	23	**95**
ESL		100	5.0	1.0	40	30	20

Notes:
TPH-D = Total Petroleum Hydrocarbons as Diesel.
TPH-MO = Total Petroleum Hydrocarbons as Motor Oil.
TPH-G = Total Petroleum Hydrocarbons as Gasoline.
TPH-BO = Total Petroleum Hydrocarbons as Bunker Oil.
MBTEX = methyl tert-butyl ether (MTBE), Benzene, Toluene, Ethylbenzene, Xylenes.
ND = Not Detected.
a = Laboratory analytical report note: no recognizable pattern.
ESL=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
BOLD = Concentration in excess of applicable ESL.
Results in 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
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	

NOTES:
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
Calculated Vapor Intrusion Risk and Hazard Summary
Cal/EPA Screening-Level Model
for Soil Gas Contamination (last modified 2/4/2009)
VIP Service
3889 Castro Valley Blvd.
Castro Valley, CA

Chemical	Sample Location	Concentration ($\mu g/m^3$)	Residential Exposure: Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Residential Exposure: Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)	CAS#
Highest Concentration					
TPH-G	SG14	380,000	Unknown	Unknown	None
Benzene	SG15	3,900	4.3E-05	1.1E-01	71432
Toluene	SG13	45,000	NA	1.3E-01	108883
Ethyl Benzene	SG14	5,600	4.8E-06	4.5E-03	100414
m,p-xylene	SG14	19,000	NA	1.5E-01	106423
o-xylene	SG14	6,300	NA	5.50E-02	95476
MTBE	SG15	53	5.70E-09	1.70E-05	1634044
		TOTALS	**4.8E-05**	**4.5E-01**	
TPH-G	SG13	260,000	Unknown	Unknown	None
Benzene		ND<42	0.0E+00	0.0E+00	71432
Toluene		45,000	NA	1.3E-01	108883
Ethyl Benzene		2,200	1.9E-06	1.8E-03	100414
m,p-xylene		6,500	NA	5.3E-02	106423
o-xylene		1,800	NA	1.6E-02	95476
MTBE		ND<48	0.0E+00	0.0E+00	1634044
		TOTALS	**1.9E-06**	**2.0E-01**	
TPH-G	SG14	380,000	Unknown	Unknown	None
Benzene		57	6.3E-07	1.7E-03	71432
Toluene		41,000	NA	1.2E-01	108883
Ethyl Benzene		5,600	4.8E-06	4.5E-03	100414
m,p-xylene		19,000	NA	1.5E-01	106423
o-xylene		6,300	NA	5.5E-02	95476
MTBE		ND<42	0.0E+00	0.0E+00	1634044
		TOTALS	**5.4E-06**	**3.3E-01**	

NOTES:
TPH-G = total petroleum hydrocarbons as gasoline.
MTBE = Methyl tert-Butyl Ether.
ND = Not Detected.
NA = Not Applicable.
For highest concentration analysis the highest concentration for each chemical from all samples and duplicates was used.
When duplicate sample results were available, the highest concentration, from either the sample or the duplicate was used.
Used p-xylene CAS # for m,p-xylene risk and hazard calculation.
JE spreadsheet default values were used with following exceptions:
• Used vadose zone SCS soil type SI for silt.
0047.R42 Soil Gas Model Results

Table 3
Calculated Vapor Intrusion Risk and Hazard Summary
Cal/EPA Screening-Level Model
for Soil Gas Contamination (last modified 2/4/2009)
VIP Service
3889 Castro Valley Blvd.
Castro Valley, CA

Chemical	Sample Location	Concentration ($\mu g/m^3$)	Residential Exposure: Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Residential Exposure: Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)	CAS#
TPH-G	SG15	41,000	Unknown	Unknown	None
Benzene		3,900	4.3E-05	1.1E-01	71432
Toluene		680	NA	2.0E-03	108883
Ethyl Benzene		170	1.5E-07	1.4E-04	100414
m,p-xylene		250	NA	2.0E-03	106423
o-xylene		250	NA	2.2E-03	95476
MTBE		53	5.70E-09	1.70E-05	1634044
		TOTALS	**4.3E-05**	**1.2E-01**	
TPH-G	SG16	11,000	Unknown	Unknown	None
Benzene		61	6.70E-07	1.80E-03	71432
Toluene		880	NA	2.6E-03	108883
Ethyl Benzene		100	8.5E-08	8.0E-05	100414
m,p-xylene		330	NA	2.7E-03	106423
o-xylene		92	NA	8.1E-04	95476
MTBE		ND<4.6	0.0E+00	0.0E+00	1634044
		TOTALS	**7.6E-07**	**8.0E-03**	

NOTES:
TPH-G = total petroleum hydrocarbons as gasoline.
MTBE = Methyl tert-Butyl Ether.
ND = Not Detected.
NA = Not Applicable.
For highest concentration analysis the highest concentration for each chemical from all samples and duplicates was used.
When duplicate sample results were available, the highest concentration, from either the sample or the duplicate was used.
Used p-xylene CAS # for m,p-xylene risk and hazard calculation.
JE spreadsheet default values were used with following exceptions:
• Used vadose zone SCS soil type SI for silt.
0047.R42 Soil Gas Model Results

FIGURES

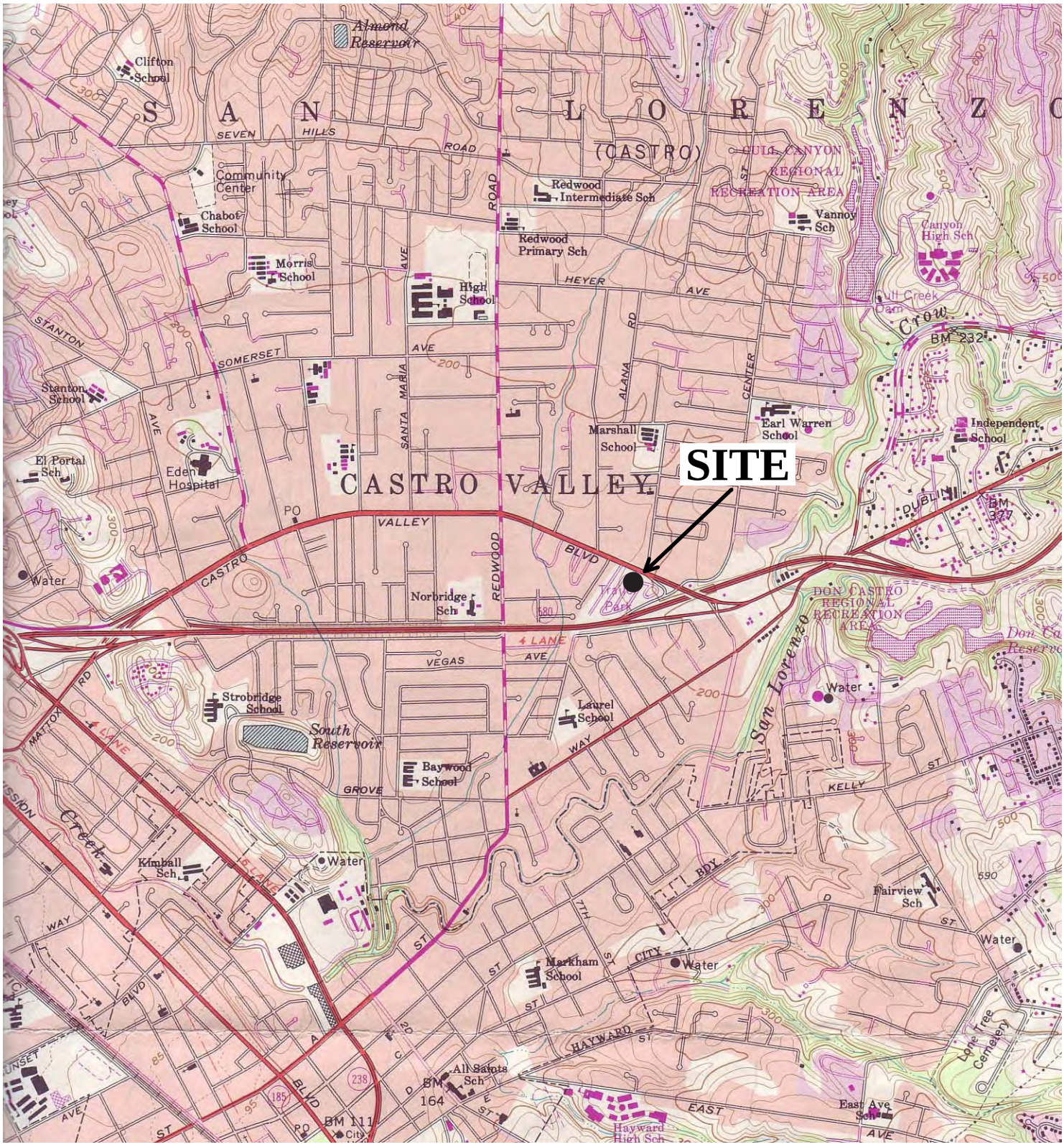


Figure 1
Site Location Map
VIP Service
3889 Castro Valley Blvd.
Castro Valley, California

N

Base Map From:
U.S.Geological Survey
Hayward, California
7.5 Minute Quadrangle
Photorevised 1980

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

0 1,000 2,000
Scale In Feet

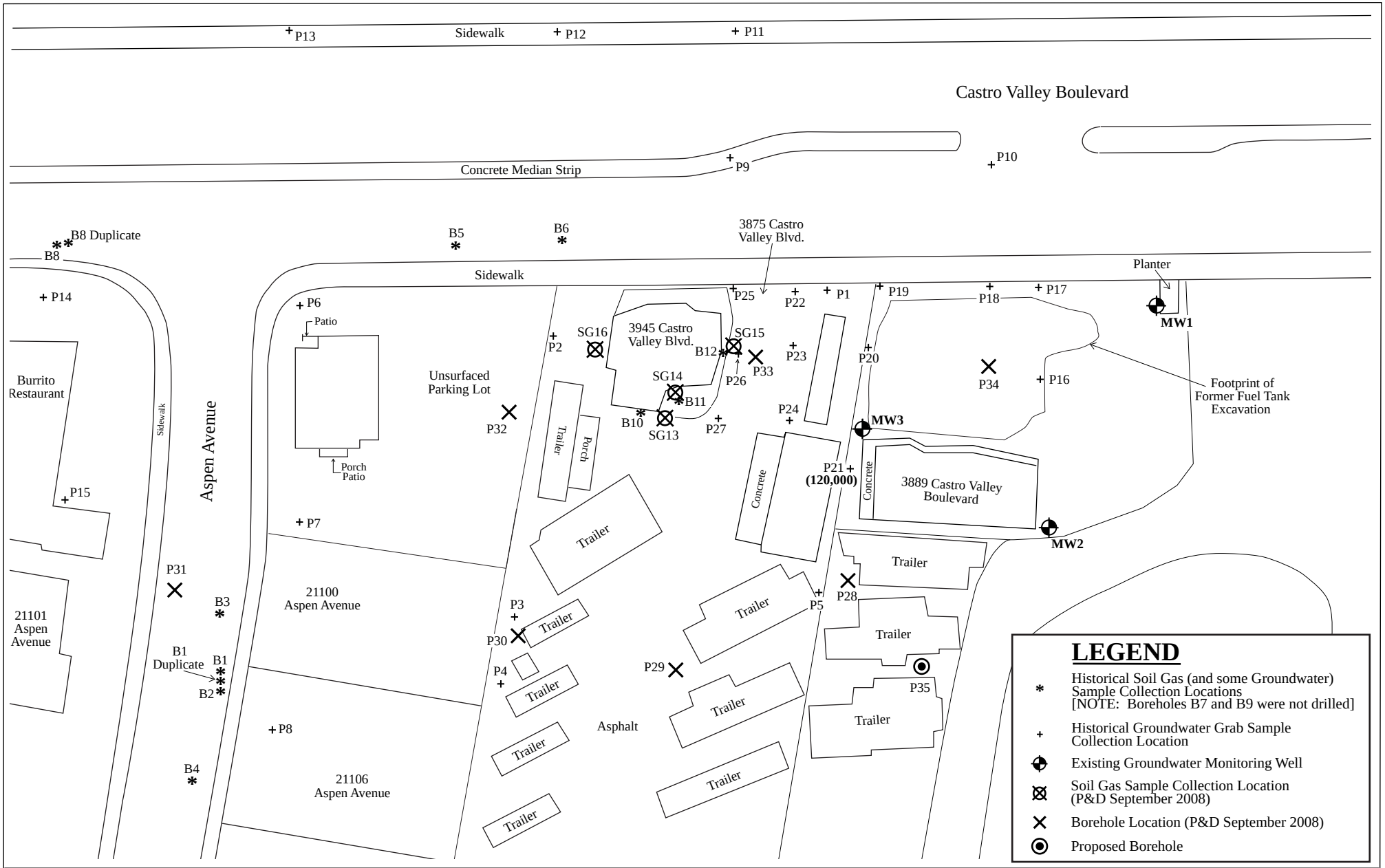


Figure 2
Site Vicinity Map Showing Groundwater and Soil Gas Sampling Locations
3889 Castro Valley Boulevard
Castro Valley, California

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
Scale in Feet

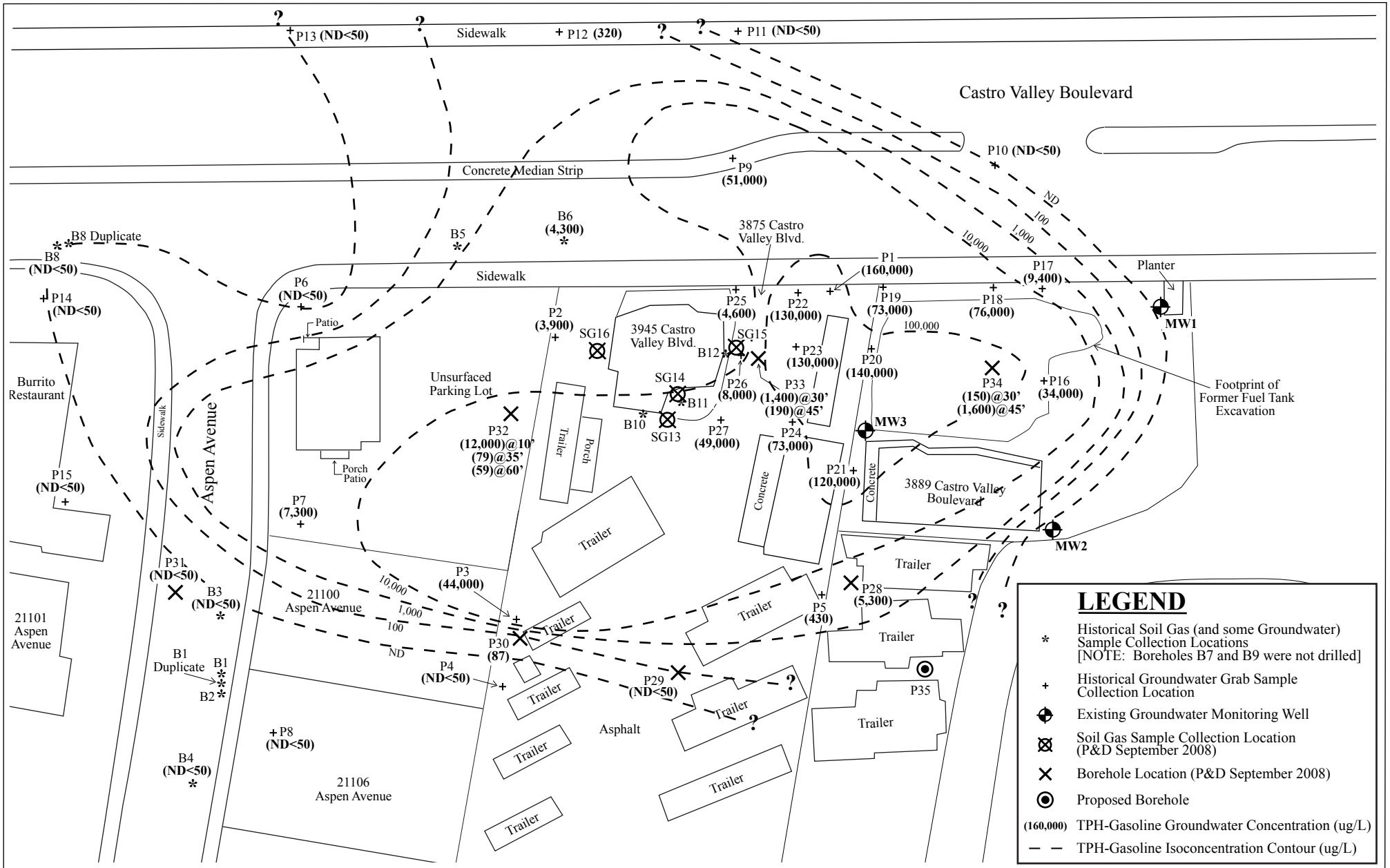


Figure 3
Site Vicinity Map Showing TPH-G Concentrations in First Encountered Groundwater
3889 Castro Valley Boulevard
Castro Valley, California

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

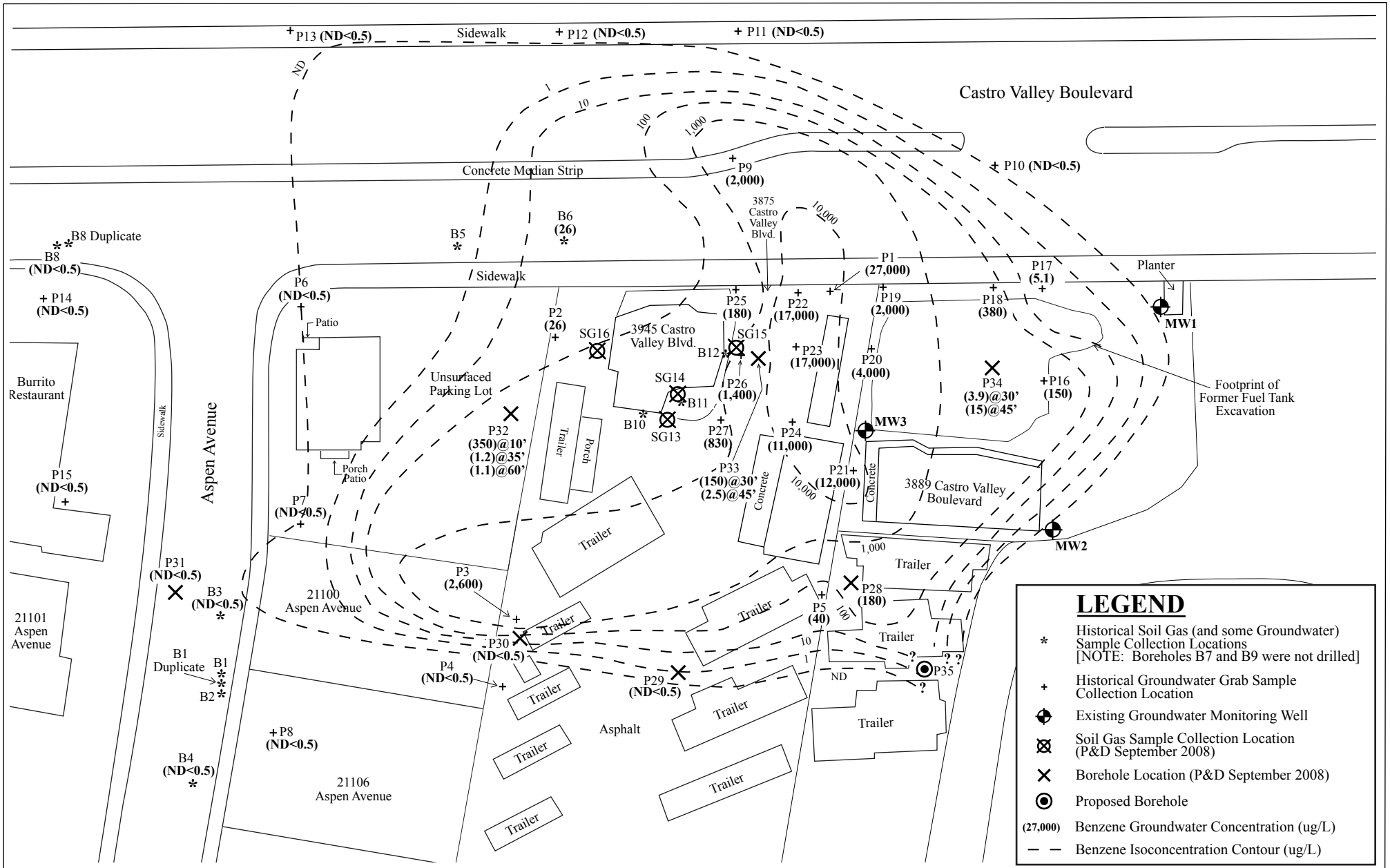
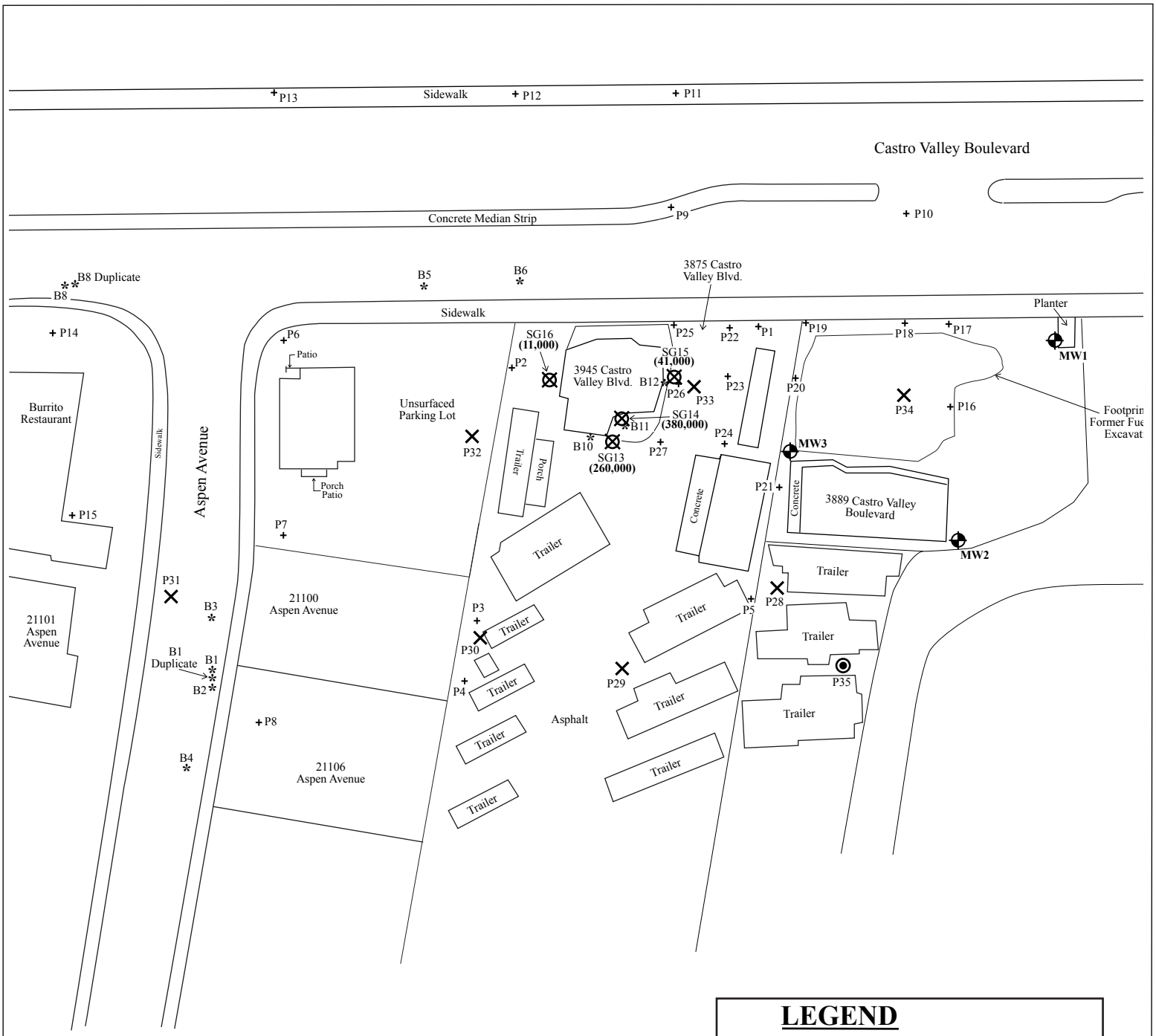


Figure 4
Site Vicinity Map Showing Benzene Concentrations in First Encountered Groundwater
3889 Castro Valley Boulevard
Castro Valley, California

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



LEGEND

- * Historical Soil Gas (and some Groundwater) Sample Collection Locations [NOTE: Boreholes B7 and B9 were not drilled]
- + Historical Groundwater Grab Sample Collection Location
- ⊕ Existing Groundwater Monitoring Well
- ⊠ Soil Gas Sample Collection Location (P&D September 2008)
- × Borehole Location (P&D September 2008)
- ◉ Proposed Borehole
- ( ) TPH-Gasoline Soil Gas Concentration (mg/m^3)

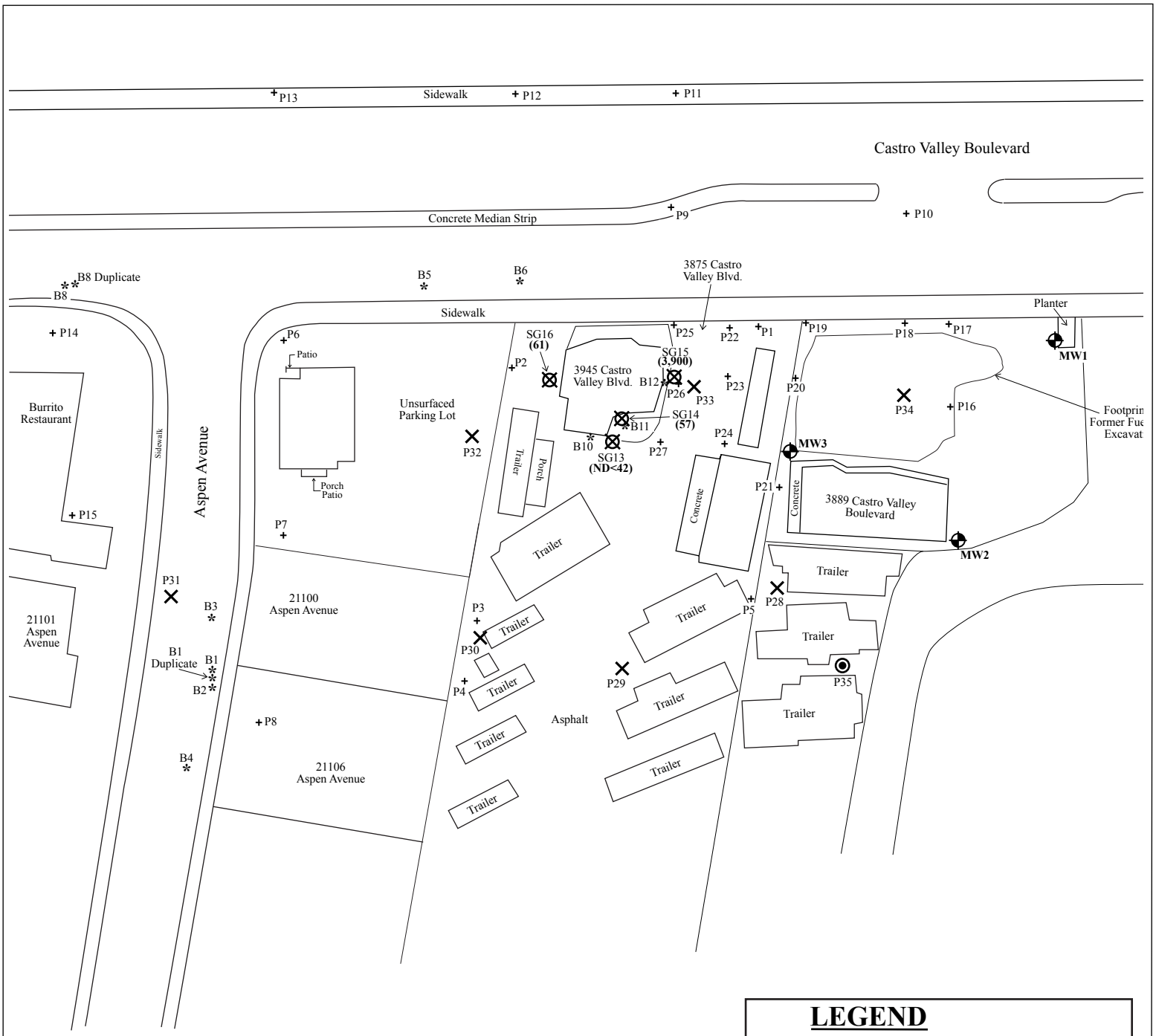
Figure 5
Site Vicinity Map Showing TPH-G Concentrations in Soil Gas
3889 Castro Valley Boulevard
Castro Valley, California

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 30 60
Scale in Feet



LEGEND

- * Historical Soil Gas (and some Groundwater) Sample Collection Locations [NOTE: Boreholes B7 and B9 were not drilled]
- + Historical Groundwater Grab Sample Collection Location
- Existing Groundwater Monitoring Well
- Soil Gas Sample Collection Location (P&D September 2008)
- × Borehole Location (P&D September 2008)
- Proposed Borehole
- ( ) Benzene Soil Gas Concentration (mg/m^3)

Figure 6
Site Vicinity Map Showing Benzene Concentrations in Soil Gas
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 30 60
Scale in Feet

Figure 7
Typical Soil Gas Sampling Manifold
3889 Castro Valley Boulevard
Castro Valley, California

APPENDIX A
Historic Borehole Groundwater Grab Sample Results

- **Report 0047.R8 dated July 14, 1995** **Table 1**
- **Report 0047.R11 dated December 27, 1995** **Table 2**
- **Report 0047.R15 dated October 9, 1996** **Table 2**
- **Report 0047.R23 dated January 14, 2000** **Table 1**
- **Report 0047.R28 dated July 2, 2002** **Table 3**

TABLE 1
GROUNDWATER GRAB SAMPLE
SUMMARY OF LABORATORY ANALYTICAL RESULTS

Location No.	TPH-D	TPH-G	Benzene	Toluene	Ethyl-benzene	Total Xylenes
			Samples Collected on June 9, 1995			
P1	NA	160	27	27	3.5	18
P2*	NA	3.9	0.026	0.0054	0.034	0.029
P3	NA	44	2.6	2.9	2.2	7.5
P4	NA	ND<0.05	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005
P5**	NA	0.43	0.040	0.0012	0.0081	0.0028

TPH-G = Total Petroleum Hydrocarbons as Gasoline.
TPH-D = Total Petroleum Hydrocarbons as Diesel.
ND = Not Detected.
* = The laboratory identified the results reported as gasoline as appearing aged and biodegraded.
** = The laboratory identified the results reported as gasoline as being the most mobile gasoline fraction ("lighter" gasoline range compounds).
Results in milligrams per Liter (mg/L), unless otherwise indicated.

TABLE 2
GROUNDWATER GRAB SAMPLE
SUMMARY OF LABORATORY ANALYTICAL RESULTS

Location No.	TPH-D	TPH-G	MTBE	Benzene	Toluene	Ethyl-benzene	Total Xylenes
			Samples Collected on November 17, 1995				
P6	NA	ND<0.05	0.017	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005
P7	NA	7.3	0.067	ND<0.005	0.0077	0.010	0.0069
P8	NA	ND<0.05	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005
P9	NA	51	0.25	2.0	1.5	1.9	8.8
P10	NA	ND<0.05	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005

TPH-G = Total Petroleum Hydrocarbons as Gasoline.
TPH-D = Total Petroleum Hydrocarbons as Diesel.
ND = Not Detected.
NA = Not Analyzed.
Results in milligrams per Liter (mg/L), unless otherwise indicated.

October 9, 1996
Report 0047.R15

TABLE 2
GROUNDWATER GRAB SAMPLE
SUMMARY OF LABORATORY ANALYTICAL RESULTS

Location No.	TPH-G	MTBE	Benzene	Toluene	Ethyl-benzene	Total Xylenes
			Samples Collected on August 8 and 9, 1996			
P11	ND<0.05	ND<0.005	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005
P12	0.32	0.03	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005
P13	ND<0.05	ND<0.005	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005
P14	ND<0.05	ND<0.005	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005
P15	ND<0.05	ND<0.005	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005

NOTE:

TPH-G = Total Petroleum Hydrocarbons as Gasoline.
TPH-D = Total Petroleum Hydrocarbons as Diesel.
ND = Not Detected.
NA = Not Analyzed.
Results in milligrams per Liter (mg/L), unless otherwise indicated.

TABLE 1
SUMMARY OF LABORATORY ANALYTICAL RESULTS
WATER SAMPLES
(Samples collected on September 8 and 9, 1999)

Sample No.	TPH-G	MTBE	Benzene	Toluene	Ethyl-benzene	Total Xylenes
B3-GW	ND<0.05	ND<0.005	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005
B4-GW	ND<0.05	ND<0.005	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005
B6-GW	4.3	ND<0.005	0.026	0.0031	0.16	0.42
B8-GW	ND<0.05	ND<0.005	ND<0.0005	ND<0.0005	ND<0.0005	ND<0.0005

TPH-G = Total Petroleum Hydrocarbons as Gasoline.
MTBE = Methyl tert-Butyl Ether.
ND = Not Detected.
NA = Not Analyzed.
Results are in milligrams per Liter (mg/L), unless otherwise indicated.

TABLE 3
SUMMARY OF LABORATORY ANALYTICAL RESULTS
GROUNDWATER GRAB SAMPLES
TPH-G, MTBE AND BTEX ANALYSIS
(Samples Collected on October 17 - 18, 2001)

Sample No.	TPH-G	MTBE	Benzene	Toluene	Ethyl-benzene	Total Xylenes
P16	34[c]	ND<0.2	0.15	0.066	2.5	2.6
P17	9.4	ND<0.01	0.0051	0.037	0.26	0.18
P18	76[c]	ND<0.2	0.38	1.5	3.2	17
P19	73[c]	ND<0.2	2.0	8.3	3.5	16
P20	140[c]	ND<0.5	4.0	11	4.3	19
P21	120[c]	ND<0.5	12	0.97	4.3	18
P22	130[c]	ND<2.0	17	26	4.6	22
P23	130[c]	ND<2.0	17	19	4.4	22
P24	73[c]	ND<0.55	11	0.34	3.3	10
P25	4.6	ND<0.025	0.18	0.057	0.13	0.51
P26	8.0	ND<0.02	1.4	0.2	0.25	0.93
P27	49	ND<0.1	0.83	4.1	1.9	8.4

TPH-G = Total Petroleum Hydrocarbons as Gasoline.
MTBE = Methyl tert-Butyl Ether.
ND = Not Detected.
c = Laboratory Analytical Report note: lighter than water immiscible sheen is present.
Results are in milligrams per Liter (mg/L), unless otherwise indicated.

APPENDIX B
Historic Soil Gas Sample Results

- **Report 0047.R23 dated January 14, 2000 Table 2**
- **Report 0047.R23 dated January 14, 2000 Table 2 Amended for Work Plan 47.W5 Appendix D**

TABLE 2
SUMMARY OF LABORATORY ANALYTICAL RESULTS
SOIL GAS SAMPLES
(Samples collected on September 9, 1999)

Sample No.	TPH-G	MTBE	Benzene	Toluene	Ethyl-benzene	Total Xylenes
B1-SG	53	ND	ND	ND	ND	ND
B1-DUPLICATE-SG	360	ND	ND	ND	ND	ND
B2-SG	94	ND	ND	ND	ND	ND
B3-SG	130	0.74	3.7	ND	ND	ND
B4-SG	90	0.84*	ND	ND	ND	ND
B5-SG	540	5.2	11*	0.56	0.83	1.8
B6-SG	560	2.6	10*	1.1	2.3	6.7
B8-SG	150	ND	ND	ND	ND	ND
B8-DUPLICATE-SG	94	ND	ND	ND	ND	ND
B8-DUPLICATE-SG-NV	NA	NA	NA	NA	NA	NA
B10-SG	200	0.068	1.6*	ND	ND	ND
B11-SG	140	0.045	0.41*	ND	ND	ND
B12-SG	66	0.018	0.035*	ND	ND	ND

TPH-G = Total Petroleum Hydrocarbons as Gasoline.
MTBE = Methyl tert-Butyl Ether.
ND = Not Detected.
NA = Not Analyzed.
* = Laboratory report note: reported value may be biased due to apparent matrix interference.
Results are in parts per million by volume (ppmv), unless otherwise indicated.

TABLE 2
SUMMARY OF LABORATORY ANALYTICAL RESULTS
SOIL GAS SAMPLES
(Samples Collected on September 9, 1999)

Sample No.	TPH-G	MTBE	Benzene	Toluene	Ethyl-benzene	Total Xylenes
B1-SG	220	ND<1.6	ND<1.4	ND<1.6	ND<1.9	ND<1.9
B1-DUPLICATE-SG	1500	ND<0.32	ND<0.28	ND<0.33	ND<0.38	ND<0.38
B2-SG	390	ND<2.2	ND<2.0	ND<2.3	ND<2.7	ND<2.7
B3-SG	540	2.7	12	ND<1.8	ND<2.1	ND<2.1
B4-SG	370	3.1*	ND<2.4	ND<2.8	ND<3.2	ND<3.2
B5-SG	2200	19	36*	2.1	3.7	8.0
B6-SG	2300	9.7	32*	4.3	10	29
B8-SG	620	ND<0.077	ND<0.068	ND<0.080	ND<0.092	ND<0.092
B8-DUPLICATE-SG	390	ND<0.16	ND<0.14	ND<0.16	ND<0.19	ND<0.19
B8-DUPLICATE-SG-NV	NA	NA	NA	NA	NA	NA
B10-SG	830	0.25	5.2*	ND<0.17	ND<0.19	ND<0.19
B11-SG	580	0.16	1.3*	ND<0.080	ND<0.092	ND<0.092
B12-SG	270	0.065	0.11*	ND<0.065	ND<0.075	ND<0.075
ESL	26	9.4	0.085	63	420	150

TPH-G = Total Petroleum Hydrocarbons as Gasoline.
MTBE = Methyl tert-Butyl Ether.
ND = Not Detected.
NA = Not Analyzed.
* = Laboratory report note: reported value may be biased due to apparent matrix interference.
ESL = February 2005 RWQCB Table E Environmental Screening Levels, Shallow Soil Gas Screening Levels for Residential Land Use.
Results are in micrograms per liter (ug/L), unless otherwise indicated.

APPENDIX C
Soil Boring Logs

P&D ENVIRONMENTAL, INC.

BORING NO.: P28	PROJECT NO.: 0047	PROJECT NAME: VIP Service, Castro Valley	
BORING LOCATION: 25 feet south of southwest corner of service station.		ELEVATION AND DATUM: None	
DRILLING AGENCY: Vironex, Inc.	DRILLER: Tim/Manuel	DATE & TIME STARTED: 9/2/08 0925	DATE & TIME FINISHED: 9/2/08 1015
DRILLING EQUIPMENT: 3.5-inch O.D. Hand Auger			
COMPLETION DEPTH: 12.0 Feet	BEDROCK DEPTH: Not Encountered	LOGGED BY: MLD	CHECKED BY:
FIRST WATER DEPTH: 7.5 Feet	NO. OF SAMPLES: 1 Water		

DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	WELL CONSTRUCTION LOG	BLOW COUNT PER 6"	PID	REMARKS
	0.0 to 3.0 ft. Brown silty sand (SM); loose, dry, with minor gravel to 0.25-in. diameter. No Petroleum Hydrocarbon (PHC) odor.	SM	No Well Constructed		0	Borehole hand augered using a 3.5-inch O.D. hand auger.
5	3.0 to 9.0 ft. Dark brown silty clay (CL); stiff, dry. No PHC odor. 4.0 ft. Color change to brown. 7.0 ft. Moist.	CL ▽			0	
10	9.0 to 11.0 ft. Greenish brown clayey sand (SC); soft, wet. No PHC odor.	SC			0	
	11.0 to 12.0 ft. Greenish brown clay (CL); soft, wet. No PHC odor.	CL				First water encountered during augering at 7.5 ft depth at 10:15 a.m.
15						Borehole terminated at 12.0 ft. on 9/2/08. Temporary 1-in. diameter slotted PVC casing placed in borehole, and sample P28-W collected at 10:20 a.m. on 9/2/08; no odor or sheen on sample. Water subsequently measured at 7.1 ft. depth at 11:00 a.m.
20						Borehole grouted on 9/2/08 using neat cement grout. Ron Smalley of Alameda County Public Works Agency onsite to observe grouting.
25						
30						

P&D ENVIRONMENTAL, INC.

BORING NO.: P29	PROJECT NO.: 0047	PROJECT NAME: VIP Service, Castro Valley	
BORING LOCATION: 160 feet south of sidewalk at mobile home park entrance		ELEVATION AND DATUM: None	
DRILLING AGENCY: Vironex, Inc.	DRILLER: Tim/Manuel	DATE & TIME STARTED: 9/8/08 1110	DATE & TIME FINISHED: 9/8/08 1210
DRILLING EQUIPMENT: 3.5-inch O.D. Hand Auger			
COMPLETION DEPTH: 10.0 Feet	BEDROCK DEPTH: Not Encountered	LOGGED BY: MLD	CHECKED BY:
FIRST WATER DEPTH: ~8.5 Feet	NO. OF SAMPLES: 1 Water		

DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	WELL CONSTRUCTION LOG	BLOW COUNT PER 6"	PID	REMARKS
	0.0 to 0.5 ft. Asphalt and road base.		No Well Constructed			Borehole hand augered using a 3.5-inch O.D. hand auger.
	0.5 to 2.0 ft. Orange brown clayey sand (SC); medium dense, moist, with gravel to 0.5-in. diameter. No Petroleum Hydrocarbon (PHC) odor.	SC			0	
	2.0 to 5.0 ft. Dark gray silty clay (CL); stiff, moist, with orange brown mottling. No PHC odor.	CL			0	First water encountered during augering at ~8.5 ft depth. Borehole terminated at 10.0 ft. on 9/8/08. Temporary 1-in. diameter slotted PVC casing placed in borehole, and sample P29-10W collected at 1:30 p.m. on 9/8/08; no odor or sheen on sample. Water subsequently measured at 6.4 ft. depth at 2:55 p.m.
5	5.0 to 7.5 ft. Olive gray silty clay (CL); medium stiff, moist. No PHC odor.	CL ▼				
	7.5 to 10.0 ft. Brown silty clay (CL); medium stiff, wet. No PHC odor. 7.5 to 8.0 ft. With gravel.	▽ CL			0	Borehole grouted on 9/8/08 using neat cement grout. Ron Smalley of Alameda County Public Works Agency onsite to observe grouting.
10						
15						
20						
25						
30						

P&D ENVIRONMENTAL, INC.

BORING NO.: P30	PROJECT NO.: 0047	PROJECT NAME: VIP Service, Castro Valley	
BORING LOCATION: 16 feet west of southwest corner of mobile home #1.		ELEVATION AND DATUM: None	
DRILLING AGENCY: Vironex, Inc,.	DRILLER: Tim/Manuel	DATE & TIME STARTED: 9/2/08 1050	DATE & TIME FINISHED: 9/2/08 1130
DRILLING EQUIPMENT: 3.5-inch O.D. Hand Auger			
COMPLETION DEPTH: 7.0 Feet	BEDROCK DEPTH: Not Encountered	LOGGED BY: MLD	CHECKED BY:
FIRST WATER DEPTH: 6.2 Feet	NO. OF SAMPLES: 1 Water		

DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	WELL CONSTRUCTION LOG	BLOW COUNT PER 6"	PID	REMARKS
	0.0 to 4.0 ft. Brown silty sand (SM); loose, dry. No Petroleum Hydrocarbon (PHC) odor.	SM	No Well Constructed		0	Borehole hand augered using a 3.5-inch O.D. hand auger.
					0	
5	4.0 to 6.0 ft. Dark brown silty clay (CL); stiff, dry. No PHC odor. 5.0 ft. Color change to brown, with orange mottling.	CL				Hand auger refusal at 7.0 feet.
	6.0 to 7.0 ft. Greenish gray clayey gravel (GC); loose, wet. No PHC odor.	GC			0	First water encountered during augering at 6.2 ft depth at 11:25 a.m.
10						Borehole terminated at 7.0 ft. on 9/2/08. Water subsequently measured at 5.7 ft. depth at 11:40 a.m. Temporary 1-in. diameter slotted PVC casing placed in borehole, and sample P30-W collected at 11:30 a.m. on 9/2/08; no odor or sheen on sample.
15						Borehole grouted on 9/2/08 using neat cement grout. Ron Smalley of Alameda County Public Works Agency onsite to observe grouting.
20						
25						
30						

P&D ENVIRONMENTAL, INC.

BORING NO.: P31	PROJECT NO.: 0047	PROJECT NAME: VIP Service, Castro Valley	
BORING LOCATION: West side of Aspen Ave., 120 feet south of Castro Valley Blvd.		ELEVATION AND DATUM: None	
DRILLING AGENCY: Vironex, Inc.	DRILLER: Tim/Manuel	DATE & TIME STARTED: 9/8/08 0945	DATE & TIME FINISHED: 9/8/08 1020
DRILLING EQUIPMENT: 3.5-inch O.D. Hand Auger			
COMPLETION DEPTH: 10.0 Feet	BEDROCK DEPTH: Not Encountered	LOGGED BY: MLD	CHECKED BY:
FIRST WATER DEPTH: 9.0 Feet	NO. OF SAMPLES: 1 Water		

DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	WELL CONSTRUCTION LOG	BLOW COUNT PER 6"	PID	REMARKS
	0.0 to 0.5 ft. Asphalt and road base.		No Well Constructed		0	Borehole hand augered using a 3.5-inch O.D. hand auger.
	0.5 to 1.5 ft. Orange brown clayey sand (SC); medium dense, moist, with minor gravel to 0.5-in. diameter. No Petroleum Hydrocarbon (PHC) odor.	SC				First water encountered during augering at 9.0 ft depth.
	1.5 to 5.0 ft. Grayish brown clay (CL); medium stiff, moist, mixed with dark brown clay. No PHC odor.	CL ▼			0	Borehole terminated at 10.0 ft. on 9/8/08. Temporary 1-in. diameter slotted PVC casing placed in borehole, and sample P31-10W collected at 12:00 p.m. on 9/8/08; no odor or sheen on sample.
5	5.0 to 7.5 ft. Bluish gray clayey sand (SC); medium dense, moist. Slight PHC odor. 7.0 to 7.5 ft. Mixed with orange brown clayey sand with minor gravel to 0.25-in. diameter.	SC			17	Water subsequently measured at 4.9 ft. depth at 2:50 p.m.
	7.5 to 10.0 ft. Brown clay (CL); stiff, moist, with black mottling. No PHC odor.	CL ▽			0	Borehole grouted on 9/8/08 using neat cement grout. Ron Smalley of Alameda County Public Works Agency onsite to observe grouting.
10						
15						
20						
25						
30						

P&D ENVIRONMENTAL, INC.

BORING NO.: P32	PROJECT NO.: 0047	PROJECT NAME: VIP Service, Castro Valley	
BORING LOCATION: East side of realty office parking lot, 60 feet south of Castro Valley Blvd.		ELEVATION AND DATUM: None	
DRILLING AGENCY: Vironex, Inc.	DRILLER: Tim/Manuel	DATE & TIME STARTED: 9/8/08 0830	DATE & TIME FINISHED: 9/8/08 0900
DRILLING EQUIPMENT: 3.5-inch O.D. Hand Auger			
COMPLETION DEPTH: 9.0 Feet	BEDROCK DEPTH: Not Encountered	LOGGED BY: MLD	CHECKED BY:
FIRST WATER DEPTH: 8.5 Feet	NO. OF SAMPLES: 3 Water		

DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	WELL CONSTRUCTION LOG	BLOW COUNT PER 6"	PID	REMARKS
	0.0 to 2.0 ft. Gray gravelly silty sand (SM); dense, dry, with gravel to 0.25-in. diameter. No Petroleum Hydrocarbon (PHC) odor.	SM	No Well Constructed		0	Soil conductivity probe pushed to 65.0 ft. depth for electrical conductivity logging on 9/5/08. Boring grouted on 9/5/08 using a tremie pipe and neat cement grout.
	2.0 to 4.0 ft. Dark brown silty clay (CL); medium stiff, moist. No PHC odor.	CL				
5	4.0 to 6.0 ft. Brown clay (CL); medium stiff, moist, with trace gravel to 0.25-in. diameter, and orange mottling. No PHC odor.	CL			0	At a location approximately 2 feet from the soil conductivity probe hole, a Hydropunch was pushed to 39.0 ft. and drill rods were retracted to 35.0 ft. to collect water sample P32-35W at 11:35 am on 9/5/08. No odor or sheen on sample.
	6.0 to 9.0 ft. Bluish gray clayey sand (SC); medium dense, moist, with orange mottling. No PHC odor. 7.0 to 9.0 ft. Wet to saturated, strong PHC odor.	▼ SC ▽			22	A different Hydropunch was then pushed to 64.0 ft. in the same borehole, and the drilling rods retracted to 60.0 ft. to collect water sample P32-60W at 12:35 on 9/5/08. No odor or sheen on sample. Borehole grouted on 9/5/08 using the Hydropunch as a tremie pipe with neat cement grout.
10						
15						At a location approximately 2 feet from the Hydropunch hole, a borehole was hand augered from 0.0 to 9.0 ft. on 9/8/08 using a 3.5-inch O.D. hand auger. First water encountered during augering at 8.5 ft depth.
20						Borehole terminated at 9.0 ft. on 9/8/08. Temporary 1-in. diameter slotted PVC casing placed in borehole, and sample P32-10W collected at 9:15 a.m. on 9/8/08; no odor or sheen on sample. Water subsequently measured at 6.8 ft. depth at 2:55 p.m.
25						Borehole grouted on 9/8/08 using neat cement grout. Ron Smalley of Alameda County Public Works Agency onsite to observe grouting.
30						

P&D ENVIRONMENTAL, INC.

BORING NO.: P33	**PROJECT NO.:** 0047	**PROJECT NAME:** VIP Service, Castro Valley	
BORING LOCATION: 15 feet west of P23		**ELEVATION AND DATUM:** None	
DRILLING AGENCY: Vironex, Inc.	**DRILLER:** Tim/Manuel	**DATE & TIME STARTED:** 9/5/08	**DATE & TIME FINISHED:** 9/5/08
DRILLING EQUIPMENT: Geoprobe 6600			
COMPLETION DEPTH: 54.0 Feet	**BEDROCK DEPTH:** Not Encountered	**LOGGED BY:** MLD	**CHECKED BY:**
FIRST WATER DEPTH:	**NO. OF SAMPLES:** 2 Water		

DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	WELL CONSTRUCTION LOG	BLOW COUNT PER 6"	PID	REMARKS
5 10 15 20 25 30	No lithologic log. Soil conductivity log only (see conductivity log P33).		No Well Constructed			Soil conductivity probe pushed to 54.0 ft. (refusal depth) for electrical conductivity logging on 9/5/08. Boring grouted on 9/5/08 using a tremie pipe and neat cement grout. At a location approximately 2 feet from the soil conductivity probe hole, a Hydropunch was pushed to 34.0 ft. and drill rods were retracted to 30.0 ft. to collect water sample P33-30W at 3:00 p.m. on 9/5/08. No odor or sheen on sample. A Different Hydropunch was then pushed to 49.0 ft. in the same borehole, and the drilling rods retracted to 45.0 ft. to collect water sample P33-45W at 4:18 p.m. on 9/5/08. No odor or sheen on sample. Borehole grouted on 9/5/08 using the Hydropunch as a tremie pipe with neat cement grout.

P&D ENVIRONMENTAL, INC.

BORING NO.: P34	PROJECT NO.: 0047	PROJECT NAME: VIP Service, Castro Valley	
BORING LOCATION: Parking lot in front of service station.		ELEVATION AND DATUM: None	
DRILLING AGENCY: Vironex, Inc.	DRILLER: Tim/Manuel	DATE & TIME STARTED: 9/4/08 0840	DATE & TIME FINISHED: 9/4/08 1100
DRILLING EQUIPMENT: Geoprobe 6600			
COMPLETION DEPTH: 38.0 Feet	BEDROCK DEPTH: Not Encountered	LOGGED BY: MLD	CHECKED BY:
FIRST WATER DEPTH: 13.0 Feet	NO. OF SAMPLES: 2 Water		

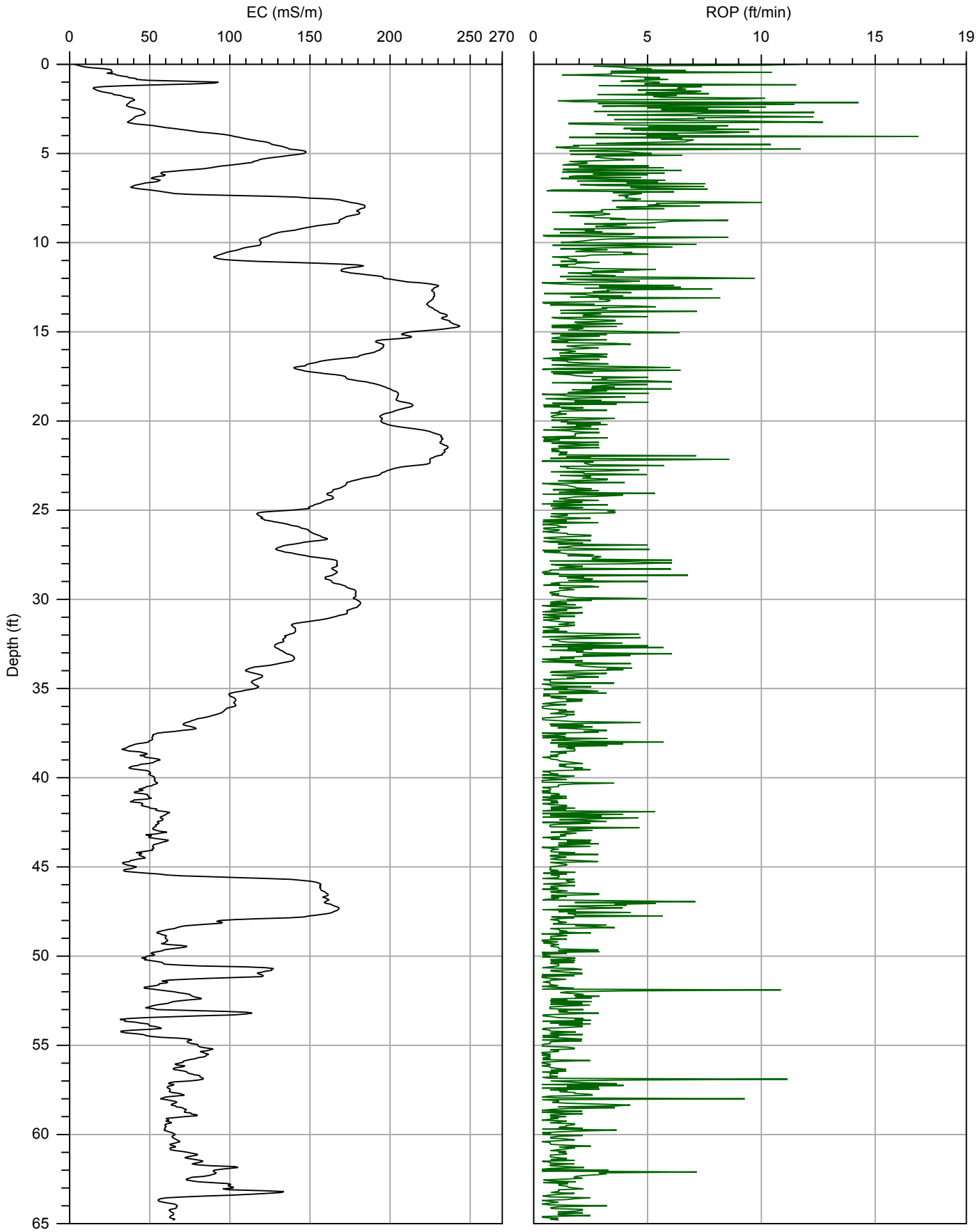
DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	WELL CONSTRUCTION LOG	BLOW COUNT PER 6"	PID	REMARKS
	0.0 to 0.5 ft. Asphalt and road base.		No Well Constructed		0	Borehole continuously cored from 0.0 to 38.0 ft.using a 5-foot long 2-inch O.D. Geoprobe Macrocore barrel sampler lined with 5-foot long 1.5-inch O.D. transparent PVC sleeves.
	0.5 to 6.0 ft. Dark brown sandy silt (ML); stiff, dry, with minor gravel to 0.5 in. diameter. No Petroleum Hydrocarbon (PHC) odor.	ML				
5					0	0 to 5 ft. 90% recovery
	6.0 to 9.0 ft. Grayish brown sandy clay (CL); medium stiff, moist, with minor gravel to 0.25 in. diameter. No PHC odor.	CL				5 to 10 ft. 90% recovery
10	9.0 to 11.0 ft. Orange brown clayey sand (SC); medium dense, moist. No PHC odor. 10.0 ft. With gravel to 0.25 in. diameter.	SC			0	10 to 15 ft. 70% recovery
	11.0 to 13.0 ft. Gray sandy clay (CL); soft, saturated. Slight PHC odor.	CL			13	
		▽				First water encountered during drilling at 13.0 ft depth.
	13.0 to 14.0 ft. Gray gravel (GP); very loose, wet, with gravel to 0.25 in. diameter. Slight PHC odor.	GP				
	14.0 to 15.0 ft. Gray sand (SP); loose, wet; change to orange-brown at 15.0 ft. Slight PHC odor.	SP				
15	15.0 to 16.0 ft. Gray gravel (GP); loose, wet, with gravel to 0.25 in. diameter. Slight PHC odor.	GP			17	15 to 20 ft. 90% recovery
	16.0 to 17.0 ft. Brown sand (SP); medium dense, moist. No PHC odor.	SP			22	
	17.0 to 20.0 ft. Brown silty clay (CL); stiff, moist, with black mottling. No PHC odor.	CL			0	
20	20.0 to 21.0 ft. Gray sandy gravel (GP); loose, wet. Slight PHC odor.	GP			55	20 to 25 ft. 100% recovery
	21.0 to 25.0 ft. Brown silty clay (CL); stiff, moist. No PHC odor.	CL			0	
25	25.0 to 27.0 ft. Brown sandy clayey gravel (GC); loose, wet. No PHC odor.	GC				25 to 30 ft. 100% recovery
	27.0 to 29.0 ft. Brown clayey sand (SC); loose, wet. No PHC odor. 28.0 ft. With some gravel to 0.25 in. diameter.	SC			0	
30	29.0 to 30.0 ft. Grayish brown silty clay (CL); stiff, moist, with black mottling. No PHC odor.	CL			0	

P&D ENVIRONMENTAL, INC.

BORING NO.: P34	PROJECT NO.: 0047	PROJECT NAME: VIP Service, Castro Valley	
BORING LOCATION: Parking lot in front of service station.		ELEVATION AND DATUM: None	
DRILLING AGENCY: Vironex, Inc.	DRILLER: Tim/Manuel	DATE & TIME STARTED: 9/4/08 0840	DATE & TIME FINISHED: 9/4/08 1100
DRILLING EQUIPMENT: Geoprobe 6600			
COMPLETION DEPTH: 38.0 Feet	BEDROCK DEPTH: Not Encountered	LOGGED BY: MLD	CHECKED BY:
FIRST WATER DEPTH: 13.0 Feet	NO. OF SAMPLES: 2 Water		

DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	WELL CONSTRUCTION LOG	BLOW COUNT PER 6"	PID	REMARKS
	30.0 to 32.5 ft. Gray sandy gravel (GP); loose, wet, with gravel mainly to 0.25 in. diameter. No PHC odor.	GP	No Well Constructed		0	30 to 35 ft. 90% recovery
	32.5 to 35.0 ft. Brown silty clay (CL); stiff, moist, with trace gravel to 0.25 in. diameter, and black mottling. No PHC odor.	CL			0	
35	35.0 to 38.0 ft. Brownish gray clayey gravel (GC); loose, wet, with gravel to 0.25 in. diameter. No PHC odor.	GC			0	35 to 38 ft. 100% recovery
	38.0 ft. Color change to bluish gray, and increased clay content.					Refusal at 38.0 ft., sample jammed in barrel.
40						Borehole terminated at 38.0 ft. on 9/4/08.
						Borehole grouted on 9/4/08 using neat cement grout.
						Soil conductivity probe pushed to 52.0 ft. for electrical conductivity logging on 9/4/08, approximately 1.5 feet from P34. Boring grouted on 9/4/08 using neat cement grout.
						For collection of groundwater samples, adjacent boring made in a separate borehole with Hydropunch on 9/11/08, approximately 1.5 feet from P34. Hydropunch pushed to 34.0 ft., then retracted to 30.0 ft., to collect water sample P34-30W at 12:35 a.m. A different Hydropunch was then pushed to 49.0 ft. in the same borehole, and retracted to 45.0 ft., to collect water sample P34-45W at 1350. Boring grouted on 9/11/08 using Hydropunch rods as tremie pipe, and neat cement grout. Ron Smalley of Alameda County Public Works Agency onsite to observe grouting.

APPENDIX D
Soil Electric Conductivity Logs



Direct Image® By Geoprobe Systems®

Company:		Operator:	File: EC0156.DAT
			Date: 9/5/2008
Project ID: 0047		Client:	Location: Borehole P32

TESTS BYPASSED

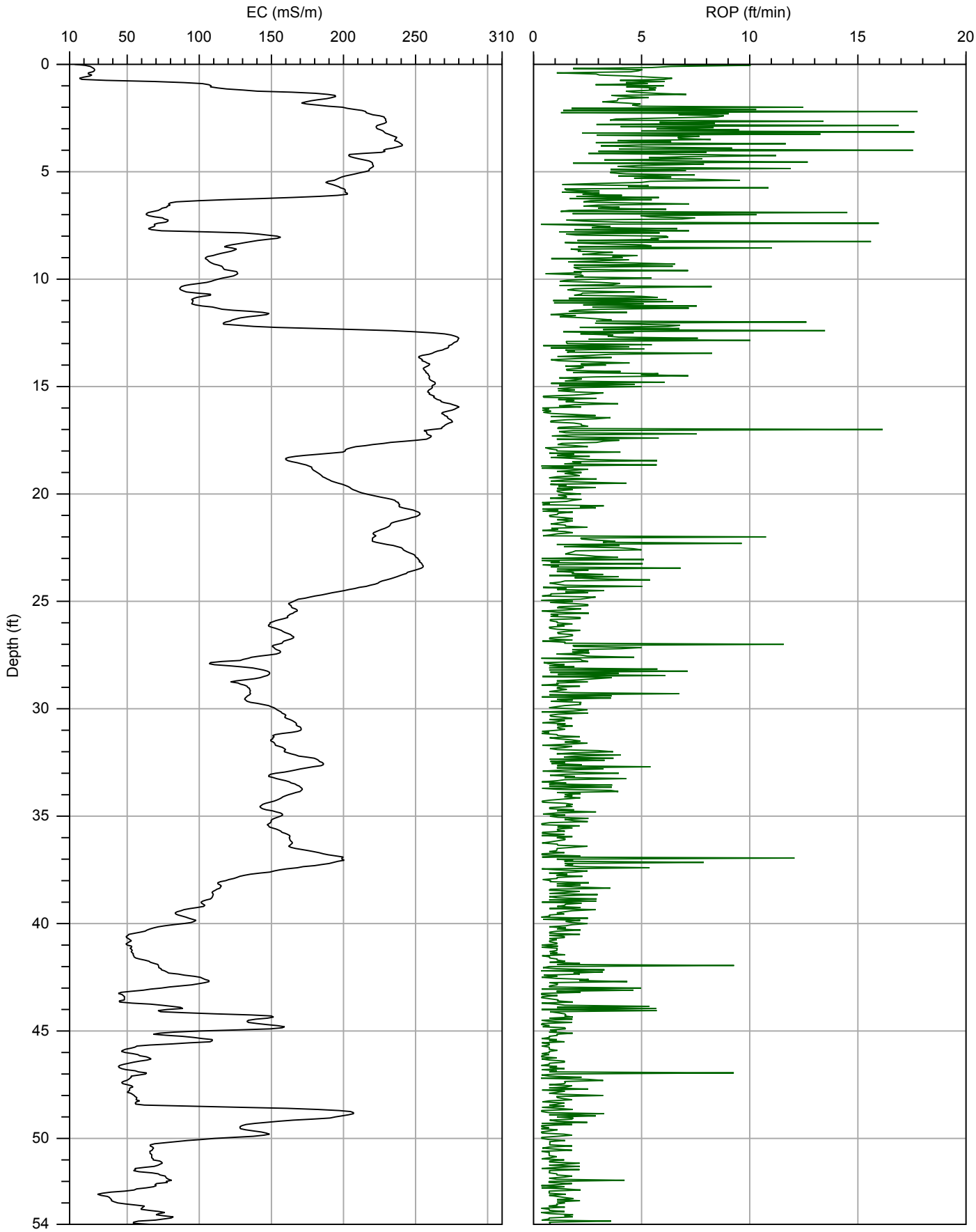
C:\COND\LOGFILES\EC0156.INF

SITE INFORMATION -- DIRECT IMAGE CONDUCTIVITY PROBE

LOG UNITS: ENGLISH
PROBE AND ARRAY: SC-500 WITH TOP DIPOLE
80 INCH STRING POT USED
LOG START TIME: Fri Sep 05 2008 10:30

LOG END DEPTH: 64.800 FEET

LOG END TIME: Fri Sep 05 2008 11:20



Direct Image® By Geoprobe Systems®

Company:	Operator:	File: EC0155.DAT
		Date: 9/4/2008
Project ID: 0047	Client:	Location: Borehole P33

TESTS BYPASSED

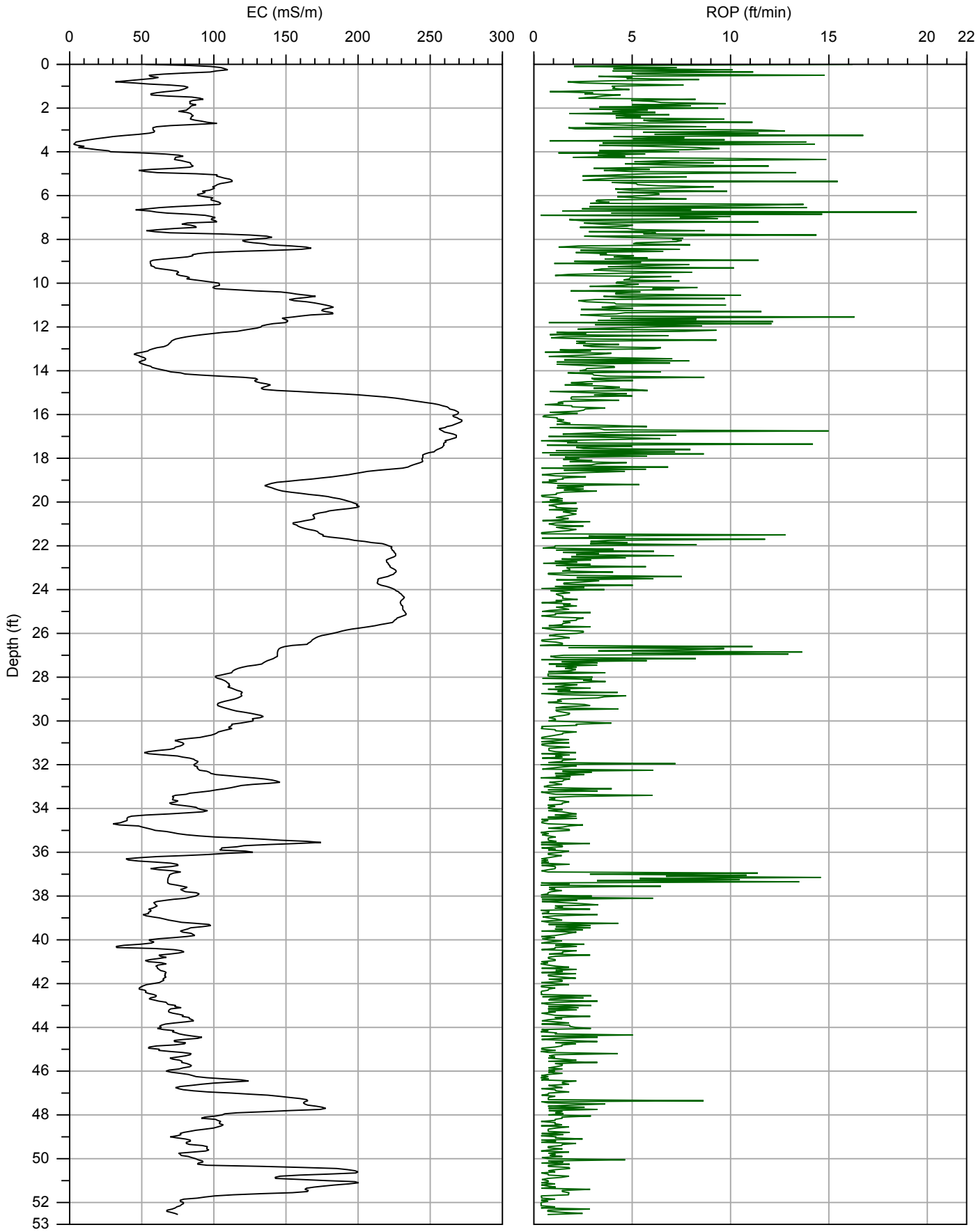
C:\COND\LOGFILES\EC0155.INF

SITE INFORMATION -- DIRECT IMAGE CONDUCTIVITY PROBE

LOG UNITS: ENGLISH
PROBE AND ARRAY: SC-500 WITH TOP DIPOLE
80 INCH STRING POT USED
LOG START TIME: Thu Sep 04 2008 17:29

LOG END DEPTH: 54.000 FEET

LOG END TIME: Thu Sep 04 2008 18:15



Direct Image® By Geoprobe Systems®

Company:	Operator:	File: EC0154.DAT
		Date: 9/4/2008
Project ID: 0047	Client:	Location: Borehole P34

TESTS BYPASSED

C:\COND\LOGFILES\EC0154.INF

SITE INFORMATION -- DIRECT IMAGE CONDUCTIVITY PROBE

LOG UNITS: ENGLISH
PROBE AND ARRAY: SC-500 WITH TOP DIPOLE
80 INCH STRING POT USED
LOG START TIME: Thu Sep 04 2008 15:30

LOG END DEPTH: 52.550 FEET

LOG END TIME: Thu Sep 04 2008 16:27

APPENDIX E
Soil Gas Purge Volume Calculations

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 in. 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 = 4.51 cubic inches.

To convert to cubic centimeters,

V total = 4.51 cubic inches X 16.39 cubic centimeters/cubic inches = 73.9 cubic centimeters.

The total volume to be purged is 3 purge volumes.

V purge total = 73.9 cubic centimeters X 3 = 222 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 = 222 cubic centimeters/200 cubic centimeters per minute = 1.11 minutes.

Converting the purge time to seconds, 1.11 minutes X 60 seconds/minute = 67 seconds.

APPENDIX F
Soil Gas Sampling Data Sheets

Appendix F
Soil Gas Sampling Data Sheets

SOIL GAS SAMPLING DATA SHEET															
Address	3889 Castro Valley Blvd.														
Job #	0047	Probe Method (check one)													
Date	9/8/2008			o PRT											
P&D Sampler	MLD	X o Temp Well													
Drilling Company															
	Vironex:	Tim													
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 -13	5	13:58	36523	vac: -30	vac: -30	vac: -29.5	vac:				conc.: 28	vac: -30	vac: -28.5	No sample taken, formation too
				time: 14:28	time: 15:39	time: 15:49	time	time:15:58:27	time:15:59:06	time:16:18:12	time: 16:19:12	time: 16:25:30	time: 17:40:23	tight.
SG - 14	5	14:10	33399	vac: -30	vac: -30	vac: -29.5	vac				conc.: 59	vac: -30	vac: -29	
				time: 14:30	time: 15:37	time: 15:47	time	time:15:51:00	time: 5:51:39	time:15:54:31	time:15:56:31	time:15:56:05	time:17:46:25	No sample taken, formation too
														tight.
SG - 15	5	15:08	12355	vac: -30	vac: -30	vac: -27	vac				conc.: 34	vac: -28.5	vac: -5	
				time: 14:31	time: 16:12:13	time: 16:48:14	time	time:16:50:30	time:16:51:09	time:16:52:00	time:16:53:12	time:16:55:00	time:17:14:10	
SG - 16	5	15:20	34660	vac: -30	vac: -30	vac: -28	vac				conc.: 31	vac: -27.5	vac: -5	
				time:14:50:30	time:14:51:09	time:15:12:00	time	time:17:24:10	time:17:24:49	time:17:25:05	time:17:26:05	time17:26:45	time:17:54:00	
SG - 15	5	15:08	36497	vac: -30	vac: -30	vac: -29	vac				conc.: 24	vac: -26.5	vac: -5	
Dup.				time:14:29	time:16:25:10	time:16:35:14	time	time:17:10:00	time:17:10:39	time:17:11:31	time:17:12:31	time:17:13:00	time:17:21:05	

Appendix F
Soil Gas Sampling Data Sheets

SOIL GAS SAMPLING DATA SHEET																
Address	Castro Valley Blvd.															
Job #	0047		Probe Method (check one)													
Date	9/11/2008				o PRT											
P&D Sample	MLD			X	o Temp Well											
Drilling Company																
	Vironex:	Tim														
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 -13	5	8:45	36497		vac: -29	vac: -25	vac: -24.5	vac				conc.	vac	vac	Cancelled sampling because water
					time:09:13:24	time:09:14:26	time:09:26:58	time	time	time	time	time	time	time	seeped into the line.
SG -14	5	9:15	33399		vac: -29	vac: -29	vac: -28	vac				conc.: 30	vac: -29	vac: -5	
					time:9:20:23	time:9:21:54	time:9:31:58	time	time:9:41:10	time:9:41:49	time:9:44:45	time:09:45:50	time:09:46:40	time:09:53:17	
SG -13	5	10:00	35560		vac: -30	vac: -27.5	vac: -28	vac				conc.: 26	vac: -28.5	vac: -5	
					time:10:03	time:10:14:50	time:10:24:20	time	time:10:38:00	time:10:38:39	time:10:40:00	time:10:41:30	time10:43:00	time:10:49:36	

APPENDIX G
Laboratory Reports and
Chain of Custody Documentation

- **McCampbell Work Order # 0809074 Borehole Groundwater P28 and P30**
- **McCampbell Work Order # 0809265 Borehole Groundwater P29, P31, and P32**
- **McCampbell Work Order # 0809208 Borehole Groundwater P32 and P33**
- **McCampbell Work Order # 0809409 Borehole Groundwater P34**
- **AirToxics Work Order #0809291 Soil Gas (TPH-G & HVOCs) SG13 through SG16**

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 Services	Date Sampled: 09/02/08
55 Santa Clara, Ste.240		Date Received: 09/03/08
Oakland, CA 94610	Client Contact: Steve Carmack	Date Reported: 09/09/08
	Client P.O.:	Date Completed: 09/09/08

WorkOrder: 0809074

September 09, 2008

Dear Steve:

Enclosed within are:

1) The results of the **2** analyzed samples from your project: **#0047; VIP Services,**
2) A QC report for the above samples,
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

0809074 CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJECT NUMBER:	PROJECT NAME:
0047	VIP SERVICES 3889 CASTRO VALLEY BLVD CASTRO VALLEY, CA

SAMPLED BY: (PRINTED AND SIGNATURE)
MICHAEL DESCHENES

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION	NUMBER OF CONTAINERS	ANALYSIS(ES): TPH G	MBTEX	PRESERVATIVE	REMARKS
+1	P28W	9/2/08	10:20	WATER		5	✓	✓	ICE	NORMAL TURN AROUND
+2	P30W	9/2/08	11:30	WATER		5	✓	✓	"	" "

ICE/t° 7.2°C
GOOD CONDITION ✓ APPROPRIATE
HEAD SPACE ABSENT ✓ CONTAINERS
DECHLORINATED IN LAB ✓ PRESERVED IN LAB ✓

PRESERVATION	VOAS	O & G	METALS	OTHER

	DATE	TIME			
RELINQUISHED BY: (SIGNATURE) Michael Deschenes	9/8/08	300	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF SAMPLES (THIS SHIPMENT)	2
RELINQUISHED BY: (SIGNATURE)	9/8/08	415	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF CONTAINERS (THIS SHIPMENT)	10
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	LABORATORY CONTACT: ANGELA RYDELINS	LABORATORY PHONE NUMBER: (877) 252-9262
				SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( )YES (X)NO	

LABORATORY: MC CAMPBELL ANALYTICAL

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

REMARKS: ALL SAMPLES ARE PRESERVED WITH HYDROCHLORIC ACID

McCampbell Analytical, Inc.
1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0809074 **ClientCode: PDEO**

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

Report to:
Steve Carmack
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 Services

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

Requested TAT: 5 days

Date Received: **09/03/2008**
Date Printed: **09/03/2008**

Lab ID	Client ID	Matrix	Collection Date	Hold	Requested Tests (See legend below) 1	2	3	4	5	6	7	8	9	10	11	12
0809074-001	P28W	Water	9/2/2008 10:20	☐	A											
0809074-002	P30W	Water	9/2/2008 11:30	☐	A											

Test Legend:

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

Prepared by: Samantha Arbuckle

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.

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Telephone: 877-252-9262 Fax: 925-252-9269

Sample Receipt Checklist

Client Name: **P & D Environmental**

Date and Time Received: **9/3/08 7:12:38 PM**

Project Name: **#0047; VIP Services**

Checklist completed and reviewed by: Samantha Arbuckle

WorkOrder N°: **0809074** 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: 7.2°C		NA ☐
Water - VOA vials have zero headspace / no bubbles?	Yes ☑	No ☐	No VOA vials submitted ☐
Sample labels checked for correct preservation?	Yes ☑	No ☐	
TTLC 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:

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Telephone: 877-252-9262 Fax: 925-252-9269

P & D Environmental	Client Project ID: #0047; VIP Services	Date Sampled: 09/02/08
		Date Received: 09/03/08
55 Santa Clara, Ste.240	Client Contact: Steve Carmack	Date Extracted: 09/05/08
Oakland, CA 94610	Client P.O.:	Date Analyzed 09/05/08

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

Extraction method: SW5030B Analytical methods: SW8021B/8015Cm Work Order: 0809074

Lab ID	Client ID	Matrix	TPH(g)	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	DF	% SS
001A	P28W	W	5300,d1,b1	ND<50	180	33	390	500	10	108
002A	P30W	W	87,d9,b1	ND	ND	3.3	ND	ND	1	121

Reporting Limit for DF =1; ND means not detected at or above the reporting limit	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 and all TCLP & SPLP extracts are reported in ug/L, soil/sludge/solid samples in mg/kg, wipe samples in µg/wipe, product/oil/non-aqueous liquid samples in mg/L.

cluttered chromatogram; sample peak coelutes with surrogate peak.

+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
d1) weakly modified or unmodified gasoline is significant
d9) no recognizable pattern

DHS ELAP Certification 1644

Angela Rydelius, Lab Manager

McCampbell Analytical, Inc.
"When Quality Counts"

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Web: www.mccampbell.com E-mail: main@mccampbell.com
Telephone: 877-252-9262 Fax: 925-252-9269

QC SUMMARY REPORT FOR SW8021B/8015Cm

W.O. Sample Matrix: Water QC Matrix: Water BatchID: 37959 WorkOrder: 0809074

EPA Method SW8021B/8015Cm **Extraction SW5030B** **Spiked Sample ID: 0809061-007A**

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	90.9	85.1	6.52	89.9	92.1	2.36	70 - 130	20	70 - 130	20
MTBE	ND	10	102	100	1.94	94.1	96.5	2.50	70 - 130	20	70 - 130	20
Benzene	ND	10	88.2	84	4.99	81.8	80.6	1.50	70 - 130	20	70 - 130	20
Toluene	ND	10	80.6	76.4	5.41	74.1	73.3	1.00	70 - 130	20	70 - 130	20
Ethylbenzene	ND	10	90	84.6	6.23	82.3	82.8	0.649	70 - 130	20	70 - 130	20
Xylenes	ND	30	86	80.2	6.86	79.9	79.9	0	70 - 130	20	70 - 130	20
%SS:	98	10	96	96	0	97	96	1.01	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 37959 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
0809074-001A	09/02/08 10:20 AM	09/05/08	09/05/08 3:50 AM				

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.

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Telephone: 877-252-9262 Fax: 925-252-9269

QC SUMMARY REPORT FOR SW8021B/8015Cm

W.O. Sample Matrix: Water QC Matrix: Water BatchID: 37981 WorkOrder: 0809074

EPA Method SW8021B/8015Cm **Extraction SW5030B** **Spiked Sample ID: 0809079-003A**

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	92.3	90.6	1.77	96.8	86.7	11.1	70 - 130	20	70 - 130	20
MTBE	ND	10	107	104	3.40	102	92.2	10.5	70 - 130	20	70 - 130	20
Benzene	ND	10	82.3	84.4	2.49	82.4	92.9	11.9	70 - 130	20	70 - 130	20
Toluene	ND	10	91.6	94.1	2.75	92.6	103	11.1	70 - 130	20	70 - 130	20
Ethylbenzene	ND	10	90.2	92.5	2.52	91.2	102	11.0	70 - 130	20	70 - 130	20
Xylenes	ND	30	100	102	2.13	101	112	9.88	70 - 130	20	70 - 130	20
%SS:	88	10	93	94	0.981	94	107	13.4	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 37981 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
0809074-002A	09/02/08 11:30 AM	09/05/08	09/05/08 7:45 AM				

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.

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Telephone: 877-252-9262 Fax: 925-252-9269

P & D Environmental 55 Santa Clara, Ste.240 Oakland, CA 94610	Client Project ID: #0047; VIP Service	Date Sampled: 09/08/08
		Date Received: 09/09/08
	Client Contact: Paul King	Date Reported: 09/16/08
	Client P.O.:	Date Completed: 09/15/08

WorkOrder: 0809265

September 16, 2008

Dear Paul:

Enclosed within are:

1) The results of the **3** analyzed samples from your project: **#0047; VIP Service,**
2) A QC report for the above samples,
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

0809265

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJECT NUMBER:	PROJECT NAME:
0047	VIP SERVICE

SAMPLED BY: (PRINTED AND SIGNATURE) MICHAEL DESCHENES

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION	NUMBER OF CONTAINERS	ANALYSIS(ES): TPH G	MBTEX	PRESERVATIVE	REMARKS
+	P29-10	9/8/08	13:28	WATER		5	X	X	ICE	Normal Turnaround Time
+30	P31-10	9/8/08	12:00	"		5	X	X	"	"
+20	P32-10	9/8/08	09:15	"		5	X	X	"	"

ICE? Y
GOOD CONDITION Y
HEAD SPACE ABSENT _____
DECHLORINATED IN LAB _____
APPROPRIATE CONTAINERS ✓
PRESERVED IN LAB _____
PRESERVATION: VOAS | O&G | METALS | OTHER

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)
Michael Deschenes	9/9/08	1600	
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)
	9/9/08	1800	
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)

TOTAL NO. OF SAMPLES (THIS SHIPMENT): 3
TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 15
LABORATORY: McCampbell Analytical, Inc
LABORATORY CONTACT: Angela Rydelins
LABORATORY PHONE NUMBER: (877) 252-9262
SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( )YES (✓)NO

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

REMARKS: All samples preserved w/ HCL

McCampbell Analytical, Inc.
1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0809265 **ClientCode: PDEO**

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

Report to:
Paul King
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: **09/09/2008**
Date Printed: **09/09/2008**

Lab ID	Client ID	Matrix	Collection Date	Hold	Requested Tests (See legend below) 1	2	3	4	5	6	7	8	9	10	11	12
0809265-001	P29-10	Water	9/8/2008 13:28	☐	A											
0809265-002	P31-10	Water	9/8/2008 12:00	☐	A											
0809265-003	P32-10	Water	9/8/2008 9:15	☐	A											

Test Legend:

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

Prepared by: Ana Venegas

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.

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Telephone: 877-252-9262 Fax: 925-252-9269

Sample Receipt Checklist

Client Name: **P & D Environmental**

Date and Time Received: **9/9/2008 7:28:53 PM**

Project Name: **#0047; VIP Service**

Checklist completed and reviewed by: Ana Venegas

WorkOrder N°: **0809265** Matrix Water

Carrier: Michael Hernandez (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: 4.6°C		NA ☐
Water - VOA vials have zero headspace / no bubbles?	Yes ☑	No ☐	No VOA vials submitted ☐
Sample labels checked for correct preservation?	Yes ☑	No ☐	
TTLC 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:

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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: 09/08/08
		Date Received: 09/09/08
55 Santa Clara, Ste.240	Client Contact: Paul King	Date Extracted: 09/12/08-09/16/08
Oakland, CA 94610	Client P.O.:	Date Analyzed 09/12/08-09/16/08

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

Extraction method SW5030B Analytical methods SW8021B/8015Cm Work Order: 0809265

Lab ID	Client ID	Matrix	TPH(g)	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	DF	% SS
001A	P29-10	W	ND	ND	ND	0.60	ND	ND	1	94
002A	P31-10	W	ND,b1	ND	ND	1.2	ND	1.3	1	98
003A	P32-10	W	12,000,d1,b1	ND<100	350	36	180	68	20	119

Reporting Limit for DF =1; ND means not detected at or above the reporting limit	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 and all TCLP & SPLP extracts are reported in ug/L, soil/sludge/solid samples in mg/kg, wipe samples in µg/wipe, product/oil/non-aqueous liquid samples in mg/L.

cluttered chromatogram; sample peak coelutes with surrogate peak.

+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
d1) weakly modified or unmodified gasoline is significant

DHS ELAP Certification 1644

Angela Rydelius, Lab Manager

McCampbell Analytical, Inc.
"When Quality Counts"

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Web: www.mccampbell.com E-mail: main@mccampbell.com
Telephone: 877-252-9262 Fax: 925-252-9269

QC SUMMARY REPORT FOR SW8021B/8015Cm

W.O. Sample Matrix: Water QC Matrix: Water BatchID: 38124 WorkOrder: 0809265

EPA Method SW8021B/8015Cm **Extraction SW5030B** **Spiked Sample ID: 0809270-005A**

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	96.2	93.9	2.45	96.4	87.8	9.30	70 - 130	20	70 - 130	20
MTBE	ND	10	99.7	105	4.90	108	103	4.81	70 - 130	20	70 - 130	20
Benzene	ND	10	87.4	84.7	3.04	87.2	87.4	0.179	70 - 130	20	70 - 130	20
Toluene	ND	10	97.5	95.1	2.49	97.7	97.5	0.261	70 - 130	20	70 - 130	20
Ethylbenzene	ND	10	96.7	93.6	3.30	96.4	95.9	0.482	70 - 130	20	70 - 130	20
Xylenes	ND	30	107	104	3.17	107	106	1.18	70 - 130	20	70 - 130	20
%SS:	97	10	96	93	2.30	94	97	3.03	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 38124 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
0809265-001A	09/08/08 1:28 PM	09/16/08	09/16/08 2:28 AM	0809265-002A	09/08/08 12:00 PM	09/12/08	09/12/08 3:05 AM
0809265-003A	09/08/08 9:15 AM	09/12/08	09/12/08 10:42 AM				

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.

McCampbell Analytical, Inc.
"When Quality Counts"

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Web: www.mccampbell.com E-mail: main@mccampbell.com
Telephone: 877-252-9262 Fax: 925-252-9269

P & D Environmental 55 Santa Clara, Ste.240 Oakland, CA 94610	Client Project ID: #0047; VIP Service	Date Sampled: 09/05/08
		Date Received: 09/08/08
	Client Contact: Paul King	Date Reported: 09/12/08
	Client P.O.:	Date Completed: 09/10/08

WorkOrder: 0809208

September 12, 2008

Dear Paul:

Enclosed within are:

1) The results of the **4** analyzed samples from your project: **#0047; VIP Service,**
2) A QC report for the above samples,
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.

0809208

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

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJECT NUMBER:	PROJECT NAME:
0047	VIP SERVICE 3889 CASTRO VALLEY BLVD. CASTRO VALLEY, CA

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

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION	NUMBER OF CONTAINERS	ANALYSIS(ES): TPHG	MBTEX					PRESERVATIVE	REMARKS
+30	P32-35	9/5/08	11:35	WATER		5	✓	✓					ICE	NORMAL TURNAROUND
+20	P32-60	9/5/08	12:35	"		5	✓	✓					"	" " "
+40	P33-30	9/5/08	1500	"		2	✓	✓					"	" " "
+10	P33-45	9/5/08	1618	"		5	✓	✓					"	" " "

ICE/t° 5.6
GOOD CONDITION ✓
HEAD SPACE ABSENT ✓*
DECHLORINATED IN LAB ___
APPROPRIATE CONTAINERS ✓
PRESERVED IN LAB ___

PRESERVATION	VOAS	O&G	METALS	OTHER

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)
Michael Deschenes	9/8/08	1646	
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)
	9/8/08	1735	
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)

TOTAL NO. OF SAMPLES (THIS SHIPMENT): 4
TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 17
LABORATORY: MCCAMPBELL ANALYTICAL
LABORATORY CONTACT:
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 SAMPLES ARE PRESERVED WITH HYDROCHLORIC ACID.

* Sample P32-~~35~~ & P33-30 had headspace

McCampbell Analytical, Inc.
1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0809208 **ClientCode: PDEO**

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

Report to:
Paul King
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: **09/08/2008**
Date Printed: **09/08/2008**

Lab ID	Client ID	Matrix	Collection Date	Hold	Requested Tests (See legend below) 1	2	3	4	5	6	7	8	9	10	11	12
0809208-001	P32-35	Water	9/5/2008 11:35	☐	A											
0809208-002	P32-60	Water	9/5/2008 12:35	☐	A											
0809208-003	P33-30	Water	9/5/2008 15:00	☐	A											
0809208-004	P33-45	Water	9/5/2008 16:18	☐	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.

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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: **9/8/08 6:24:18 PM**

Project Name: **#0047; VIP Service**

Checklist completed and reviewed by: Melissa Valles

WorkOrder N°: **0809208** Matrix Water

Carrier: Michael Hernandez (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: 5.6°C		NA ☐
Water - VOA vials have zero headspace / no bubbles?	Yes ☐	No ☑	No VOA vials submitted ☐
Sample labels checked for correct preservation?	Yes ☑	No ☐	
TTLC 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: Sample P32-35 and P33-30 had headspace.

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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: 09/05/08
		Date Received: 09/08/08
55 Santa Clara, Ste.240	Client Contact: Paul King	Date Extracted: 09/10/08
Oakland, CA 94610	Client P.O.:	Date Analyzed 09/10/08

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

Extraction method SW5030B Analytical methods SW8021B/8015Cm Work Order: 0809208

Lab ID	Client ID	Matrix	TPH(g)	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	DF	% SS
001A	P32-35	W	79,d1,b1	ND	1.2	5.0	1.3	2.6	1	97
002A	P32-60	W	59,d1,b1	ND	1.1	1.8	1.1	2.2	1	93
003A	P33-30	W	1400,d1,b1	ND<50	150	51	41	240	10	94
004A	P33-45	W	190,d1,b1	ND	2.5	2.6	3.1	17	1	104

Reporting Limit for DF =1; ND means not detected at or above the reporting limit	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 and all TCLP & SPLP extracts are reported in ug/L, soil/sludge/solid samples in mg/kg, wipe samples in µg/wipe, product/oil/non-aqueous liquid samples in mg/L.

cluttered chromatogram; sample peak coelutes with surrogate peak.

+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
d1) weakly modified or unmodified gasoline is significant

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Telephone: 877-252-9262 Fax: 925-252-9269

QC SUMMARY REPORT FOR SW8021B/8015Cm

W.O. Sample Matrix: Water QC Matrix: Water BatchID: 38063 WorkOrder: 0809208

EPA Method: SW8021B/8015Cm **Extraction: SW5030B** **Spiked Sample ID: 0809209-004A**

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	99.2	101	1.34	91.3	92.1	0.931	70 - 130	20	70 - 130	20
MTBE	ND	10	105	106	1.20	105	97.9	6.85	70 - 130	20	70 - 130	20
Benzene	ND	10	96.1	96.8	0.801	91.6	91.1	0.600	70 - 130	20	70 - 130	20
Toluene	ND	10	96.2	96.7	0.495	84.5	83.4	1.22	70 - 130	20	70 - 130	20
Ethylbenzene	ND	10	101	101	0	93.9	93.2	0.740	70 - 130	20	70 - 130	20
Xylenes	ND	30	112	113	0.350	89.7	91.3	1.76	70 - 130	20	70 - 130	20
%SS:	96	10	94	94	0	96	98	1.40	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 38063 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
0809208-001A	09/05/08 11:35 AM	09/10/08	09/10/08 5:12 AM	0809208-002A	09/05/08 12:35 PM	09/10/08	09/10/08 6:18 AM
0809208-003A	09/05/08 3:00 PM	09/10/08	09/10/08 9:03 AM	0809208-004A	09/05/08 4:18 PM	09/10/08	09/10/08 6:51 AM

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.

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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: 09/11/08
55 Santa Clara, Ste.240		Date Received: 09/12/08
Oakland, CA 94610	Client Contact: Steve Carmack	Date Reported: 09/18/08
	Client P.O.:	Date Completed: 09/18/08

WorkOrder: 0809409

September 18, 2008

Dear Steve:

Enclosed within are:

1) The results of the **2** analyzed samples from your project: **#0047; VIP Service,**
2) A QC report for the above samples,
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

0809409

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJECT NUMBER:	PROJECT NAME:
0047	VIP SERVICE, ~~3889 CASTRO VALLEY BLVD.~~ CASTRO VALLEY, ~~CA~~

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 8021B	PRESERVATIVE	REMARKS
+1	P34W-30	9/11/08	12:35	WATER		5	✓	✓	ICE	NORMAL TURN AROUND
+5	P34W-45	9/11/08	13:50	"		5	✓	✓	"	" " "

ICE/t° 5.9
GOOD CONDITION ✓ APPROPRIATE CONTAINERS ✓
HEAD SPACE ABSENT ✓
DECHLORINATED IN LAB NA PRESERVED IN LAB NA
PRESERVATION VOAS | O&G | METALS | OTHER

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)
Michael Deschenes	9/12/08	1401	
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)
	9/12/08	1735	
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)

TOTAL NO. OF SAMPLES (THIS SHIPMENT)	2
TOTAL NO. OF CONTAINERS (THIS SHIPMENT)	10
LABORATORY:	McCAMPBELL ANALYTICAL INC
LABORATORY CONTACT:	ANGELA RYDELINS
LABORATORY PHONE NUMBER:	(877) 252-9262
SAMPLE ANALYSIS REQUEST SHEET ATTACHED:	( )YES (✓)NO

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

REMARKS: ALL SAMPLES PRESERVED IN HCL.

McCampbell Analytical, Inc.
1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0809409 **ClientCode: PDEO**

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

Report to:
Steve Carmack
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: **09/12/2008**
Date Printed: **09/17/2008**

Lab ID	Client ID	Matrix	Collection Date	Hold	Requested Tests (See legend below) 1	2	3	4	5	6	7	8	9	10	11	12
0809409-001	P34W-30	Water	9/11/2008 12:35	☐	A											
0809409-002	P34W-45	Water	9/11/2008 13:50	☐	A											

Test Legend:

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

Prepared by: Samantha Arbuckle

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.

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Telephone: 877-252-9262 Fax: 925-252-9269

P & D Environmental	Client Project ID: #0047; VIP Service	Date Sampled: 09/11/08
		Date Received: 09/12/08
55 Santa Clara, Ste.240	Client Contact: Steve Carmack	Date Extracted: 09/16/08-09/17/08
Oakland, CA 94610	Client P.O.:	Date Analyzed 09/16/08-09/17/08

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

Extraction method SW5030B Analytical methods SW8021B/8015Cm Work Order: 0809409

Lab ID	Client ID	Matrix	TPH(g)	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	DF	% SS
001A	P34W-30	W	150,d1,b1	ND	3.9	2.5	3.1	12	1	103
002A	P34W-45	W	1600,d1,b1	ND	15	13	23	95	1	104

Reporting Limit for DF =1; ND means not detected at or above the reporting limit	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 and all TCLP & SPLP extracts are reported in ug/L, soil/sludge/solid samples in mg/kg, wipe samples in µg/wipe, product/oil/non-aqueous liquid samples in mg/L.

cluttered chromatogram; sample peak coelutes with surrogate peak.

+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
d1) weakly modified or unmodified gasoline is significant

DHS ELAP Certification 1644

Angela Rydelius, Lab Manager

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Web: www.mccampbell.com E-mail: main@mccampbell.com
Telephone: 877-252-9262 Fax: 925-252-9269

QC SUMMARY REPORT FOR SW8021B/8015Cm

W.O. Sample Matrix: Water QC Matrix: Water BatchID: 38218 WorkOrder 0809409

EPA Method SW8021B/8015Cm **Extraction SW5030B** **Spiked Sample ID: 0809406-001B**

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	109	111	2.00	78.3	80.5	2.69	70 - 130	20	70 - 130	20
MTBE	ND	10	81.1	81.3	0.273	92.6	95.9	3.43	70 - 130	20	70 - 130	20
Benzene	ND	10	84.4	86.3	2.13	89.9	96.6	7.13	70 - 130	20	70 - 130	20
Toluene	ND	10	84	84.9	1.04	80.3	85.7	6.52	70 - 130	20	70 - 130	20
Ethylbenzene	ND	10	85.8	87.7	2.16	89.2	94.9	6.14	70 - 130	20	70 - 130	20
Xylenes	ND	30	85.8	87.4	1.87	88.6	93.1	4.99	70 - 130	20	70 - 130	20
%SS:	115	10	98	96	1.65	99	102	3.59	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 38218 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
0809409-001A	09/11/08 12:35 PM	09/16/08	09/16/08 11:40 PM	0809409-002A	09/11/08 1:50 PM	09/17/08	09/17/08 6:24 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.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Air Toxics Ltd. Introduces the Electronic Report

Thank you for choosing Air Toxics Ltd. To better serve our customers, we are providing your report by e-mail. This document is provided in Portable Document Format which can be viewed with Acrobat Reader by Adobe.

This electronic report includes the following:

- Work order Summary;
- Laboratory Narrative;
- Results; and
- Chain of Custody (copy).

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630

(916) 985-1000 .FAX (916) 985-1020
Hours 8:00 A.M to 6:00 P.M. Pacific

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0809291

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, Castro Valley
DATE RECEIVED:	09/15/2008	**CONTACT:**	Kyle Vagadori
DATE COMPLETED:	09/26/2008		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SG13	Modified TO-15	7.0 "Hg	15 psi
02A	SG14	Modified TO-15	4.0 "Hg	15 psi
02AA	SG14 Lab Duplicate	Modified TO-15	4.0 "Hg	15 psi
03A	SG15	Modified TO-15	5.0 "Hg	15 psi
04A	SG15-DUP	Modified TO-15	5.0 "Hg	15 psi
05A	SG16	Modified TO-15	6.5 "Hg	15 psi
06A	Lab Blank	Modified TO-15	NA	NA
06B	Lab Blank	Modified TO-15	NA	NA
07A	CCV	Modified TO-15	NA	NA
07B	CCV	Modified TO-15	NA	NA
08A	LCS	Modified TO-15	NA	NA
08B	LCS	Modified TO-15	NA	NA

CERTIFIED BY: Linda J. Fruman DATE: 09/26/08

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
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: 07/01/08, Expiration date: 06/30/09
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
Modified TO-15 Std & Soil Gas
P & D Environmental
Workorder# 0809291

Five 1 Liter Summa Canister samples were received on September 15, 2008. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the Full Scan mode. The method involves concentrating up to 1.0 liter of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

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.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	***TO-15***	***ATL Modifications***
Daily CCV	+- 30% Difference	</= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

The Chain of Custody (COC) was not relinquished properly. A date was not provided by the field sampler.

Analytical Notes

There were no analytical discrepancies.

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

AN ENVIRONMENTAL ANALYTICAL LABORATORY

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

Client Sample ID: SG13

Lab ID#: 0809291-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Toluene	13	12000	50	45000
Ethyl Benzene	13	520	57	2200
m,p-Xylene	13	1500	57	6500
o-Xylene	13	410	57	1800
TPH ref. to Gasoline (MW=100)	260	64000	1100	260000

Client Sample ID: SG14

Lab ID#: 0809291-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Benzene	12	18	37	57
Toluene	12	11000	44	41000
Ethyl Benzene	12	1300	50	5600
m,p-Xylene	12	4400	50	19000
o-Xylene	12	1400	50	6300
TPH ref. to Gasoline (MW=100)	230	93000	950	380000

Client Sample ID: SG14 Lab Duplicate

Lab ID#: 0809291-02AA

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Benzene	12	17	37	54
Toluene	12	11000	44	41000
Ethyl Benzene	12	1300	50	5600
m,p-Xylene	12	4400	50	19000
o-Xylene	12	1400	50	6300
TPH ref. to Gasoline (MW=100)	230	92000	950	380000

Client Sample ID: SG15

Lab ID#: 0809291-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Methyl tert-butyl ether	6.0	15	22	53
Benzene	6.0	1200	19	3900
Toluene	6.0	180	23	680

AN ENVIRONMENTAL ANALYTICAL LABORATORY

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

Client Sample ID: SG15

Lab ID#: 0809291-03A

Ethyl Benzene	6.0	40	26	170
m,p-Xylene	6.0	160	26	710
o-Xylene	6.0	58	26	250
TPH ref. to Gasoline (MW=100)	120	10000	490	41000

Client Sample ID: SG15-DUP

Lab ID#: 0809291-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Methyl tert-butyl ether	2.8	8.6	10	31
Benzene	2.8	570	9.1	1800
Toluene	2.8	97	11	360
Ethyl Benzene	2.8	26	12	110
m,p-Xylene	2.8	100	12	430
o-Xylene	2.8	37	12	160
TPH ref. to Gasoline (MW=100)	57	2900	230	12000

Client Sample ID: SG16

Lab ID#: 0809291-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Benzene	1.3	19	4.1	61
Toluene	1.3	230	4.9	880
Ethyl Benzene	1.3	24	5.6	100
m,p-Xylene	1.3	77	5.6	330
o-Xylene	1.3	21	5.6	92
TPH ref. to Gasoline (MW=100)	26	2700	100	11000

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SG13

Lab ID#: 0809291-01A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**w092216**	**Date of Collection: 9/11/08**	
Dil. Factor:	**2.64**	**Date of Analysis: 9/22/08 05:31 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Propanol	53	Not Detected	130	Not Detected
Methyl tert-butyl ether	13	Not Detected	48	Not Detected
Benzene	13	Not Detected	42	Not Detected
Toluene	13	12000	50	45000
Ethyl Benzene	13	520	57	2200
m,p-Xylene	13	1500	57	6500
o-Xylene	13	410	57	1800
TPH ref. to Gasoline (MW=100)	260	64000	1100	260000

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	96	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SG14

Lab ID#: 0809291-02A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**w092218**	**Date of Collection: 9/11/08**	
Dil. Factor:	**2.33**	**Date of Analysis: 9/22/08 06:55 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Propanol	47	Not Detected	110	Not Detected
Methyl tert-butyl ether	12	Not Detected	42	Not Detected
Benzene	12	18	37	57
Toluene	12	11000	44	41000
Ethyl Benzene	12	1300	50	5600
m,p-Xylene	12	4400	50	19000
o-Xylene	12	1400	50	6300
TPH ref. to Gasoline (MW=100)	230	93000	950	380000

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	91	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	97	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SG14 Lab Duplicate

Lab ID#: 0809291-02AA

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**w092217**	**Date of Collection:**	**9/11/08**
Dil. Factor:	**2.33**	**Date of Analysis:**	**9/22/08 06:20 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Propanol	47	Not Detected	110	Not Detected
Methyl tert-butyl ether	12	Not Detected	42	Not Detected
Benzene	12	17	37	54
Toluene	12	11000	44	41000
Ethyl Benzene	12	1300	50	5600
m,p-Xylene	12	4400	50	19000
o-Xylene	12	1400	50	6300
TPH ref. to Gasoline (MW=100)	230	92000	950	380000

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	98	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SG15

Lab ID#: 0809291-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**r092511**	**Date of Collection: 9/8/08**	
Dil. Factor:	**12.1**	**Date of Analysis: 9/25/08 05:42 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Propanol	24	Not Detected	59	Not Detected
Methyl tert-butyl ether	6.0	15	22	53
Benzene	6.0	1200	19	3900
Toluene	6.0	180	23	680
Ethyl Benzene	6.0	40	26	170
m,p-Xylene	6.0	160	26	710
o-Xylene	6.0	58	26	250
TPH ref. to Gasoline (MW=100)	120	10000	490	41000

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	93	70-130
4-Bromofluorobenzene	93	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SG15-DUP

Lab ID#: 0809291-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**r092512**	**Date of Collection: 9/8/08**	
Dil. Factor:	**5.69**	**Date of Analysis: 9/25/08 06:37 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Propanol	11	Not Detected	28	Not Detected
Methyl tert-butyl ether	2.8	8.6	10	31
Benzene	2.8	570	9.1	1800
Toluene	2.8	97	11	360
Ethyl Benzene	2.8	26	12	110
m,p-Xylene	2.8	100	12	430
o-Xylene	2.8	37	12	160
TPH ref. to Gasoline (MW=100)	57	2900	230	12000

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	94	70-130
4-Bromofluorobenzene	95	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: SG16

Lab ID#: 0809291-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**r092514**	**Date of Collection: 9/8/08**	
Dil. Factor:	**2.58**	**Date of Analysis: 9/25/08 08:29 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Propanol	5.2	Not Detected	13	Not Detected
Methyl tert-butyl ether	1.3	Not Detected	4.6	Not Detected
Benzene	1.3	19	4.1	61
Toluene	1.3	230	4.9	880
Ethyl Benzene	1.3	24	5.6	100
m,p-Xylene	1.3	77	5.6	330
o-Xylene	1.3	21	5.6	92
TPH ref. to Gasoline (MW=100)	26	2700	100	11000

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	81	70-130
4-Bromofluorobenzene	87	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0809291-06A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**w092210**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/22/08 01:34 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
2-Propanol	20	Not Detected	49	Not Detected
Methyl tert-butyl ether	5.0	Not Detected	18	Not Detected
Benzene	5.0	Not Detected	16	Not Detected
Toluene	5.0	Not Detected	19	Not Detected
Ethyl Benzene	5.0	Not Detected	22	Not Detected
m,p-Xylene	5.0	Not Detected	22	Not Detected
o-Xylene	5.0	Not Detected	22	Not Detected
TPH ref. to Gasoline (MW=100)	100	Not Detected	410	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	97	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0809291-06B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**r092505**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/25/08 12:00 PM**	

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)	10	Not Detected	41	Not Detected

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	77	70-130
4-Bromofluorobenzene	82	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0809291-07A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**w092206**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/22/08 11:42 AM**	

Compound	**%Recovery**
2-Propanol	116
Methyl tert-butyl ether	99
Benzene	106
Toluene	104
Ethyl Benzene	105
m,p-Xylene	106
o-Xylene	107
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	98	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0809291-07B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**r092502**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/25/08 09:14 AM**	

Compound	**%Recovery**
2-Propanol	82
Methyl tert-butyl ether	93
Benzene	100
Toluene	98
Ethyl Benzene	99
m,p-Xylene	97
o-Xylene	95
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	84	70-130
4-Bromofluorobenzene	86	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0809291-08A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**w092208**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/22/08 12:38 PM**	

Compound	**%Recovery**
2-Propanol	117
Methyl tert-butyl ether	82
Benzene	104
Toluene	103
Ethyl Benzene	105
m,p-Xylene	107
o-Xylene	108
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	99	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0809291-08B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**r092503**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 9/25/08 09:45 AM**	

Compound	**%Recovery**
2-Propanol	87
Methyl tert-butyl ether	94
Benzene	100
Toluene	101
Ethyl Benzene	99
m,p-Xylene	98
o-Xylene	96
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	88	70-130

APPENDIX H
Soil Gas Risk and Hazard Calculation Work Sheets

DATA ENTRY SHEET

SG-SCREEN
?A 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	3.90E+03			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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	3.90E+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	137.4

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	3.90E+03	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	3.59E+00

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)
4.3E-05	1.1E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
108883	4.50E+04			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	4.50E+04	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	137.4

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	4.50E+04	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	4.12E+01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-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	1.3E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
100414	5.60E+03			Ethylbenzene

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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	5.60E+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	9,994	7.43E-03	3.05E-01	1.80E-04	5.85E-03	137.4

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	5.60E+03	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	4.66E+00

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.5E-06	1.0E+00

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)
4.8E-06	4.5E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
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Reset to Defaults

DTSC
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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	1.90E+04			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	1.90E+04	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	137.4

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	1.90E+04	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	1.61E+01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	1.5E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

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Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	6.30E+03			o-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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	6.30E+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	10,245	4.88E-03	2.00E-01	1.80E-04	6.79E-03	137.4

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	6.30E+03	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	5.77E+00

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	5.5E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

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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
1634044	5.30E+01			MTBE

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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	5.30E+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	7,113	5.99E-04	2.46E-02	1.80E-04	7.99E-03	137.4

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	5.30E+01	1.25	8.33E+01	7.99E-03	5.00E+03	1.14E+09	1.01E-03	5.36E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.6E-07	3.0E+00

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)
5.7E-09	1.7E-05

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A Version 2.0; 04/

Reset to Defaults

DTSC
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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	4.50E+04			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	4.50E+04	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	137.4

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	4.50E+04	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	4.12E+01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-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	1.3E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
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Reset to Defaults

DTSC
Vapor Intrusion Guidance
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Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	2.20E+03			Ethylbenzene

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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	2.20E+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	9,994	7.43E-03	3.05E-01	1.80E-04	5.85E-03	137.4

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	2.20E+03	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	1.83E+00

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.5E-06	1.0E+00

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)
1.9E-06	1.8E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
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Reset to Defaults

DTSC
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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	6.50E+03			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	6.50E+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	10,083	7.22E-03	2.96E-01	1.80E-04	6.00E-03	137.4

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	6.50E+03	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	5.50E+00

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	5.3E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
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(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
95476	1.80E+03			o-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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	1.80E+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	10,245	4.88E-03	2.00E-01	1.80E-04	6.79E-03	137.4

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	1.80E+03	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	1.65E+00

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	1.6E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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	5.70E+01			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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	5.70E+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	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} ($\mu g/m^3$)	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	5.70E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	5.25E-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)
6.3E-07	1.7E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
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Reset to Defaults

DTSC
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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	4.10E+04			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	4.10E+04	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	137.4

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	4.10E+04	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	3.75E+01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-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	1.2E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
100414	5.60E+03			Ethylbenzene

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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	5.60E+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	9,994	7.43E-03	3.05E-01	1.80E-04	5.85E-03	137.4

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	5.60E+03	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	4.66E+00

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.5E-06	1.0E+00

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)
4.8E-06	4.5E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
106423	1.90E+04			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	1.90E+04	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	137.4

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	1.90E+04	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	1.61E+01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	1.5E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
95476	6.30E+03			o-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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	6.30E+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	10,245	4.88E-03	2.00E-01	1.80E-04	6.79E-03	137.4

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	6.30E+03	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	5.77E+00

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	5.5E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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	3.90E+03			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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	3.90E+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	137.4

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	3.90E+03	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	3.59E+00

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)
4.3E-05	1.1E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
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Reset to Defaults

DTSC
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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	6.80E+02			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	6.80E+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	9,001	6.29E-03	2.58E-01	1.80E-04	6.79E-03	137.4

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+02	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	6.22E-01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-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	2.0E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

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Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	1.70E+02			Ethylbenzene

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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	1.70E+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	9,994	7.43E-03	3.05E-01	1.80E-04	5.85E-03	137.4

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	1.70E+02	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	1.41E-01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.5E-06	1.0E+00

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	1.4E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

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(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
106423	2.50E+02			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	2.50E+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	10,083	7.22E-03	2.96E-01	1.80E-04	6.00E-03	137.4

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	2.50E+02	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	2.11E-01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	2.0E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
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Reset to Defaults

DTSC
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(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
95476	2.50E+02			o-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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	2.50E+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	10,245	4.88E-03	2.00E-01	1.80E-04	6.79E-03	137.4

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	2.50E+02	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	2.29E-01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	2.2E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
1634044	5.30E+01			MTBE

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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	5.30E+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	7,113	5.99E-04	2.46E-02	1.80E-04	7.99E-03	137.4

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	5.30E+01	1.25	8.33E+01	7.99E-03	5.00E+03	1.14E+09	1.01E-03	5.36E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.6E-07	3.0E+00

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)
5.7E-09	1.7E-05

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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	6.10E+01			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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	6.10E+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	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} ($\mu g/m^3$)	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	6.10E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	5.62E-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)
6.7E-07	1.8E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
108883	8.80E+02			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	8.80E+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	9,001	6.29E-03	2.58E-01	1.80E-04	6.79E-03	137.4

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	8.80E+02	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	8.05E-01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-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	2.6E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
100414	1.00E+02			Ethylbenzene

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

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)
137.4	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	9,994	7.43E-03	3.05E-01	1.80E-04	5.85E-03	137.4

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	1.00E+02	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	8.32E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.5E-06	1.0E+00

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)
8.5E-08	8.0E-05

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
106423	3.30E+02			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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	3.30E+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	10,083	7.22E-03	2.96E-01	1.80E-04	6.00E-03	137.4

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	3.30E+02	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	2.79E-01

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	2.7E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
?A 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
95476	9.20E+01			o-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	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

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)
137.4	0.280	0.263	6.91E-09	0.833	5.75E-09	4,000	9.20E+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	10,245	4.88E-03	2.00E-01	1.80E-04	6.79E-03	137.4

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	9.20E+01	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	8.42E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	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	8.1E-04

MESSAGE SUMMARY BELOW:

END