Xtra OIL COMPANY

2307 PACIFIC AVENUE
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July 11, 2011

Ms. Barbara Jakub
Alameda County Environmental Health Department
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

SUBJECT: SUBSURFACE INVESTIGATION REPORT CERTIFICATION
County Case # RO 191
Xtra Oil Company
1701 Park Street
Alameda, CA

Dear Ms. Jakub:

P&D Environmental, Inc. has prepared the following document:

- Subsurface Investigation Report (B8 And SG1 Through SG3) dated July 11, 2011 (document 0058.R16).

I declare under penalty of perjury that the contents and conclusions in the document are true and correct to the best of my knowledge.

Should you have any questions, please do not hesitate to contact me at (510) 865-9506.

Sincerely,
Xtra Oil Company

Keith Simas

0058.L42

P&D ENVIRONMENTAL, INC.

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

July 11, 2011
Report 0058.R16

Mr. Ted Simas
Mr. Keith Simas
Xtra Oil Company
2307 Pacific Ave.
Alameda, CA 94501

SUBJECT: SUBSURFACE INVESTIGATION REPORT
(B8 AND SG1 THROUGH SG3)
County Case # RO 191
Xtra Oil Company
1701 Park Street
Alameda, CA

Gentlemen:

P&D Environmental, Inc. (P&D) is pleased to present this report documenting the drilling of one soil boring at location B8 and the collection of three soil gas sample designated as SG1 through SG3 at the property located at 1713 and 1715 Park Street, which is immediately to the northeast of the subject site. The soil boring was drilled for the collection of a groundwater sample to further define the presence and extent of petroleum hydrocarbons directly to the north of onsite well MW-4. The soil gas sampling was performed in an effort to evaluate the the presence of petroleum hydrocarbon vapors at the perimeter of the building located immediately downgradient of the subject site.

A Site Location Map is attached as Figure 1, and a Site Plan showing the sample collection locations is attached as Figure 2. All work was performed under the direct supervision of a professional geologist.

This report is prepared in accordance with guidelines set forth in the following documents.

- "Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites" dated August 10, 1990 and "Appendix A - Workplan for Initial Subsurface Investigation" dated August 20, 1991.
- 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,
- DTSC March 3, 2010 "Advisory - Active Soil Gas Investigations".

BACKGROUND

A detailed discussion of the site background, historical monitoring and sampling, and historical investigations are provided in P&D's Remedial Action Work Plan (RAWP) dated October 24, 2007 (document 0058.W2), P&D's Corrective Action Plan (CAP) dated October 11, 2010 (document 0058.W3), and P&D's Site Conceptual Model (SCM) Report dated October 8, 2010 (document 0058.R10). In the Data Gap section of the SCM report, P&D recommended that one groundwater grab sample be collected at location B8 and that soil gas samples be collected at locations SG1 through SG3.

FIELD ACTIVITIES

Prior to drilling, authorization for site access was obtained from the offsite property owner, Alameda County Public Works Agency (ACPWA) drilling permit # W2011-0357 was obtained for borehole drilling, the drilling locations were marked with white paint, Underground Safety Alert was notified for buried utility location, and a health and safety plan was prepared. All drilling at borehole B8 and soil gas sample collection at location SG1 through SG3 was performed on June 14, 2011. A description of field procedures and conditions encountered during sample collection are provided below.

Continuous Coring and Groundwater Sample Collection

On June 14, 2011 P&D personnel oversaw drilling at location B8 shown on Figure 2. Drilling was performed by Vironex, Inc. of Concord, California using GeoProbe direct push technology. Borehole B8 was continuously cored to a total depth of 12.0 feet below the ground surface (bgs), using a Geoprobe Macrocore barrel sampler lined with transparent PVC sleeves. Following removal of the liner from the sampler, the liner was evaluated for the amount of sample recovery. The soil from the borehole was then logged in the field in accordance with standard geologic field techniques and the Unified Soil Classification System. The soil from the borehole was also 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 elevated PID values, odors, staining, or discoloration were detected in the soil in borehole B8. A copy of the boring log is attached with this report as Appendix A.

Prior to drilling the depth to water was measured using an electric water level indicator in historical wells MW1 through MW4 and in recently installed wells EW2, EW4, EW5, and OW2 at the 1701 Park Street property. The measured depth to water for groundwater monitoring wells MW1 through MW4 on June 16, 2011 ranged from 5.79 to 6.89 feet. The measured depth to groundwater on June 16, 2011 in wells EW2, EW4, EW5, and OW2 was 6.09, 4.72, 4.71, and 4.80 feet, respectively.

The borehole was temporarily extended to a depth of 10.0 feet bgs and a temporary slotted PVC pipe was placed in the borehole. No water entered the slotted PVC pipe. The slotted PVC pipe was removed from the borehole and the borehole was then advanced to a depth of 12.0 feet bgs, at which depth groundwater was encountered. The temporary slotted PVC pipe was placed back into the borehole and groundwater was subsequently measured in the borehole prior to groundwater sample collection at a depth of 6.3 feet bgs.

A groundwater grab sample was collected from the temporary slotted PVC pipe in the continuously cored borehole using a new polyethylene tube with a peristaltic pump. A new piece of silicone tubing was used in the rollers in the peristaltic pump. The sample was placed into 40-milliliter VOAs preserved with hydrochloric acid and capped with Teflon-lined screw caps. Clean, unused sample containers provided by the laboratory were used. 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 either previously unused clean material, or was cleaned with an Alconox solution followed by a clean water rinse prior to use in each borehole. Following groundwater sample collection the borehole was filled with neat cement grout using a tremie pipe. Mr. Steve Miller of ACPWA was on site to observe and document grouting of the borehole.

Soil Gas Sample Collection

Boreholes SG1 through SG3 were drilled at the perimeter of the building located at 1713 and 1715 Park Street (see Figure 2). The actual locations of sample collection were adjusted to the closest location to the proposed locations because of the presence of buried utilities in the vicinity of proposed locations SG1 and SG2 and because of the presence of multiple boxes full of tiles in the vicinity of proposed location SG3. Each of the proposed temporary soil gas wells (SG1 through SG3) were constructed by Vironex, Inc. of Pacheco, California by driving a hollow 1-inch diameter Geoprobe drill rod with an expendable tip to a depth of 5 feet bgs, dislodging the expendable tip, and then inserting a 0.250-inch outside diameter (0.187-inch inside diameter) Teflon tube to a depth of 7 inches above the bottom of the hollow rod with a 2-inch long porous high-density polyethylene (HDPE) filter was connected to the bottom of the tubing. This resulted in the center of the filter

being located approximately 6 inches above the bottom of the hollow rod. A #2/16 Lonestar sack sand was added to the annular space between the hollow rod and the Teflon tubing as the hollow rod was withdrawn from the ground until the lowermost 12 inches of the hole was filled with sand. Granular bentonite (with grains measuring 1 to 2 millimeters in diameter) was placed in the annular space above the sand to a height of 12 inches above the sand, and the remaining annular space was filled with a bentonite slurry to the ground surface. The temporary well was then undisturbed for a minimum of 30 minutes prior to purging for sample collection to allow soil gas equilibration.

A soil gas sampling manifold with a 1-liter Summa canister as the sampling canister for each location (see Figure 3) was assembled in a 35-gallon Rubbermaid bin that had been modified by cutting viewing ports into the sides of the bin and covering the viewing ports with transparent polycarbonate sheets. The Rubbermaid bin was also modified to include a hole measuring approximately two inches square in the bottom of the bin to allow the bin to cover the temporary soil gas well while still allowing access to the well through the bottom of the bin. At the time that the sampling manifold was assembled, the vacuum for the sample canister was checked with a vacuum gauge and recorded.

Prior to sampling the soil gas, a 10 minute leak check of the sampling manifold was performed by closing the valve located between the filter and the pressure gauge, opening the purge canister valve, and recording the manifold system vacuum (see Figure 3). No purge testing for purge volume determination was performed because the samples were collected using Summa canisters. Following successful verification of the manifold leak check, a default of three purge volumes was extracted prior to sample collection. The purge volume was calculated based on the void space in the tem porary well sand pack interval. 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 B of this report.

Following completion of the purging of three volumes, a tracer gas (2-Propanol) was placed in a dish adjacent to the purge canister in the bin, and a lid for the bin that had been modified to include two gauntlet nitrile gloves for adjustment of equipment inside the bin while the bin lid was in place and a viewing port covered with a transparent polycarbonate sheet was placed over the top of the bin, enclosing the well, the sampling manifold, and the 1-liter sample canister.

The vapor concentration of the 2-Propanol was monitored with a Photoionization Detector (PID) until 2-Propanol vapor concentration appeared to have equilibrated. The gloves in the lid of the bin were then used to open the sample canister valve. Once the vacuum for the sample canister valve had decreased to 5 inches of mercury, the gloves in the lid of the bin were used to close the sample canister valve. The pressure gage on the inlet side of the flow controller (see Figure 3) was monitored during sample collection to ensure that the vacuum applied to the soil gas well did not exceed 100 inches of water.

Because a tee was not provided by the laboratory, one replicate soil gas sample was collected into a Summa canister from temporary soil gas well SG2 using methods described above. Following soil gas sample collection at each location, a PID was connected to the Teflon tubing to obtain a preliminary field value for the sample collection location. Organic vapors were detected with the PID at locations SG-1 and SG-3 with PID reading of 2 and 5 ppm, respectively. No precipitation cumulatively exceeding 0.5 inches occurred during the 5 days prior to, or on the day of, the soil gas sample collection (June 14, 2011). A precipitation event did not occur on the day before or during the day of the efforts for soil gas sample collection. Measurements of vacuums, purging and equilibration time intervals, and PID readings were recorded on Soil Gas Sampling Data Sheets that are provided in Appendix B of this report. In addition, graphs showing weather conditions (temperature, wind direction, wind speed, and barometric pressure) for a weather station located approximately 0.9 miles to the west-northwestof the subject site are included in Appendix C. The graphs include information for the two weeks prior to the soil gas sample collection event on June 14, 2011, for the two weeks after the sample collection date, and for the day of the soil gas sample collection event.

The soil gas Summa canister samples were stored in a box and promptly shipped to the laboratory for extraction and analysis. Chain of custody procedures were observed for all sample handling. Measurements of vacuums, purging and equilibration time intervals, and PID readings were recorded on a Soil Gas Sampling Data Sheet.

Following collection of the Summa canister sample at each location, the same manifold was used to collect a soil gas sample using a sorbent tube. The sorbent tube was kept in a cooler with ice prior to use and after use. At the time of sample collection, the inlet for the sampling tube was connected to the manifold where the 1-liter Summa canister had been connected. A vacuum pump was connected to the downstream side of the sorbent tube using Swagelok fittings, and the shroud was placed over the manifold and sorbent tube (the vacuum pump was located outside of the shroud). A vacuum was applied with the vacuum pump to the sorbent tube for 5 minutes. The flow controller in the manifold restricted the flow through the tube to a nominal flow rate of 200 milliliters per minute, resulting in a total volume pulled through the tube of approximately 1,000 millilters. The pressure gage on the inlet side of the flow controller (see Figure 3) was monitored during sample collection to ensure that the vacuum applied to the temporary well did not exceed 100 inches of water. The vacuum on the inlet side of the manifold did not exceed 100 inches of water vacuum at any of the sampling locations. Following completion of the 5 minute sample collection period, the sorbent tube was removed from the manifold, the ends of the tube were sealed, and the tube stored in a cooler with ice pending delivery to the laboratory.

One replicate soil gas sample was collected immediately following sample collection with a sorbent tube using the sorbent tube method described above. The replicate Summa canister and the replicate sorbent tube soil gas samples were stored as described above. Chain of custody

procedures were observed for all sample handling. Measurements of vacuums, purging and equilibration time intervals, and PID readings were recorded on a Soil Gas Sampling Data Sheet. Copies of the purge volume calculations and the Soil Gas Sampling Data Sheets are attached as Appendix B.

Soil gas samples at a depth of 10.0 feet bgs were not collected because water levels in wells OW2, EW4 and EW5 was measures at 5.70, 5.65 and 5.65 feet bgs, respectively.

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 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.

Drummed Waste Disposal

Soil generated during drilling was stored in a labeled 5-gallon bucket with a lid at the 1701 Park Street site pending characterization and disposal.

GEOLOGY AND HYDROGEOLOGY

Based on review of the Geologic map and map database of the Oakland metropolitan area, Alameda, Contra Costa, and San Francisco Counties, California, by R.W. Graymer (2000) of the U. S. Geological Survey, the subject site is underlain Holocene and Pleistocene age dune sand (Qds) which consists of fine-grained, very well-sorted and well-drained eolian deposits. Buried paleosols encountered in the dunes are considered indicative of periods of nondeposition.

The subsurface materials encountered in borehole B8 consisted predominantly of silty to clayey fine sand to the total depth explored of 12.0 feet bgs, with a fine sand layer encountered between the depths of 4.0 and 6.0 feet bgs. The subsurface materials encountered in borehole B8 are similar to the silty fine sand materials encountered in boreholes nearby boreholes EW5 and OW2 at the 1701 Park Street site.

Prior to drilling the depth to water was measured using an electric water level indicator in historical wells MW1 through MW4 and in recently installed wells EW2, EW4, EW5, and OW2 at the 1701 Park Street property. The measured depth to water for groundwater monitoring wells MW1 through MW4 on June 16, 2011 ranged from 5.79 to 6.89 feet. The measured depth to groundwater on June 16, 2011 in wells EW2, EW4, EW5, and OW2 was 6.09, 4.72, 4.71, and 4.80 feet, respectively.

Groundwater was encountered during drilling in borehole B8 at a depth of 12.0 feet bgs, and was subsequently measured in the borehole prior to groundwater sample collection at a depth of 6.3 feet bgs. The depth to water in the borehole was subsequently measured again in the borehole after sampling at 5.9 feet bgs.

LABORATORY ANALYSIS

The groundwater sample collected from the borehole was analyzed at McCampbell Analytical, Inc. (McCampbell) in Pittsburg, California for Total Petroleum Hydrocarbons as Gasoline (TPH-G) using EPA Method 5030B in conjunction with modified EPA Method 8015B; for Total Petroleum Hydrocarbons as Diesel (TPH-D) and Total Petroleum Hydrocarbons as Bunker Oil (TPH-BO) using EPA Method 3010C and EPA Method 3630C in conjunction with EPA Method 8015B with silica gel cleanup; and for Methyl-tert butyl, benzene, toluene, ethylbenzene, total xylenes (MBTEX), and for fuel oxygenates and lead scavengers using EPA Method 5030B in conjunction with EPA Method 8260B.

No analytes were detected in the groundwater sample collected from borehole B8, except MTBE at a concentration of 0.82 micrograms per Liter (ug/L). The groundwater sample results are summarized in Table 1. Copies of the laboratory analytical reports and chain of custody documentation are attached with this report as Appendix D.

The soil gas samples SG1 through SG3 and the sample replicate SG2-REP were analyzed at Air Toxics Limited of Folsom, California for TPH-G using modified EPA Method TO-3, for MTBE, BTEX, tert-butyl alcohol (TBA), and the tracer gas 2-propanol by modified EPA Method TO-15, and for naphthalene and the tracer gas 2-propanol using modified EPA Method TO-17. TBA and MTBE were not detected in any of the soil gas samples. TPH-G was detected in soil gas samples SG1, SG2, SG2 Rep, and SG3 at concentrations of 3,700, 910, 790, and 13,000 micrograms per cubic meter (ug/m^3), respectively. Benzene was detected in the same samples at concentrations of 14, 21, 15, and 17 ug/m^3, respectively, and the remaining BTEX analytes were detected at concentrations ranging from 6.5 to 240 ug/m^3, respectively. 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 D.

SOIL GAS RISK AND HAZARD EVALUATION

The RWQCB May 2008 Environmental Screening Level (ESL) guidance document "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater" section 2.7 references the DTSC Vapor Intrusion guide (Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air, revised February 7, 2005) 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 in the screening mode 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-G 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, except a soil type of sand (S) was used.

The modeled cumulative risk and hazard for indoor air for the residential structure at 1713 and 1715 Park Street was evaluated by using the highest concentration for each detected chemical from the samples and the replicate samples (SG2 Rep and SG3 Rep), and the cumulative risk and hazard for indoor air were also calculated for each of samples SG1, SG2, SG2 Rep, SG3, and SG3 Rep.

The DTSC vapor intrusion model spreadsheet output results for samples SG1, SG2, SG2 Rep, SG3, and SG3 Rep are summarized in Table 3, along with the calculated cumulative risk and hazard for the highest concentrations encountered in either the samples or the replicate samples for each compound. The model input, intercalcs and output sheets for each calculation are attached with this report as Appendix E. The cumulative hazard quotient was calculated to be less than one and the incremental carcinogenic risk was calculated to be less than 1 in a million for the highest concentration scenario and for each of the samples. Review of Table 3 shows that a majority of both the risk and the hazard in each of the samples and in the highest concentration scenario is from benzene.

Sensitivity analysis of the soil gas model was performed using benzene for a total of eight scenarios, including the DTSC JE model spreadsheet default value scenario for a residential exposure scenario with a soil gas sampling depth of 152.4 cm (5 feet) and a soil type of silt (S). The results of the sensitivity analysis are summarized in Table 4, and the model input, intercalcs and output sheets for each calculation are attached with this report as Appendix F. Review of Table 4 shows that the model is insensitive to average soil temperature and soil type, but is sensitive to soil gas sampling depth and soil gas contaminant concentration.

DISCUSSION AND RECOMMENDATIONS

Review of the soil gas sample results in Table 2 shows that none of the detected compounds in the soil gas samples or the replicate samples exceed their respective May 2008 Table E soil gas vapor intrusion concern Environmental Screening Level concentrations for either residential or commercial/industrial land use scenarios, with the exception of TPH-G at location SG3. Review of Table 3 shows that the cumulative hazard quotient was calculated to be less than one and the cumulative carcinogenic risk was calculated to be less than 1 in a million for all of the samples. Additionally the cumulative hazard quotient was calculated to be less than one and the cumulative carcinogenic risk was calculated to be less than 1 in a million for the highest concentration exposure scenario.

Based on the sample results, P&D recommends that sampling be performed again at the same locations 6 months from the time of the intial soil gas sampling to evaluate soil gas conditions during two different seasons in accordance with DTSC guidance.

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 Xtra Oil Company. 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 the 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 borings 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.

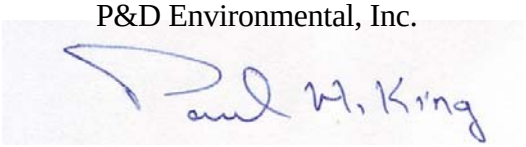
This report has been prepared in accordance with generally accepted practices using standards of care and diligence normally practiced by recognized consulting firms performing services of a similar nature. P&D is not responsible for the accuracy or completeness of information provided by other individuals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

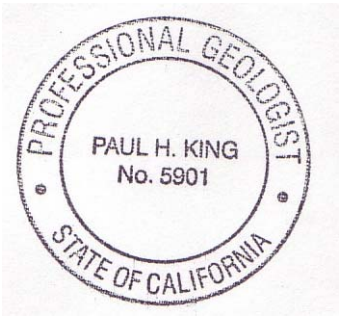
July 11, 2011
Report 0058.R16

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
California Professional Geologist #5901
Expires: 12/31/11

Attachments:

Table 1 - Summary of Borehole Groundwater Sample Analytical Results
Table 2 - Summary of Soil Gas Sample Analytical Results
Table 3 - Summary of Soil Gas Risk and Hazard Analysis
Table 4 - Summary of Soil Gas Model Sensitivity Analysis

Figure 1 - Site Location Map
Figure 2 - Site Vicinity Map Detail Showing Sample Collection
Figure 3 - Typical Soil Gas Sample Collection Manifold

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

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0058.R16

TABLES

TABLE 1

SUMMARY OF BOREHOLE GROUNDWATER SAMPLE ANALYTICAL RESULTS

Sample ID	Sampling Date	TPH-G	TPH-D	TPH-BO	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	Fuel Oxygenates & Lead Scavengers by EPA Method 8260B
B8-W	6/14/2011	ND<50	ND<50	ND<100	0.82	ND<0.5	ND<0.5	ND<0.5	ND<0.5	All ND<0.5, except TBA<2.0
ESL		*100*	*100*	*100*	*5.0*	*1.0*	*40*	*30*	*20*	*Various*

NOTES:
TPH-G = Total Petroleum Hydrocarbons as Gasoline.
TPH-D = Total Petroleum Hydrocarbons as Diesel.
TPH-BO = Total Petroleum Hydrocarbons as Bunker Oil.
MTBE = Methyl-tert butyl Ether.
ESL = Environmental Screening Level, developed by San Francisco Bay – Regional Water Quality Control Board (SF-RWQCB) updated May 2008, from Table A– Groundwate Screening Levels, Groundwater is a current or potential source of drinking water.
BOLD = Concentration in excess of applicable ESL value.
Results and ESLs are in ug/L (micrograms per Liter), unless otherwise indicated.

TABLE 2

SUMMARY OF SOIL GAS SAMPLE ANALYTICAL RESULTS

Sample ID	Sample Date	TPH-G	MTBE	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylenes	TBA	2-Propanol	TO-17 Results
SG1	6/14/2011	3,700	ND<4.4	14	240	30	110	41	ND<15	ND<12	2-Propanol = >2,600, a Naphthalene = 2.1
SG2	6/14/2011	910	ND<4.4	21	36	6.5	28	10	ND<15	13	2-Propanol = ND<49 Naphthalene = 0.94
SG2-Rep	6/14/2011	790	ND<4.1	15	38	7.0	30	9.9	ND<14	23	NA NA
SG3	6/14/2011	**13,000**	ND<4.4	17	140	21	73	30	ND<15	ND<12	2-Propanol = ND<49 Naphthalene = 0.62
SG3-Rep	6/14/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	2-Propanol = ND<49 Naphthalene = 6.1
ESL [1]		*10,000*	*9,400*	*84*	*63,000*	*980*	*m, p, o xylenes 21,000 combined*				*2-Propanol =None* *Naphthalene = 72*
ESL 2		*29,000*	*31,000*	*280*	*180,000*	*3,300*	*m, p, o xylenes58,000 combined*				*2-Propanol =None* *Naphthalene = 240*

Abbreviations and Notes:

TPH-G = Total Petroleum Hydrocarbons as Gasoline.
MTBE = Methyl-tert butyl Ether.
TBA = tert-butyl alcohol.
ND = Not Detected.
NA = Not Analyzed.
a = Laboratory Note: Saturated peak.
2-propanol used in field as leak detector.
ESL[1] = Environmental Screening Level, developed by San Francisco Bay – Regional Water Quality Control Board (SF-RWQCB), from Table E – Indoor Air and Soil Gas (Vapor Intrusion Concerns) Shallow Soil Gas Screening Levels for Residential Land Use.
ESL[2] = Environmental Screening Level, developed by San Francisco Bay – Regional Water Quality Control Board (SF-RWQCB), from Table E – Indoor Air and Soil Gas (Vapor Intrusion Concerns) Shallow Soil Gas Screening Levels for Commercial/Industrial Land Use
Values in bold exceed ESL[1]
Values Underlined exceed ESL[2]
All soil gas samples collected at 5-foot depth.
Results in micrograms per cubic meter (µg/m3), unless otherwise indicated.

TABLE 3

SUMMARY OF SOIL GAS RISK AND HAZARD ANALYSIS

Cal/EPA Screening-Level Model
for Soil Gas Contamination (last modified 2/4/2009)
Xtra Oil Company
1701 Park Street
Alameda, CA
Sampled 6/14/11

Chemical	Sample Location	Concentration ($\mu g/m^3$)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
	SG1			
Benzene		14	1.5E-07	4.1E-04
Toluene		240	NA	7.0E-04
Ethylbenzene		30	2.6E-08	2.4E-05
m,p-Xylenes		110	NA	8.9E-04
o-Xylene		41	NA	3.6E-04
Naphthalene		2.1	2.1E-08	4.7E-04
		TOTALS	**2.0E-07**	**2.9E-03**
	SG2			
Benzene		21	2.3E-07	6.2E-04
Toluene		36	NA	1.1E-04
Ethylbenzene		6.5	5.6E-09	5.2E-06
m,p-Xylenes		28	NA	2.3E-04
o-Xylene		10	NA	8.8E-05
Naphthalene		0.94	9.3E-09	2.1E-04
		TOTALS	**2.4E-07**	**1.3E-03**
	SG2-Rep			
Benzene		15	1.6E-07	4.4E-04
Toluene		38	NA	1.1E-04
Ethylbenzene		7.0	6.0E-09	5.6E-06
m,p-Xylenes		30	NA	2.4E-04
o-Xylene		9.9	NA	8.7E-05
		TOTALS	**1.7E-07**	**8.8E-04**
	SG3			
Benzene		17	1.9E-07	5.0E-04
Toluene		140	NA	4.1E-04
Ethylbenzene		21	1.8E-08	1.7E-05
m,p-Xylenes		73	NA	5.9E-04
o-Xylene		30	NA	2.6E-04
Naphthalene		0.62	6.1E-09	7.4E-04
		TOTALS	**2.1E-07**	**2.5E-03**
	SG3-Rep			
Naphthalene		6.1	6.0E-08	1.4E-03
		TOTALS	**6.0E-08**	**1.4E-03**

NOTES
Used p-Xylene CAS # for m,p-Xylene risk and hazard calculation.
Spreadsheet default values were used, except for vadose zone soil type S (sand) was selected.

Cal/EPA Screening-Level Model
for Soil Gas Contamination (last modified 2/4/2009)
Xtra Oil Company
1701 Park Street
Alameda, CA
Sampled 6/14/11

Chemical	Sample Location	**Highest** Detected Concentration ($\mu g/m^3$)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	SG2	21	2.3E-07	6.2E-04
Toluene	SG1	240	NA	7.0E-04
Ethylbenzene	SG1	30	2.6E-08	2.4E-05
m,p-Xylenes	SG1	110	NA	8.9E-04
o-Xylene	SG1	41	NA	3.6E-04
Naphthalene	SG3-Rep	6.1	6.0E-08	1.4E-03
		TOTALS	**3.2E-07**	**4.0E-03**

NOTES
Used p-Xylene CAS # for m,p-Xylene risk and hazard calculation.
Spreadsheet default values were used, except for vadose zone soil type S (sand) was selected.

TABLE 4

SUMMARY OF SOIL GAS MODEL SENSITIVITY ANALYSIS

USEPA Vapor Intrusion Model (2003)
Johnson and Ettinger model (DTSC spreadsheet)
Xtra Oil Company
1701 Park Street
Alameda, CA

Chemical	Concentration (ug/m^3)	Sample Result Location	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Scenario 1 = Table 3 Highest Concentration with Model Default Values Except for Soil = S .				
Benzene	21	SG2	2.3E-07	6.2E-04
Scenario 2 = Scenario 1 values except average soil temperature is 15 degrees C.				
Benzene	21	SG2	2.3E-07	6.2E-04
Scenario 3 = Scenario 1 values except soil type is CL.				
Benzene	21	SG2	2.3E-07	6.2E-04
Scenario 4 = Scenario 1 values except soil type is SI.				
Benzene	21	SG2	2.3E-07	6.2E-04
Scenario 5 = Scenario 1 values except soil gas sampling depth is 76.20 cm (2.5 ft).				
Benzene	21	SG2	3.5E-07	9.5E-04
Scenario 6 = Scenario 1 values except soil gas sampling depth is 304.8 cm (10 ft).				
Benzene	21	SG2	1.4E-07	3.7E-04
Scenario 7 = Scenario 1 values except benzene concentration = 100 ug/m3.				
Benzene	100	SG2	1.1E-06	2.9E-03
Scenario 8 = Scenario 1 values except benzene concentration = 1,000 ug/m3.				
Benzene	1,000	SG2	1.1E-05	2.9E-02

Report 0058.R16 Soil Gas Model Sensitivity Analysis

FIGURES

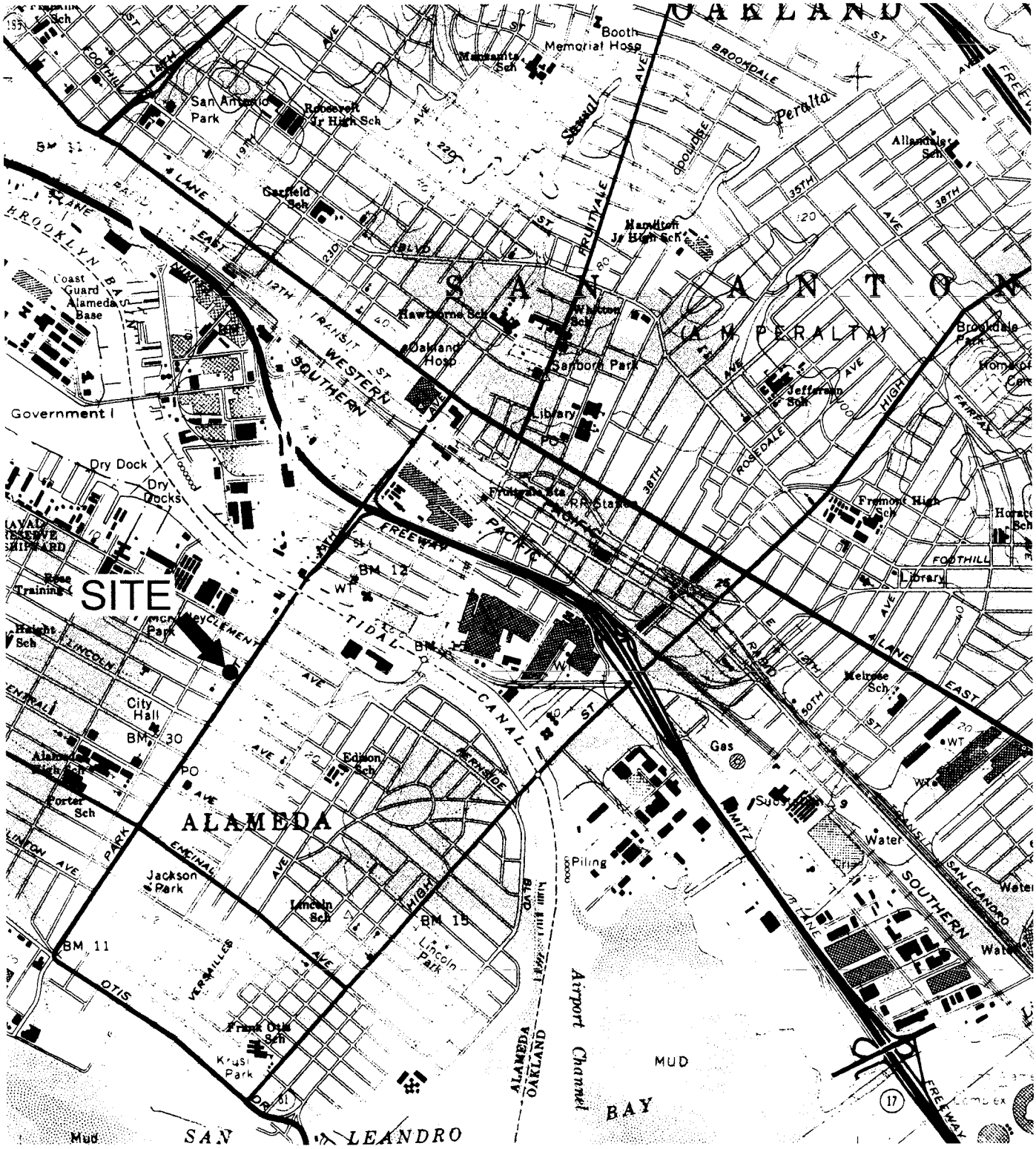


FIGURE 1
Site Location Map
1701 Park Street
Alameda, CA

N

Base Map From:
USGS Topographic Map, 7.5 minute series, Oakland East, Calif. quadrangle, 1980

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

0 1000 2000
SCALE IN FEET

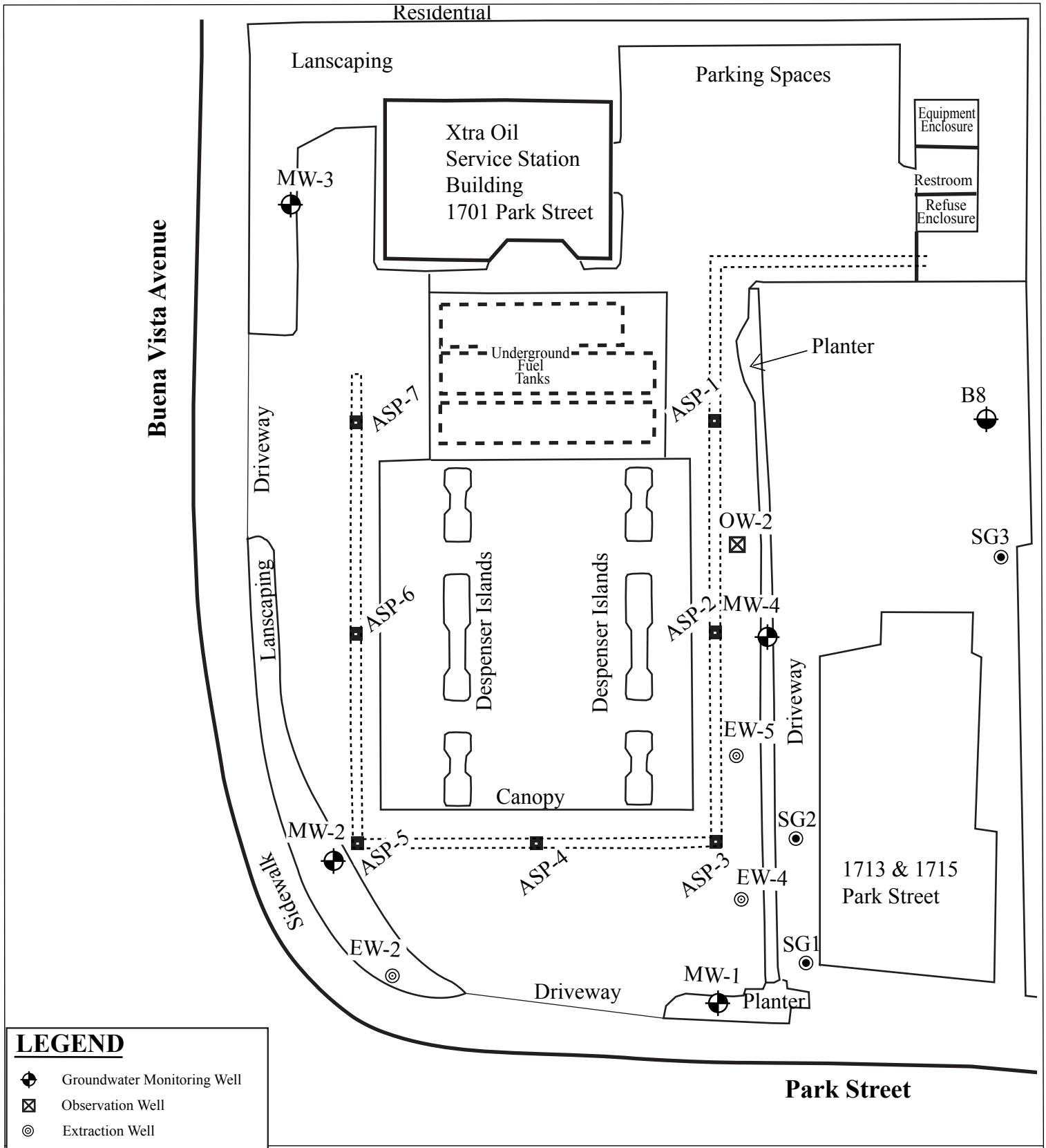


Figure 2
Site Plan Showing Sample Collection Locations
Xtra Oil Company
1701 Park Street
Alameda, California

Basemap from: Alisto Engineering Group September 2005, and Google Earth October 2009

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

0 12.5 25
Approximate Scale in Feet

N

Figure 3
Typical Soil Gas Sample Collection Manifold
Xtra Oil Company
1701 Park Street
Alameda, California

APPENDIX A

Soil Boring Log

P&D ENVIRONMENTAL, INC.

BORING NO.: B8	PROJECT NO.: 0058	PROJECT NAME: Xtra Oil 1701 Park Street, Alameda	
BORING LOCATION: Approximately 26 ft. southeast from northeast corner of Building			ELEVATION AND DATUM: None
DRILLING AGENCY: Vironex	DRILLER: Joe	DATE & TIME STARTED: 6/14/11 1030	DATE & TIME FINISHED: 6/14/11 1400
DRILLING EQUIPMENT: GeoProbe 6610 DT Track Rig			
COMPLETION DEPTH: 12.0 Feet	BEDROCK DEPTH: Not Encountered	LOGGED BY: MLD	CHECKED BY: PHK
FIRST WATER DEPTH: 9.0 Feet	NO. OF SAMPLES: 1Water		

DEPTH (FT.)	DESCRIPTION	GRAPHIC COLUMN	BLOW COUNT PER 6"	WELL CONSTRUCTION LOG	PID	REMARKS
	0.0 to 0.5 ft. Concrete (3-inches) and base rock (FILL).	FILL		No Well Constructed		Borehole continuously cored using a 5.0-foot long 2.0-inch O.D. Geoprobe Macrocore barrel sampler. The sampler was lined with 4.8-foot long 1.5-inch O.D. transparent PVC tubes.
	0.5 to 4.0 ft. Dark grayish-black silty fine sand (SM); loose, moist. No Petroleum Hydrocarbon (PHC) odor.	SM			0	0-5 ft 3.2 ft recovery 5-10 ft 4.6 ft recovery 10-12 ft 2.0 ft recovery
5	4.0 to 6.0 ft. Brown fine sand (SP); loose, moist. No PHC odor.	SP		▼	0	Water encountered during drilling at 9.0 ft. Borehole temporarily terminated at 10.0 ft and temporary 1.0-inch diameter slotted PVC casing placed in borehole. Casing was dry at 1058. Borehole advanced to 12.0 ft.
	6.0 to 8.5 ft. Dark brown clayey fine sand (SC); medium dense, moist to wet. No PHC odor. Wet at 8.5 ft.	SC			0	Water level measured at 9.3 ft at 1112 and at 6.3 ft at 1117. Sample B8-W collected at 1125; no sheen or odor on sample. Depth to water was subsequently measured at 5.9 ft at 1140.
10	9.0 to 12.0 ft. Brown silty fine sand (SM); medium dense, wet to saturated, with orange mottling. No PHC odor. Saturated at 9.0 ft.	SM		▽	0	
					0	
15						Borehole grouted on 6/14/11 using a tremie pipe and neat cement grout. Mr. Steve Miller with Alameda County Public Works Agency on site to observe and document grouting of borehole.
20						
25						
30						

APPENDIX B

Weather Data

Report 0058.R16 Appendix B

http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KCAALAME1&day=14&year=2011&month=6&graphspan=day

History for KCAALAME1

Encinal & Lafayette, Alameda, CA

About This Station

Lat: N 37 ° 46 ' 3 " (37.768 °)
Lon: W 122 ° 15 ' 18 " (-122.255 °)
Elevation (ft): 15
Hardware: Davis Vantage Pro 2
Weather Station Software:

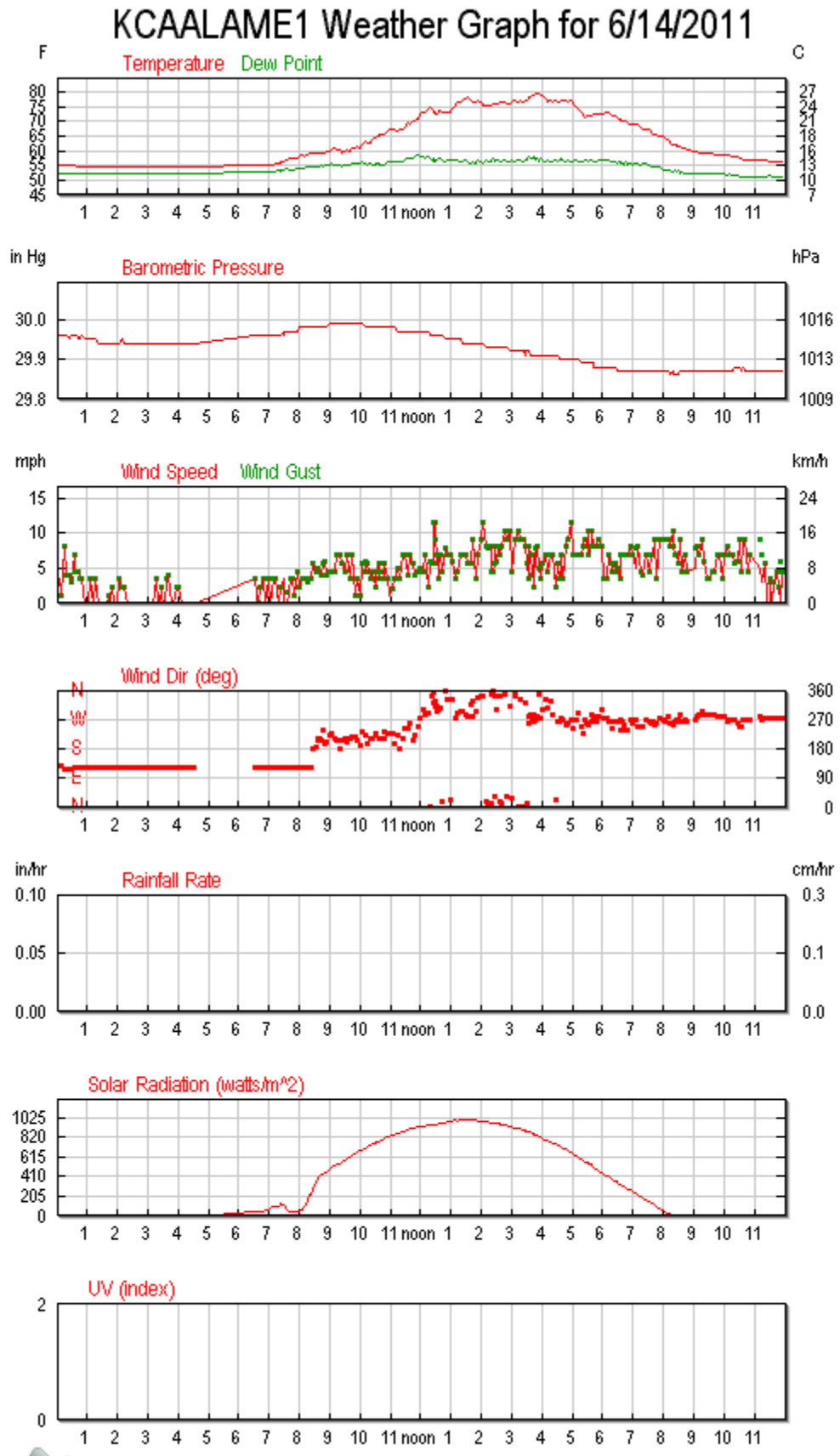
« Previous Day | June | 14 | 2011 | View | Next Day »

Daily Weekly Monthly Yearly Custom

	Current:	High:	Low:	Average:
Temperature:	**60.2** °F	**80.2** °F	**55.2** °F	**65.3** °F
Dew Point:	**54.3** °F	**59.5** °F	**51.9** °F	**55.4** °F
Humidity:	81%	93%	46%	73%
Wind Speed:	**8.1**mph	**11.5**mph	-	**4.8**mph
Wind Gust:	**8.1**mph	**11.5**mph	-	-
Wind:	WSW	-	-	West
Pressure:	**29.93**in	**29.99**in	**29.86**in	-
Precipitation:	**0.00**in			
Solar Radiation:	**383.0** watts/m^2			
UV Index:	**0.0**			

Statistics for the rest of the month

	High:	Low:	Average:
Temperature:	**91.9** °F	**51.1** °F	**60.4** °F
Dew Point:	**62.4** °F	**46.3** °F	**53.0** °F
Humidity:	96.0%	29.0%	78.0%
Wind Speed:	**22.0**mph from the SW	-	**6.3**mph
Wind Gust:	**116.0**mph from the SW	-	-
Wind:	-	-	WSW
Pressure:	**30.14**in	**29.66**in	-
Precipitation:	**2.21**in		


KCAALAME1 Weather Graph for 6/14/2011
F
C
Temperature
Dew Point
80 75 70 65 60 55 50 45
27 24 21 18 16 13 10 7
1 2 3 4 5 6 7 8 9 10 11 noon 1 2 3 4 5 6 7 8 9 10 11
in Hg
hPa
Barometric Pressure
30.0 29.9 29.8
1016 1013 1009
mph
km/h
Wind Speed
Wind Gust
15 10 5 0
24 16 8 0
Wind Dir (deg)
N W S E N
360 270 180 90 0
in/hr
cm/hr
Rainfall Rate
0.10 0.05 0.00
0.3 0.1 0.0
Solar Radiation (watts/m^2)
1025 820 615 410 205 0
UV (index)
2 0
Weather Underground
wunderground.com

http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KCAALAME1&graphspan=custom&month=6&day=1&year=2011&monthend=6&dayend=14&yearend=2011

History for KCAALAME1

Encinal & Lafayette, Alameda, CA

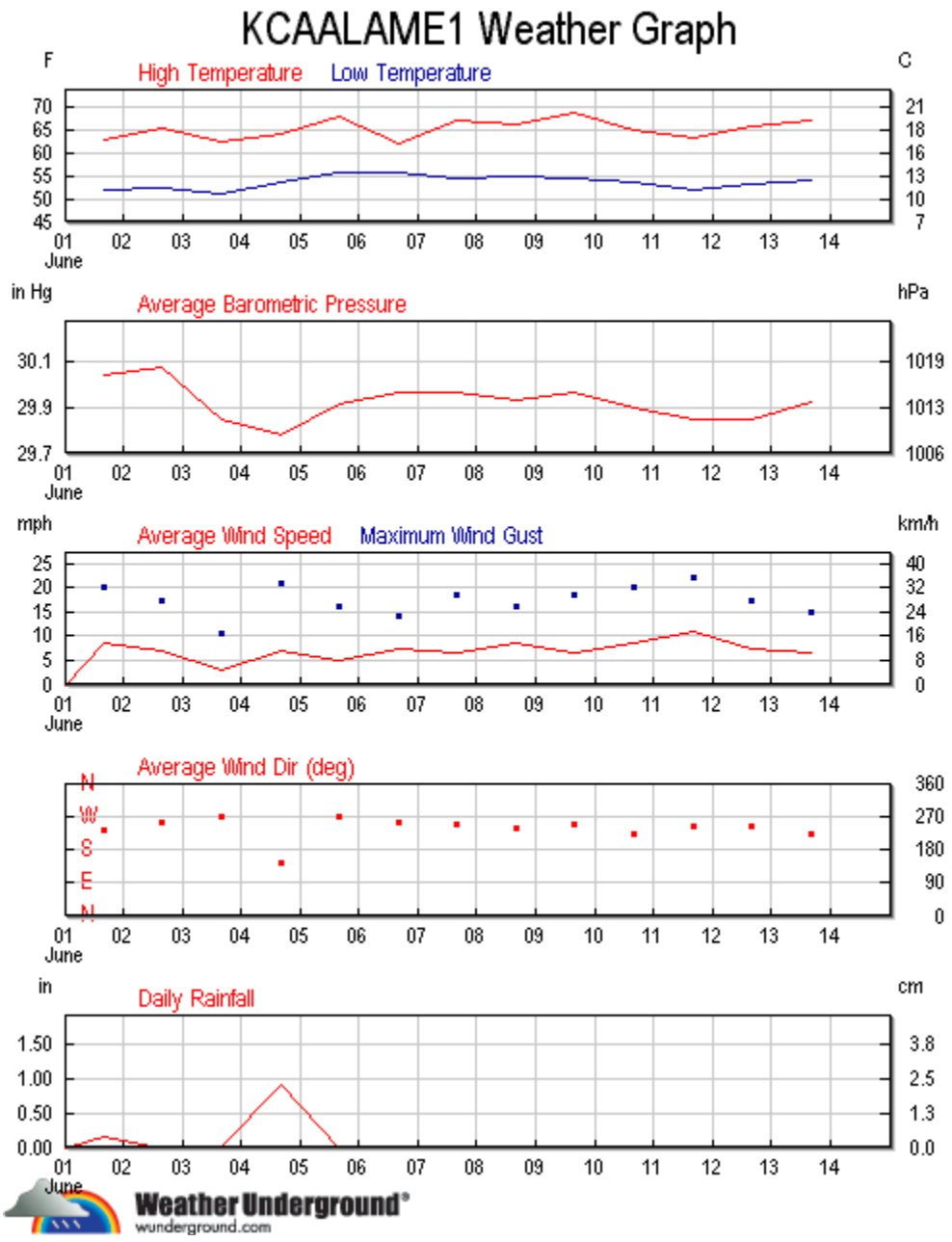
About This Station

Lat: N 37 ° 46 ' 3 " (37.768 °)
Lon: W 122 ° 15 ' 18 " (-122.255 °)
Elevation (ft): 15
Hardware: Davis Vantage Pro 2
Weather Station Software:

June | 1 | 2011 - TO - June | 14 | 2011 | Go

Daily | Weekly | Monthly | Yearly | **Custom**

	High:	Low:	Average:
Temperature:	**80.3** °F	**51.1** °F	**58.6** °F
Dew Point:	**59.5** °F	**46.3** °F	**52.2** °F
Humidity:	96.0%	46.0%	80.0%
Wind Speed:	**22.0**mph from the SW	-	**6.9**mph
Wind Gust:	**22.0**mph from the SW	-	-
Wind:	-	-	WSW
Pressure:	**30.14**in	**29.66**in	-
Precipitation:	**1.10**in		


KCAALAME1 Weather Graph
F
High Temperature
Low Temperature
C
70
65
60
55
50
45
21
18
16
13
10
7
01 02 03 04 05 06 07 08 09 10 11 12 13 14
June
in Hg
Average Barometric Pressure
hPa
30.1
29.9
29.7
1019
1013
1006
01 02 03 04 05 06 07 08 09 10 11 12 13 14
June
mph
Average Wind Speed
Maximum Wind Gust
km/h
25
20
15
10
5
0
40
32
24
16
8
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14
June
Average Wind Dir (deg)
N
W
S
E
N
360
270
180
90
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14
June
in
Daily Rainfall
cm
1.50
1.00
0.50
0.00
3.8
2.5
1.3
0.0
01 02 03 04 05 06 07 08 09 10 11 12 13 14
June
Weather Underground
wunderground.com

http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KCAALAME1&graphspan=custom&month=6&day=1&year=2011&monthend=6&dayend=14&yearend=2011

History for KCAALAME1

Encinal & Lafayette, Alameda, CA

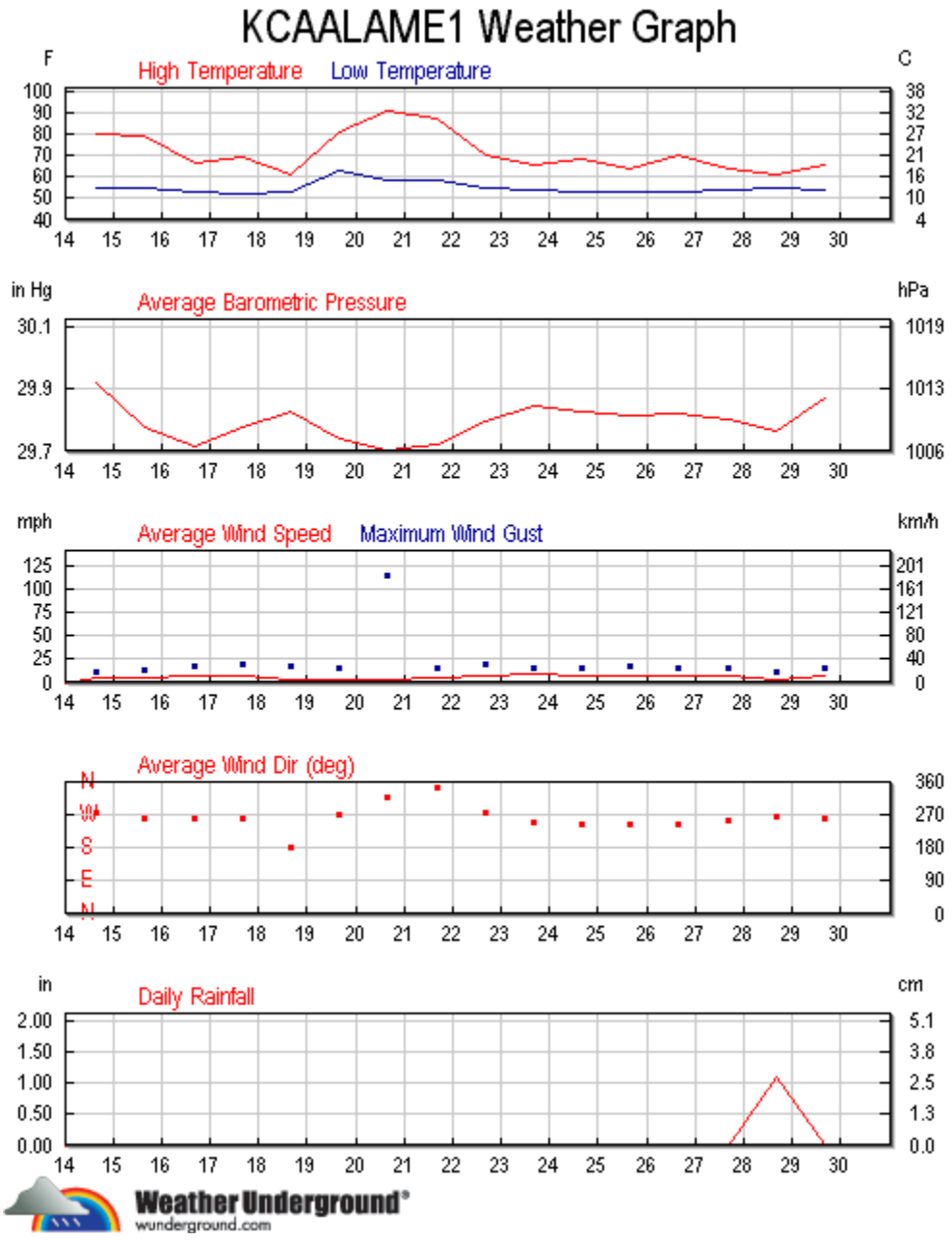
About This Station

Lat: N 37 ° 46 ' 3 " (37.768 °)
Lon: W 122 ° 15 ' 18 " (-122.255 °)
Elevation (ft): 15
Hardware: Davis Vantage Pro 2
Weather Station Software:

June 14 2011 - TO - June 30 2011 Go

Daily Weekly Monthly Yearly **Custom**

	High:	Low:	Average:
Temperature:	**91.9** °F	**52.4** °F	**62.2** °F
Dew Point:	**62.4** °F	**48.8** °F	**53.8** °F
Humidity:	96.0%	29.0%	76.0%
Wind Speed:	**20.0**mph from the WNW	-	**5.7**mph
Wind Gust:	**116.0**mph from the SW	-	-
Wind:	-	-	West
Pressure:	**29.99**in	**29.68**in	-
Precipitation:	**1.11**in		


KCAALAME1 Weather Graph
F
High Temperature
Low Temperature
C
100 90 80 70 60 50 40
38 32 27 21 16 10 4
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
in Hg
Average Barometric Pressure
hPa
30.1 29.9 29.7
1019 1013 1006
mph
Average Wind Speed
Maximum Wind Gust
km/h
125 100 75 50 25 0
201 161 121 80 40 0
Average Wind Dir (deg)
N W S E N
360 270 180 90 0
in
Daily Rainfall
cm
2.00 1.50 1.00 0.50 0.00
5.1 3.8 2.5 1.3 0.0
Weather Underground
wunderground.com

APPENDIX C

Soil Gas Purge Volume Calculations and Soil Gas Sampling Data Sheets

Report 0058.R16
Appendix A
7 feet tubing, 12 inch sand interval

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 in./2, h = 12 in., and porosity = 0.35

V sand interval = 3.14 x (0.5 x 0.5) x 12 x 0.35 = 3.30 cubic inches.

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

V total = 2.31 cubic inches + 3.30 cubic inches = 5.60 cubic inches.

To convert to cubic centimeters:

V total = 5.60 cubic inches x 16.39 cubic centimeters/cubic inches = 91.8 cubic centimeters.

The total volume for 3 purge volumes is calculated as follows:

V purge total = 91.8 cubic centimeters x 3 = 275 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 = 275 cubic centimeters/ 200 cubic centimeters per minute = 1.38 minutes.

Converting the purge time to seconds, 1.38 minutes x 60seconds/ minute = 83 seconds.

Notes:

Yellow hi-lite indicates data entry required.
Blue hi-lite indicates values are calculated.

SOIL GAS SAMPLING DATA SHEET

Address 1713-1717 PARK ST, ALAMEDA
Job # 0022.R1G
Date 6/14/11
P&D Sampler MLD
Drilling Company VIRONEX

Probe Method (check one)
o PRT
x Temp Well

Soil Gas Location Designation	Probe Depth (Ft.)	Time Probe Installed	Canister #	Sample Canister Initial Vacuum Check (In. Hg) and time	Start leak check vacuum (In. Hg) and time	End leak check vacuum (In. Hg) and time	ADDITIONAL leak check vacuum (In. Hg) and time	Start PURGE time	End PURGE time	Start of tracer gas equilibration time	Time and conc. (ppm) of tracer gas equilibration	Begin sample collection vacuum (In. Hg) and time	End sample collection vacuum (In. Hg) and time	NOTES
SG 1	5	1220	30823	vac -30 time 1250	vac -27.5 time 1251	vac -29.5 time 1301	vac time	133000 time	133123 time	133200 time	conc. 75 time 133430	vac -30 time 133500	vac -5 time 133722	FLOW RATE: 200 cm3/min 134100 2 PPM
SG 2	5	1245	22967	vac -30 time 1305	vac -30 time 1306	vac -30 time 131600	vac time	133100 time	133223 time	133300 time	conc. 96 time 133500	vac -30 time 133600	vac -5 time 134412	134200 0 PPM
SG 2 REP	5	1245	33633	vac -30 time 1335	vac -28 time 1340	vac -28 time 1350	vac time	time	time	135015 time	conc. 105 time 135150	vac -30 time 135200	vac -5 time 140005	
SG 3	5	1305	31754	vac -30 time 1308	vac -30 time 1310	vac -30 time 1320	vac time	135600 time	135723 time	135800 time	conc. 107 time 135230	vac -30 time 135900	vac -5 time 140700	140000 5 PPM
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	

SOIL GAS SAMPLING DATA SHEET

Address 1713-1717 PARK ST, ALAMEDA

Job # 0058, 216

Date 6/14/11

P&D Sampler MD

Drilling Company VIRONEX

Probe Method (check one)
o PRT
X Temp Well

Soil Gas Location Designation	Probe Depth (Ft.)	Time Probe Installed	Canister #	Sample Canister Initial Vacuum Check (In. Hg) and time	Start leak check vacuum (In. Hg) and time	End leak check vacuum (In. Hg) and time	ADDITIONAL leak check vacuum (In. Hg) and time	Start PURGE time	End PURGE time	Start of tracer gas equilibration time	Time and conc. (ppm) of tracer gas equilibration	Begin sample collection vacuum (In. Hg) and time	End sample collection vacuum (In. Hg) and time	NOTES
SG 1	5		G0143677	vac time	vac time	vac time	vac time	time	time	time 143200	conc. 94 time 143530	vac time 143600	vac time 144100	SORBENT TUBES
SG 2	5		G0137151	vac time	vac time	vac time	vac time	time	time	time 150000	conc. 102 time 150400	vac time 150500	vac time 151000	FLOW RATE: 200 cm³/min
SG 3	5		G0143670	vac time	vac time	vac time	vac time	time	time	time 152900	conc. 98 time 153230	vac time 153300	vac time 153800	
SG 3 REP	5		G0132039	vac time	vac time	vac time	vac time	time	time	time 154200	conc. 92 time 154430	vac time 154500	vac time 155000	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	
SG				vac time	vac time	vac time	vac time	time	time	time	conc. time	vac time	vac time	

APPENDIX D

Laboratory Analytical Reports and Chain of Custody Documentation

- **McCampbell Work Order # 1106518 - Borehole B8 grab groundwater sample results**
- **Air Toxics Work Order # 1106401B - Soil gas samples SG1, SG2, SG2 Rep, and SG3 TPH-G Modified TO-3 results**
- **Air Toxics Work Order # 1106401AR1 - Soil gas samples SG1, SG2, SG2 Rep, and SG3 MBTEX, TBA, and 2-Propanol Modofied TO-15 results**
- **Air Toxics Work Order # 1106369 - Soil gas samples SG1, SG2, SG3, and SG3 Rep, Naphthalene and 2-Propanol Modified TO-17 VI results**

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

Analytical Report

P & D Environmental	Client Project ID: #0058; Xtra Oil 1701 Park Street Alameda	Date Sampled: 06/14/11
		Date Received: 06/15/11
55 Santa Clara, Ste.240	Client Contact: Paul King	Date Reported: 06/23/11
Oakland, CA 94610	Client P.O.:	Date Completed: 06/17/11

WorkOrder: 1106518

June 23, 2011

Dear Paul:

Enclosed within are:

1) The results of the **1** analyzed sample from your project: **#0058; Xtra Oil 1701 Park Street Alameda,**
2) A QC report for the above sample,
3) A copy of the chain of custody, and
4) An invoice for analytical services.

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

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

McCampbell Analytical Laboratories for your analytical needs.

Best regards,

Angela Rydelius
Laboratory Manager
McCampbell Analytical, Inc.

The analytical results relate only to the items tested.

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

1106518

w/ silica gel cleanup and centrifuge

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJECT NUMBER:	PROJECT NAME:
0058	XTRA OIL 1701 PARK STREET ALAMEDA

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

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION	NUMBER OF CONTAINERS (dissolved)	ANALYSIS(ES): TPH(G,D,BO) BY MODIFIED EPA 8015	BTEX, GEL OXYGENATES, LEAD SCAVENGERS BY EPA 8260	PRESERVATIVE	REMARKS
X	B8-W	6/14/11	1125	H2O		7	X	X	ICE	NORMAL TURNAROUND

ICE/t° 2.2
GOOD CONDITION ____ APPROPRIATE CONTAINERS ____
HEAD SPACE ABSENT ____ PRESERVED IN LAB ____
DECHLORINATED IN LAB ____
VOAS | O&G | METALS | OTHER
PRESERVATION ____

RELINQUISHED BY: (SIGNATURE) Michael Deschenes	DATE 6/15	TIME 1629	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF SAMPLES (THIS SHIPMENT) 1 TOTAL NO. OF CONTAINERS (THIS SHIPMENT) 7	LABORATORY: MC CAMPBELL ANALYTICAL
RELINQUISHED BY: (SIGNATURE)	DATE 6/15	TIME 1755	RECEIVED BY: (SIGNATURE)	LABORATORY CONTACT: ANGELA RYDELIUS	LABORATORY PHONE NUMBER: (877) 252-9262
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( )YES (X)NO	

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

REMARKS: ALL SAMPLE CONTAINERS PRESERVED WITH HCL

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

CHAIN-OF-CUSTODY RECORD

WorkOrder: 1106518 **ClientCode: PDEO**

☐ WaterTrax ☐ 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: #0058; Xtra Oil 1701 Park Street Alameda

Bill to:
Accounts Payable
Xtra Oil Company
2307 Pacific Avenue
Alameda, CA 94501

Requested TAT: 5 days

Date Received: **06/15/2011**
Date Printed: **06/16/2011**

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
1106518-001	B8-W	Water	6/14/2011	☐	A	B										

Test Legend:

1	G-MBTEX_W	2	MBTEXOXYPBSCV-8260B_W	3		4		5	
6		7		8		9		10	
11		12							

The following SampID: 001A contains testgroup.

Prepared by: Zoraida Cortez

Comments:

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

McCampbell Analytical, Inc.
"When Quality Counts"

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

Sample Receipt Checklist

Client Name: **P & D Environmental**
Date and Time Received: **6/15/2011 7:45:50 PM**

Project Name: **#0058; Xtra Oil 1701 Park Street Alameda**
Checklist completed and reviewed by: Zoraida Cortez

WorkOrder N°: **1106518** Matrix Water
Carrier: Benjamin Yslas (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: 2.2°C		NA ☐
Water - VOA vials have zero headspace / no bubbles?	Yes ☑	No ☐	No VOA vials submitted ☐
Sample labels checked for correct preservation?	Yes ☑	No ☐	
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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P & D Environmental	Client Project ID: #0058; Xtra Oil 1701 Park Street Alameda	Date Sampled: 06/14/11
		Date Received: 06/15/11
55 Santa Clara, Ste.240	Client Contact: Paul King	Date Extracted 06/16/11
Oakland, CA 94610	Client P.O.:	Date Analyzed 06/16/11

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline *

Extraction method: SW5030B Analytical methods: SW8015Bm Work Order: 1106518

Lab ID	Client ID	Matrix	TPH(g)	DF	% SS	Comments
001A	B8-W	W	ND	1	97	

Reporting Limit for DF =1; ND means not detected at or above the reporting limit	W	50	µg/L	
	S	NA	NA	

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

cluttered chromatogram; sample peak coelutes w/surrogate peak; low surrogate recovery due to matrix interference. %SS = Percent Recovery of Surrogate Standard; DF = Dilution Factor

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

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Angela Rydelius, Lab Manager

McCampbell Analytical, Inc.
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Telephone: 877-252-9262 Fax: 925-252-9269

P & D Environmental	Client Project ID: #0058; Xtra Oil 1701 Park Street Alameda	Date Sampled: 06/14/11
		Date Received: 06/15/11
55 Santa Clara, Ste.240	Client Contact: Paul King	Date Extracted: 06/16/11
Oakland, CA 94610	Client P.O.:	Date Analyzed: 06/16/11

Oxygenates, MBTEX & Lead Scavengers by GC/MS*

Extraction Method: SW5030B Analytical Method: SW8260B Work Order: 1106518

Lab ID	1106518-001B				Reporting Limit for DF =1		
Client ID	B8-W						
Matrix	W						
DF	1					S	W
Compound	**Concentration**					ug/kg	µg/L
tert-Amyl methyl ether (TAME)	ND					NA	0.5
Benzene	ND					NA	0.5
t-Butyl alcohol (TBA)	ND					NA	2.0
1,2-Dibromoethane (EDB)	ND					NA	0.5
1,2-Dichloroethane (1,2-DCA)	ND					NA	0.5
Diisopropyl ether (DIPE)	ND					NA	0.5
Ethylbenzene	ND					NA	0.5
Ethyl tert-butyl ether (ETBE)	ND					NA	0.5
Methyl-t-butyl ether (MTBE)	0.82					NA	0.5
Toluene	ND					NA	0.5
Xylenes, Total	ND					NA	0.5
Surrogate Recoveries (%)							
%SS1:	125						
%SS2:	107						
%SS3:	87						
Comments							

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

ND means not detected above the reporting limit/method detection limit; N/A means analyte not applicable to this analysis.

surrogate diluted out of range or coelutes with another peak; &) low surrogate due to matrix interference.

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

DHS ELAP Certification 1644

Angela Rydelius, Lab Manager

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P & D Environmental	Client Project ID: #0058; Xtra Oil 1701 Park Street Alameda	Date Sampled: 06/14/11
		Date Received: 06/15/11
55 Santa Clara, Ste.240	Client Contact: Paul King	Date Extracted: 06/15/11
Oakland, CA 94610	Client P.O.:	Date Analyzed: 06/23/11

Total Extractable Petroleum Hydrocarbons with Silica Gel Clean-Up (Decanted)*

Extraction method: SW3510C/3630C Analytical methods: SW8015B Work Order: 1106518

Lab ID	Client ID	Matrix	TPH-Diesel (C10-C23)	TPH-Bunker Oil (C10-C36)	DF	% SS	Comments
1106518-001A	B8-W	W	ND	ND	1	102	

Reporting Limit for DF =1; ND means not detected at or above the reporting limit	W	50	100	µg/L
	S	NA	NA	mg/Kg

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

#) cluttered chromatogram resulting in coeluted surrogate and sample peaks, or; surrogate peak is on elevated baseline, or; surrogate has been diminished by dilution of original extract; &) low or no surrogate due to matrix interference.

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

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

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Angela Rydelius, Lab Manager

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QC SUMMARY REPORT FOR SW8021B/8015Bm

W.O. Sample Matrix: Water QC Matrix: Water BatchID: 59074 WorkOrder: 1106518

EPA Method: SW8021B/8015Bm **Extraction: SW5030B** **Spiked Sample ID: 1106506-002A**

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	101	99.2	1.97	101	104	2.78	70 - 130	20	70 - 130	20
MTBE	ND	10	112	122	8.66	115	120	3.80	70 - 130	20	70 - 130	20
Benzene	ND	10	94	101	7.21	97.8	101	2.97	70 - 130	20	70 - 130	20
Toluene	ND	10	94.9	101	6.29	97.8	101	2.77	70 - 130	20	70 - 130	20
Ethylbenzene	ND	10	94.7	100	5.66	96	99.5	3.59	70 - 130	20	70 - 130	20
Xylenes	ND	30	97.6	104	5.88	99.1	103	3.47	70 - 130	20	70 - 130	20
%SS:	99	10	96	96	0	96	97	1.16	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 59074 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
1106518-001A	06/14/11	06/16/11	06/16/11 8:37 PM				

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

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

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

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

cluttered chromatogram; sample peak coelutes with surrogate peak.

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

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

DHS ELAP Certification 1644 QA/QC Officer

McCampbell Analytical, Inc.
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QC SUMMARY REPORT FOR SW8260B

W.O. Sample Matrix: Water QC Matrix: Water BatchID: 59106 WorkOrder: 1106518

EPA Method: SW8260B **Extraction: SW5030B** **Spiked Sample ID: 1106520-002A**

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
tert-Amyl methyl ether (TAME)	ND	10	86.5	84.8	2.00	83.8	82.8	1.15	70 - 130	30	70 - 130	30
Benzene	ND	10	99.3	96.7	2.71	100	98.2	2.12	70 - 130	30	70 - 130	30
t-Butyl alcohol (TBA)	ND	50	84.8	85.5	0.902	83.2	86	3.23	70 - 130	30	70 - 130	30
1,2-Dibromoethane (EDB)	ND	10	97.9	97	0.857	98.3	96.5	1.91	70 - 130	30	70 - 130	30
1,2-Dichloroethane (1,2-DCA)	0.78	10	89.1	87.4	1.81	94.1	94	0.115	70 - 130	30	70 - 130	30
Diisopropyl ether (DIPE)	ND	10	106	102	3.07	105	103	2.02	70 - 130	30	70 - 130	30
Ethyl tert-butyl ether (ETBE)	ND	10	100	100	0	101	99	2.19	70 - 130	30	70 - 130	30
Methyl-t-butyl ether (MTBE)	ND	10	104	104	0	104	102	2.06	70 - 130	30	70 - 130	30
Toluene	ND	10	104	98.1	5.67	104	102	2.23	70 - 130	30	70 - 130	30
%SS1:	130	25	115	116	0.733	116	116	0	70 - 130	30	70 - 130	30
%SS2:	105	25	106	104	1.78	106	106	0	70 - 130	30	70 - 130	30
%SS3:	84	2.5	90	91	1.20	93	96	3.08	70 - 130	30	70 - 130	30

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

BATCH 59106 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
1106518-001B	06/14/11	06/16/11	06/16/11 9:21 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.

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

NR = 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.

Laboratory extraction solvents such as methylene chloride and acetone may occasionally appear in the method blank at low levels.

DHS ELAP Certification 1644

QA/QC Officer

McCampbell Analytical, Inc.
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Web: www.mccampbell.com E-mail: main@mccampbell.com
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QC SUMMARY REPORT FOR SW8015B

W.O. Sample Matrix: Water QC Matrix: Water BatchID: 59025 WorkOrder: 1106518

EPA Method: SW8015B **Extraction: SW3510C/3630C** **Spiked Sample ID: N/A**

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-Diesel (C10-C23)	N/A	1000	N/A	N/A	N/A	102	104	1.65	N/A	N/A	70 - 130	30
%SS:	N/A	625	N/A	N/A	N/A	99	101	1.08	N/A	N/A	70 - 130	30

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

BATCH 59025 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
1106518-001A	06/14/11	06/15/11	06/23/11 3:16 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.

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

NR = 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.

DHS ELAP Certification 1644

QA/QC Officer

Air Toxics LTD.
Laboratory Services Since 1989

6/23/2011
Mr. Paul King
P & D Environmental
55 Santa Clara
Suite 240
Oakland CA 94610

Project Name: XTRA OIL 1701 PARK ST. ALAMEDA
Project #: 0058
Workorder #: 1106401B

Dear Mr. Paul King

The following report includes the data for the above referenced project for sample(s) received on 6/17/2011 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-3 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

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

Regards,

Kyle Vagadori

Project Manager

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 1106401B

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 #**	0058 XTRA OIL 1701 PARK ST. ALAMEDA
DATE RECEIVED:	06/17/2011	**CONTACT:**	Kyle Vagadori
DATE COMPLETED:	06/23/2011		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SG-1	Modified TO-3	5.5 "Hg	15 psi
02A	SG-2	Modified TO-3	5.5 "Hg	15 psi
03A	SG-2 REP	Modified TO-3	3.5 "Hg	15 psi
04A	SG-3	Modified TO-3	5.0 "Hg	15 psi
05A	Lab Blank	Modified TO-3	NA	NA
06A	LCS	Modified TO-3	NA	NA
06AA	LCSD	Modified TO-3	NA	NA

CERTIFIED BY: Linda J. Fruman DATE: 06/23/11

Laboratory Director

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

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

LABORATORY NARRATIVE
Modified TO-3
P & D Environmental
Workorder# 1106401B

Four 1 Liter Summa Canister samples were received on June 17, 2011. The laboratory performed analysis for volatile organic compounds in air via modified EPA Method TO-3 using gas chromatography with flame ionization detection. The method involves concentrating up to 200 mL of sample. The concentrated aliquot is then dry purged to remove water vapor prior to entering the chromatographic system. The TPH (Gasoline Range) results are calculated using the response factor of Gasoline. A molecular weight of 100 is used to convert the TPH (Gasoline Range) ppmv result to ug/L.

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

Requirement	***TO-3***	***ATL Modifications***
Daily Calibration Standard Frequency	Prior to sample analysis and every 4 - 6 hrs	Prior to sample analysis and after the analytical batch </= 20 samples
Initial Calibration Calculation	4-point calibration using a linear regression model	5-point calibration using average Response Factor
Initial Calibration Frequency	Weekly	When daily calibration standard recovery is outside 75 - 125 %, or upon significant changes to procedure or instrumentation
Moisture Control	Nafion system	Sorbent system
Minimum Detection Limit (MDL)	Calculated using the equation DL = A+3.3S, where A is intercept of calibration line and S is the standard deviation of at least 3 reps of low level standard	40 CFR Pt. 136 App. B
Preparation of Standards	Levels achieved through dilution of gas mixture	Levels achieved through loading various volumes of the gas mixture

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit.
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 detection limit.
M - Reported value may be biased due to apparent matrix interferences.

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

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED EPA METHOD TO-3 GC/FID

Client Sample ID: SG-1

Lab ID#: 1106401B-01A

Compound	Rpt. Limit (ppmv)	Rpt. Limit (ug/L)	Amount (ppmv)	Amount (ug/L)
TPH (Gasoline Range)	0.062	0.25	0.90	3.7

Client Sample ID: SG-2

Lab ID#: 1106401B-02A

Compound	Rpt. Limit (ppmv)	Rpt. Limit (ug/L)	Amount (ppmv)	Amount (ug/L)
TPH (Gasoline Range)	0.062	0.25	0.22	0.91

Client Sample ID: SG-2 REP

Lab ID#: 1106401B-03A

Compound	Rpt. Limit (ppmv)	Rpt. Limit (ug/L)	Amount (ppmv)	Amount (ug/L)
TPH (Gasoline Range)	0.057	0.23	0.19	0.79

Client Sample ID: SG-3

Lab ID#: 1106401B-04A

Compound	Rpt. Limit (ppmv)	Rpt. Limit (ug/L)	Amount (ppmv)	Amount (ug/L)
TPH (Gasoline Range)	0.060	0.25	3.3	13

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Client Sample ID: SG-1

Lab ID#: 1106401B-01A

MODIFIED EPA METHOD TO-3 GC/FID

File Name:	**d062008**	**Date of Collection: 6/14/11 1:39:00 PM**	
Dil. Factor:	**2.47**	**Date of Analysis: 6/20/11 01:01 PM**	

Compound	**Rpt. Limit (ppmv)**	**Rpt. Limit (ug/L)**	**Amount (ppmv)**	**Amount (ug/L)**
TPH (Gasoline Range)	0.062	0.25	0.90	3.7

Container Type: 1 Liter Summa Canister

Surrogates	**%Recovery**	**Method Limits**
Fluorobenzene (FID)	82	75-150

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Client Sample ID: SG-2

Lab ID#: 1106401B-02A

MODIFIED EPA METHOD TO-3 GC/FID

File Name:	**d062009**	**Date of Collection: 6/14/11 1:44:00 PM**	
Dil. Factor:	**2.47**	**Date of Analysis: 6/20/11 01:55 PM**	

Compound	Rpt. Limit (ppmv)	Rpt. Limit (ug/L)	Amount (ppmv)	Amount (ug/L)
TPH (Gasoline Range)	0.062	0.25	0.22	0.91

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Fluorobenzene (FID)	82	75-150

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Client Sample ID: SG-2 REP

Lab ID#: 1106401B-03A

MODIFIED EPA METHOD TO-3 GC/FID

File Name:	**d062010**	**Date of Collection: 6/14/11 2:01:00 PM**	
Dil. Factor:	**2.29**	**Date of Analysis: 6/20/11 02:28 PM**	

Compound	Rpt. Limit (ppmv)	Rpt. Limit (ug/L)	Amount (ppmv)	Amount (ug/L)
TPH (Gasoline Range)	0.057	0.23	0.19	0.79

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Fluorobenzene (FID)	84	75-150

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Client Sample ID: SG-3

Lab ID#: 1106401B-04A

MODIFIED EPA METHOD TO-3 GC/FID

File Name:	**d062012**	**Date of Collection: 6/14/11 2:07:00 PM**	
Dil. Factor:	**2.42**	**Date of Analysis: 6/20/11 03:54 PM**	

Compound	**Rpt. Limit (ppmv)**	**Rpt. Limit (ug/L)**	**Amount (ppmv)**	**Amount (ug/L)**
TPH (Gasoline Range)	0.060	0.25	3.3	13

Container Type: 1 Liter Summa Canister

Surrogates	**%Recovery**	**Method Limits**
Fluorobenzene (FID)	81	75-150

Air Toxics LTD.
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Client Sample ID: Lab Blank

Lab ID#: 1106401B-05A

MODIFIED EPA METHOD TO-3 GC/FID

File Name:	**d062005**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 6/20/11 09:35 AM**	

Compound	Rpt. Limit (ppmv)	Rpt. Limit (ug/L)	Amount (ppmv)	Amount (ug/L)
TPH (Gasoline Range)	0.025	0.10	Not Detected	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Fluorobenzene (FID)	83	75-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 1106401B-06A

MODIFIED EPA METHOD TO-3 GC/FID

File Name:	**d062003**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 6/20/11 07:59 AM**	

Compound	**%Recovery**
TPH (Gasoline Range)	96

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
Fluorobenzene (FID)	87	75-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCSD

Lab ID#: 1106401B-06AA

MODIFIED EPA METHOD TO-3 GC/FID

File Name:	**d062015**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 6/20/11 05:45 PM**	

Compound	**%Recovery**
TPH (Gasoline Range)	86

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
Fluorobenzene (FID)	86	75-150

1106401

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:
0058	XTRA OIL 1701 PARK ST. ALAMEDA

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

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION (INITIAL, SUMMA#, FINAL, PID)	NUMBER OF CONTAINERS	ANALYSIS(ES): TPH-G BY TO-3	MBTEX, TBA, 2-PROPANOL BY TO-15	PRESERVATIVE	REMARKS
01A	SG-1	6/14/11	135922	SOIL GAS	-30 30823 -5 2PPM	1	X	X	ICE	NORMAL TURN AROUND
02A	SG-2	↓	134412	↓	-30 22967 -5 0PPM	1	X	X	↓	SIGNMA
03A	SG-2 REP		140105	↓	-30 33633 -5 0PPM	1	X	X		
04A	SG-3	↓	140700	↓	-30 31754 -5 5PPM	1	X	X	↓	↓

FED EX

CUSTODY SEAL INTACT? Y N NONE TEMP: N/A

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF SAMPLES (THIS SHIPMENT): 4	LABORATORY:
Michael Deschenes	6/17/11	0900	ATL	TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 4	AIR TOXICS, LTD
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	LABORATORY CONTACT: KYLE VAGADORI	LABORATORY PHONE NUMBER: (916) 985-1000
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( )YES (X)NO	

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

REMARKS: 2-PROPANOL WAS OUR TRACER GAS

Air Toxics LTD.
Laboratory Services Since 1989

7/7/2011
Mr. Paul King
P & D Environmental
55 Santa Clara
Suite 240
Oakland CA 94610

Project Name: XTRA OIL 1701 PARK ST. ALAMEDA
Project #: 0058
Workorder #: 1106401AR1

Dear Mr. Paul King

The following report includes the data for the above referenced project for sample(s) received on 6/17/2011 at Air Toxics Ltd.

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

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

Regards,

Kyle Vagadori

Project Manager

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 1106401AR1

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 #**	0058 XTRA OIL 1701 PARK ST. ALAMEDA
DATE RECEIVED:	06/17/2011	**CONTACT:**	Kyle Vagadori
DATE COMPLETED:	06/24/2011		
DATE REISSUED:	07/07/2011		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SG-1	Modified TO-15	5.5 "Hg	15 psi
02A	SG-2	Modified TO-15	5.5 "Hg	15 psi
03A	SG-2 REP	Modified TO-15	3.5 "Hg	15 psi
04A	SG-3	Modified TO-15	5.0 "Hg	15 psi
05A	Lab Blank	Modified TO-15	NA	NA
06A	CCV	Modified TO-15	NA	NA
07A	LCS	Modified TO-15	NA	NA
07AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY: Linda J. Furman DATE: 07/07/11

Laboratory Director

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

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

LABORATORY NARRATIVE
EPA Method TO-15
P & D Environmental
Workorder# 1106401AR1

Four 1 Liter Summa Canister samples were received on June 17, 2011. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

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

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

All Quality Control Limit exceedences and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page.

THE WORKORDER WAS REISSUED ON 7/7/11 TO REPORT THE ADDITIONAL COMPOUND 2-PROPANOL AS REQUIRED BY THE SPECIFIC CLIENT OR PROJECT.

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 and/or LCS.
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

Air Toxics LTD.
Laboratory Services Since 1989

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

Client Sample ID: SG-1

Lab ID#: 1106401AR1-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	1.2	4.3	3.9	14
Ethyl Benzene	1.2	7.0	5.4	30
Toluene	1.2	64	4.6	240
m,p-Xylene	1.2	26	5.4	110
o-Xylene	1.2	9.5	5.4	41

Client Sample ID: SG-2

Lab ID#: 1106401AR1-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	1.2	6.5	3.9	21
Ethyl Benzene	1.2	1.5	5.4	6.5
Toluene	1.2	9.6	4.6	36
m,p-Xylene	1.2	6.4	5.4	28
o-Xylene	1.2	2.4	5.4	10
2-Propanol	4.9	5.2	12	13

Client Sample ID: SG-2 REP

Lab ID#: 1106401AR1-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	1.1	4.8	3.6	15
Ethyl Benzene	1.1	1.6	5.0	7.0
Toluene	1.1	10	4.3	38
m,p-Xylene	1.1	6.8	5.0	30
o-Xylene	1.1	2.3	5.0	9.9
2-Propanol	4.6	9.3	11	23

Client Sample ID: SG-3

Lab ID#: 1106401AR1-04A

Air Toxics LTD.
Laboratory Services Since 1989

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

Client Sample ID: SG-3

Lab ID#: 1106401AR1-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	1.2	5.3	3.9	17
Ethyl Benzene	1.2	4.8	5.2	21
Toluene	1.2	36	4.6	140
m,p-Xylene	1.2	17	5.2	73
o-Xylene	1.2	6.9	5.2	30

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: SG-1

Lab ID#: 1106401AR1-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**3062229r1**	**Date of Collection: 6/14/11 1:39:00 PM**	
Dil. Factor:	**2.47**	**Date of Analysis: 6/22/11 10:58 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	1.2	4.3	3.9	14
Ethyl Benzene	1.2	7.0	5.4	30
Toluene	1.2	64	4.6	240
m,p-Xylene	1.2	26	5.4	110
o-Xylene	1.2	9.5	5.4	41
tert-Butyl alcohol	4.9	Not Detected	15	Not Detected
2-Propanol	4.9	Not Detected	12	Not Detected
Methyl tert-butyl ether	1.2	Not Detected	4.4	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	123	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	99	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: SG-2

Lab ID#: 1106401AR1-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**3062230r1**	**Date of Collection:**	**6/14/11 1:44:00 PM**
Dil. Factor:	**2.47**	**Date of Analysis:**	**6/22/11 11:18 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	1.2	6.5	3.9	21
Ethyl Benzene	1.2	1.5	5.4	6.5
Toluene	1.2	9.6	4.6	36
m,p-Xylene	1.2	6.4	5.4	28
o-Xylene	1.2	2.4	5.4	10
tert-Butyl alcohol	4.9	Not Detected	15	Not Detected
2-Propanol	4.9	5.2	12	13
Methyl tert-butyl ether	1.2	Not Detected	4.4	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	121	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	102	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: SG-2 REP

Lab ID#: 1106401AR1-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**3062231r1**	**Date of Collection:**	**6/14/11 2:01:00 PM**
Dil. Factor:	**2.29**	**Date of Analysis:**	**6/22/11 11:36 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	1.1	4.8	3.6	15
Ethyl Benzene	1.1	1.6	5.0	7.0
Toluene	1.1	10	4.3	38
m,p-Xylene	1.1	6.8	5.0	30
o-Xylene	1.1	2.3	5.0	9.9
tert-Butyl alcohol	4.6	Not Detected	14	Not Detected
2-Propanol	4.6	9.3	11	23
Methyl tert-butyl ether	1.1	Not Detected	4.1	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	124	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	100	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: SG-3

Lab ID#: 1106401AR1-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**3062232r1**	**Date of Collection:**	**6/14/11 2:07:00 PM**
Dil. Factor:	**2.42**	**Date of Analysis:**	**6/22/11 11:54 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	1.2	5.3	3.9	17
Ethyl Benzene	1.2	4.8	5.2	21
Toluene	1.2	36	4.6	140
m,p-Xylene	1.2	17	5.2	73
o-Xylene	1.2	6.9	5.2	30
tert-Butyl alcohol	4.8	Not Detected	15	Not Detected
2-Propanol	4.8	Not Detected	12	Not Detected
Methyl tert-butyl ether	1.2	Not Detected	4.4	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	126	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	99	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 1106401AR1-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**3062209a**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 6/22/11 12:29 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.50	Not Detected	1.6	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
tert-Butyl alcohol	2.0	Not Detected	6.1	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	118	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	99	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: CCV

Lab ID#: 1106401AR1-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**3062202**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 6/22/11 08:06 AM**	

Compound	%Recovery
Benzene	105
Ethyl Benzene	105
Toluene	104
m,p-Xylene	103
o-Xylene	106
tert-Butyl alcohol	95
2-Propanol	118
Methyl tert-butyl ether	87

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	116	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	98	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 1106401AR1-07A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**3062203c**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 6/22/11 08:43 AM**	

Compound	%Recovery
Benzene	104
Ethyl Benzene	101
Toluene	102
m,p-Xylene	102
o-Xylene	103
tert-Butyl alcohol	60
2-Propanol	118
Methyl tert-butyl ether	89

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	115	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	96	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCSD

Lab ID#: 1106401AR1-07AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**3062204c**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 6/22/11 09:16 AM**	

Compound	%Recovery
Benzene	104
Ethyl Benzene	104
Toluene	101
m,p-Xylene	103
o-Xylene	103
tert-Butyl alcohol	58 Q
2-Propanol	118
Methyl tert-butyl ether	86

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	113	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	98	70-130

1106401

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:
0058	XTRA OIL 1701 PARK ST. ALAMEDA

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

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION (INITIAL, SUMMA#, FINAL, PID)	NUMBER OF CONTAINERS	ANALYSIS(ES): TPH-G BY TO-3	MBTEX, TBA, 2-PROPANOL BY TO-15	PRESERVATIVE	REMARKS
01A	SG-1	6/14/11	135922	SOIL GAS	-30 30823 -5 2PPM	1	X	X	ICE	NORMAL TURN AROUND
02A	SG-2	↓	134412	↓	-30 22967 -5 0PPM	1	X	X	↓	SIGNMA
03A	SG-2 REP		140105	↓	-30 33633 -5 0PPM	1	X	X		
04A	SG-3	↓	140700	↓	-30 31754 -5 5PPM	1	X	X	↓	↓

FED EX

CUSTODY SEAL INTACT? Y N NONE TEMP: N/A

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF SAMPLES (THIS SHIPMENT): 4	LABORATORY:
Michael Deschenes	6/17/11	0900	ATL	TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 4	AIR TOXICS, LTD
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	LABORATORY CONTACT: KYLE VAGADORI	LABORATORY PHONE NUMBER: (916) 985-1000
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( )YES (X)NO	

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

REMARKS: 2-PROPANOL WAS OUR TRACER GAS

Air Toxics LTD.
Laboratory Services Since 1989

6/24/2011
Mr. Paul King
P & D Environmental
55 Santa Clara
Suite 240
Oakland CA 94610

Project Name: XTRA OIL 1701 PARK ST ALAMEDA
Project #: 0058
Workorder #: 1106369

Dear Mr. Paul King

The following report includes the data for the above referenced project for sample(s) received on 6/17/2011 at Air Toxics Ltd.

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

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

Regards,

Kyle Vagadori

Project Manager

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 1106369

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 #**	0058 XTRA OIL 1701 PARK ST ALAMEDA
DATE RECEIVED:	06/17/2011	**CONTACT:**	Kyle Vagadori
DATE COMPLETED:	06/24/2011		

FRACTION #	NAME	TEST
01A	SG1	Modified TO-17 VI
02A	SG2	Modified TO-17 VI
03A	SG3	Modified TO-17 VI
04A	SG3-REP	Modified TO-17 VI
05A	Lab Blank	Modified TO-17 VI
05B	Lab Blank	Modified TO-17 VI
06A	CCV	Modified TO-17 VI
06B	CCV	Modified TO-17 VI
07A	LCS	Modified TO-17 VI
07AA	LCSD	Modified TO-17 VI
07B	LCS	Modified TO-17 VI
07BB	LCSD	Modified TO-17 VI

CERTIFIED BY: Linda D. Frumarn DATE: 06/24/11

Laboratory Director

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

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

LABORATORY NARRATIVE
EPA Method TO-17
P & D Environmental
Workorder# 1106369

Four TO-17 VI Tube samples were received on June 17, 2011. The laboratory performed the analysis via EPA Method TO-17 using GC/MS in the full scan mode. TO-17 sorbent tubes are thermally desorbed onto a secondary trap. The trap is thermally desorbed to elute the components into the GC/MS system for further separation.

Receiving Notes

A Temperature Blank was included with the shipment. Temperature was measured and was not within 4±2 °C. Coolant in the form of blue ice was present. Analysis proceeded.

Analytical Notes

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

Results reported for 2-Propanol in sample SG1 may be biased low due to extreme saturation.

The recovery of surrogates 1,2-Dichloroethane-d4 and Naphthalene-d8 in sample SG3-REP was outside the laboratory limits of 50-150%.

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 and/or LCS.
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

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
EPA METHOD TO-17

Client Sample ID: SG1

Lab ID#: 1106369-01A

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
2-Propanol	49	49	>2600 S	>2600 S
Naphthalene	0.50	0.50	2.1	2.1

Client Sample ID: SG2

Lab ID#: 1106369-02A

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	0.50	0.50	0.94	0.94

Client Sample ID: SG3

Lab ID#: 1106369-03A

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	0.50	0.50	0.62	0.62

Client Sample ID: SG3-REP

Lab ID#: 1106369-04A

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	0.50	0.50	6.1	6.1

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: SG1

Lab ID#: 1106369-01A

EPA METHOD TO-17

File Name:	**f062016**	**Date of Extraction: NA**	**Date of Collection: 6/14/11 2:41:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 6/20/11 07:41 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
2-Propanol	49	49	>2600 S	>2600 S
Naphthalene	0.50	0.50	2.1	2.1

S = Saturated peak; data reported as estimated.

Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	138	50-150
Toluene-d8	114	50-150
Naphthalene-d8	138	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: SG2

Lab ID#: 1106369-02A

EPA METHOD TO-17

File Name:	**f062017**	**Date of Extraction: NA**	**Date of Collection: 6/14/11 3:10:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 6/20/11 08:21 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
2-Propanol	49	49	Not Detected	Not Detected
Naphthalene	0.50	0.50	0.94	0.94

Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	126	50-150
Toluene-d8	108	50-150
Naphthalene-d8	135	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: SG3

Lab ID#: 1106369-03A

EPA METHOD TO-17

File Name:	**11062210**	**Date of Extraction: NA**	**Date of Collection: 6/14/11 3:38:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 6/22/11 12:21 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
2-Propanol	49	49	Not Detected	Not Detected
Naphthalene	0.50	0.50	0.62	0.62

Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	116	50-150
Toluene-d8	92	50-150
Naphthalene-d8	103	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: SG3-REP

Lab ID#: 1106369-04A

EPA METHOD TO-17

File Name:	**f062019**	**Date of Extraction: NA**	**Date of Collection: 6/14/11 3:50:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 6/20/11 09:21 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
2-Propanol	49	49	Not Detected	Not Detected
Naphthalene	0.50	0.50	6.1	6.1

Q = Exceeds Quality Control limits.

Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	156 Q	50-150
Toluene-d8	138	50-150
Naphthalene-d8	182 Q	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 1106369-05A

EPA METHOD TO-17

File Name:	**f062014**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 6/20/11 06:27 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
2-Propanol	49	49	Not Detected	Not Detected
Naphthalene	0.50	0.50	Not Detected	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	132	50-150
Toluene-d8	106	50-150
Naphthalene-d8	124	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 1106369-05B

EPA METHOD TO-17

File Name:	**11062209**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 6/22/11 10:57 AM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
2-Propanol	49	49	Not Detected	Not Detected
Naphthalene	0.50	0.50	Not Detected	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	117	50-150
Toluene-d8	137	50-150
Naphthalene-d8	94	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: CCV

Lab ID#: 1106369-06A

EPA METHOD TO-17

File Name:	**f062012**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 6/20/11 04:45 PM**

Compound	%Recovery
2-Propanol	115
Naphthalene	114

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	127	50-150
Toluene-d8	104	50-150
Naphthalene-d8	130	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: CCV

Lab ID#: 1106369-06B

EPA METHOD TO-17

File Name:	**11062202**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 6/21/11 10:34 PM**

Compound	**%Recovery**
2-Propanol	105
Naphthalene	76

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	95	50-150
Toluene-d8	81	50-150
Naphthalene-d8	79	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS
Lab ID#: 1106369-07A
EPA METHOD TO-17

File Name:	**f062010**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 6/20/11 03:34 PM**

Compound	**%Recovery**
2-Propanol	82
Naphthalene	136

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	130	50-150
Toluene-d8	103	50-150
Naphthalene-d8	143	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCSD

Lab ID#: 1106369-07AA

EPA METHOD TO-17

File Name:	**f062011**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 6/20/11 04:06 PM**

Compound	%Recovery
2-Propanol	81
Naphthalene	138

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	126	50-150
Toluene-d8	104	50-150
Naphthalene-d8	138	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS
Lab ID#: 1106369-07B
EPA METHOD TO-17

File Name:	**11062203**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 6/21/11 11:14 PM**

Compound	%Recovery
2-Propanol	82
Naphthalene	89

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	50-150
Toluene-d8	90	50-150
Naphthalene-d8	77	50-150

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCSD

Lab ID#: 1106369-07BB

EPA METHOD TO-17

File Name:	**11062204**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 6/21/11 11:54 PM**

Compound	%Recovery
2-Propanol	90
Naphthalene	93

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	87	50-150
Toluene-d8	89	50-150
Naphthalene-d8	73	50-150

* Original in box w/ Summas *

1106369

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:
0058	XTRA OIL 1701 PARK ST ALAMEDA

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

	SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION (START TIME / TUBE # / END TIME)	NUMBER OF CONTAINERS	ANALYSIS(ES): HAPs/TPH(ALEHG)/2-PROPANOL BY TO-17	PRESERVATIVE	REMARKS
01A	SG1	6/14/11	14:41:00	Soil Gas	14:36:00 / G0143697 / 14:41:00	1	X	ICE	NORMAL TURNAROUND
02A	SG2	"	15:10:00	"	15:05:00 / G0137151 / 15:10:00	1	X	"	SORBENT TUBE
03A	SG3	"	15:38:00	"	15:33:00 / G0143670 / 15:38:00	1	X	"	"
04A	SG3-REP	"	15:50:00	"	15:45:00 / G0138039 / 15:50:00	1	X	"	"

Fedex

CUSTODY SEAL INTACT?
Y N (NONE) TEMP N/A

BM 17.1°C
6/17/11

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF SAMPLES (THIS SHIPMENT)	LABORATORY:
Michael Deschenes			B. Wattenberg ATL 6/17/11 0900	4	AIR TOXICS, LTD
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF CONTAINERS (THIS SHIPMENT) 4	LABORATORY CONTACT: KYLE JACADI
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( )YES (✓)NO	LABORATORY PHONE NUMBER: (916) 985-1000

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

REMARKS: 2-PROPANOL WAS OUR TRACER GAS

APPENDIX E

Soil Gas Risk and Hazard Calculation Work Sheets

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	1.40E+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 (cm²)
15	152.4	24	S		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.5	0.43	0.15	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	1.40E+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	1.40E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	1.29E-02

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

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.5E-07	4.1E-04

MESSAGE SUMMARY BELOW:

END

SG1 Toluene 240 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	2.40E+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 (^{o}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	S		

MORE

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

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	2.40E+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	2.40E+02	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	2.20E-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	7.0E-04

MESSAGE SUMMARY BELOW:

END

SG1 Ethylbenzene 30 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	3.00E+01			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	S		

MORE

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

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	3.00E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,994	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	3.00E+01	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	2.49E-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)
2.6E-08	2.4E-05

MESSAGE SUMMARY BELOW:

END

SG1 m,p-Xylenes 110 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
106423	1.10E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	1.10E+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	1.10E+02	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	9.30E-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	8.9E-04

MESSAGE SUMMARY BELOW:

END

SG1 o-Xylenes 41 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	4.10E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	4.10E+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	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	4.10E+01	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	3.75E-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	3.6E-04

MESSAGE SUMMARY BELOW:

END

SG1 Naphthalene 2.1 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
91203	2.10E+00			Naphthalene

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 (^{o}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	S		

MORE

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

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	2.10E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	12,768	4.48E-04	1.84E-02	1.80E-04	4.61E-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	2.10E+00	1.25	8.33E+01	4.61E-03	5.00E+03	5.18E+15	7.05E-04	1.48E-03

Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.4E-05	3.0E-03

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)
2.1E-08	4.7E-04

MESSAGE SUMMARY BELOW:

END

SG2 Benzene 21 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.10E+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	S		

MORE

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

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	2.10E+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	2.10E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	1.94E-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)
2.3E-07	6.2E-04

MESSAGE SUMMARY BELOW:

END

SG2 Toluene 36 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	3.60E+01			Toluene

MORE ↓

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

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	3.60E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,001	6.29E-03	2.58E-01	1.80E-04	6.79E-03	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	3.60E+01	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	3.29E-02

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	1.1E-04

MESSAGE SUMMARY BELOW:

END

SG2 Ethylbenzene 6.5 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (□g/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	6.50E+00			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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	6.50E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,994	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	6.50E+00	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	5.41E-03

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)
5.6E-09	5.2E-06

MESSAGE SUMMARY BELOW:

END

SG2 m,p-Xylenes 28 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
106423	2.80E+01			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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	2.80E+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	10,083	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	2.80E+01	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	2.37E-02

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

END

SG2 m,p-Xylenes 28 ug/m^3

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	2.3E-04

MESSAGE SUMMARY BELOW:

END

SG2 o-Xylenes 10 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	1.00E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	1.00E+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	1.00E+01	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	9.15E-03

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	8.8E-05

MESSAGE SUMMARY BELOW:

END

SG2 Naphthalene 0.94 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
91203	9.40E-01			Naphthalene

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 (^{o}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	S		

MORE

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

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	9.40E-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	12,768	4.48E-04	1.84E-02	1.80E-04	4.61E-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	9.40E-01	1.25	8.33E+01	4.61E-03	5.00E+03	5.18E+15	7.05E-04	6.63E-04

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.4E-05	3.0E-03

END

SG2 Naphthalene 0.94 ug/m^3

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)
9.3E-09	2.1E-04

MESSAGE SUMMARY BELOW:

END

SG2 Rep Benzene 15 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	1.50E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	1.50E+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	1.50E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	1.38E-02

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

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.6E-07	4.4E-04

MESSAGE SUMMARY BELOW:

END

SG2 Rep Toluene 38 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	3.80E+01			Toluene

MORE ↓

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

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	3.80E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,001	6.29E-03	2.58E-01	1.80E-04	6.79E-03	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	3.80E+01	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	3.48E-02

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	1.1E-04

MESSAGE SUMMARY BELOW:

END

SG2 Rep Ethylbenzene 7.0 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	7.00E+00			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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	7.00E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,994	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	7.00E+00	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	5.82E-03

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)
6.0E-09	5.6E-06

MESSAGE SUMMARY BELOW:

END

SG2 Rep m,p-Xylenes 30 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
106423	3.00E+01			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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	3.00E+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	10,083	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	3.00E+01	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	2.54E-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	2.4E-04

MESSAGE SUMMARY BELOW:

END

SG2 Rep o-Xylenes 9.9ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	9.90E+00			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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

SG2 Rep o-Xylenes 9.9 ug/m^3

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	0.257	1.02E-07	0.703	7.15E-08	4,000	9.90E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	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	9.90E+00	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	9.06E-03

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	8.7E-05

MESSAGE SUMMARY BELOW:

END

SG3 Benzene 17 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	1.70E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	1.70E+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	1.70E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	1.57E-02

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

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.9E-07	5.0E-04

MESSAGE SUMMARY BELOW:

END

SG3 Toluene 140 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	1.40E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	1.40E+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	1.40E+02	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	1.28E-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	4.1E-04

MESSAGE SUMMARY BELOW:

END

SG3 Ethylbenzene 21 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	2.10E+01			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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	2.10E+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	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	2.10E+01	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	1.75E-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)
1.8E-08	1.7E-05

MESSAGE SUMMARY BELOW:

END

SG3 m,p-Xylenes 73 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
106423	7.30E+01			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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	7.30E+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	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	7.30E+01	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	6.17E-02

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

END

SG3 m,p-Xylenes 73 ug/m^3

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	5.9E-04

MESSAGE SUMMARY BELOW:

END

SG3 o-Xylenes 30 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (□g/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	3.00E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	3.00E+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	3.00E+01	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	2.75E-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	2.6E-04

MESSAGE SUMMARY BELOW:

END

SG3 Naphthalene 0.62ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
91203	6.20E-01			Naphthalene

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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	6.20E-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	12,768	4.48E-04	1.84E-02	1.80E-04	4.61E-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	6.20E-01	1.25	8.33E+01	4.61E-03	5.00E+03	5.18E+15	7.05E-04	4.37E-04

Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.4E-05	3.0E-03

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)
6.1E-09	1.4E-04

MESSAGE SUMMARY BELOW:

END

SG3 Rep Naphthalene 6.1 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
91203	6.10E+00			Naphthalene

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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	6.10E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	12,768	4.48E-04	1.84E-02	1.80E-04	4.61E-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+00	1.25	8.33E+01	4.61E-03	5.00E+03	5.18E+15	7.05E-04	4.30E-03

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.4E-05	3.0E-03

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)
6.0E-08	1.4E-03

MESSAGE SUMMARY BELOW:

END

Highest Concentration
SG2 Benzene 21 ug/m^3

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.10E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Highest Concentration
SG2 Benzene 21 ug/m^3

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	0.257	1.02E-07	0.703	7.15E-08	4,000	2.10E+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	2.10E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	1.94E-02

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

END

Highest Concentration
SG2 Benzene 21 ug/m^3

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.3E-07	6.2E-04

MESSAGE SUMMARY BELOW:

END

Highest Concentration
SG1 Toluene 240 ug/m^3

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	2.40E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Highest Concentration
SG1 Toluene 240 ug/m^3

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	0.257	1.02E-07	0.703	7.15E-08	4,000	2.40E+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	2.40E+02	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	2.20E-01

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

END

Highest Concentration
SG1 Toluene 240 ug/m^3

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	7.0E-04

MESSAGE SUMMARY BELOW:

END

Highest Concentration

SG1 Ethylbenzene 30 ug/m^3

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	3.00E+01			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 (^oC)	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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Highest Concentration
SG1 Ethylbenzene 30 ug/m^3

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	0.257	1.02E-07	0.703	7.15E-08	4,000	3.00E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,994	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	3.00E+01	1.25	8.33E+01	5.85E-03	5.00E+03	2.36E+12	8.32E-04	2.49E-02

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

END

Highest Concentration
SG1 Ethylbenzene 30 ug/m^3

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.6E-08	2.4E-05

MESSAGE SUMMARY BELOW:

END

Highest Concentration
SG1 m,p-Xylenes 110 ug/m^3

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
106423	1.10E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Highest Concentration
SG1 m,p-Xylenes 110 ug/m^3

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	0.257	1.02E-07	0.703	7.15E-08	4,000	1.10E+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	1.10E+02	1.25	8.33E+01	6.00E-03	5.00E+03	1.17E+12	8.45E-04	9.30E-02

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

END

Highest Concentration
SG1 m,p-Xylenes 110 ug/m^3

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	8.9E-04

MESSAGE SUMMARY BELOW:

END

Highest Concentration
SG1 o-Xylenes 41 ug/m^3

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	4.10E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Highest Concentration
SG1 o-Xylenes 41 ug/m^3

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	0.257	1.02E-07	0.703	7.15E-08	4,000	4.10E+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	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	4.10E+01	1.25	8.33E+01	6.79E-03	5.00E+03	4.63E+10	9.15E-04	3.75E-02

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

END

Highest Concentration
SG1 o-Xylenes 41 ug/m^3

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	3.6E-04

MESSAGE SUMMARY BELOW:

END

Highest Concentration

SG3 Rep Naphthalene 6.1 ug/m^3

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (ug/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
91203	6.10E+00			Naphthalene

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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Highest Concentration

SG3 Rep Naphthalene 6.1 ug/m^3

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	0.257	1.02E-07	0.703	7.15E-08	4,000	6.10E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	12,768	4.48E-04	1.84E-02	1.80E-04	4.61E-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+00	1.25	8.33E+01	4.61E-03	5.00E+03	5.18E+15	7.05E-04	4.30E-03

Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.4E-05	3.0E-03

END

Highest Concentration

SG3 Rep Naphthalene 6.1 ug/m^3

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)
6.0E-08	1.4E-03

MESSAGE SUMMARY BELOW:

END

APPENDIX F

Soil Gas Model Sensitivity Analysis Risk and Hazard Calculation Work Sheets

Scenario 1
Table 3 Highest Concentration
Model Default Values Except Soil Type = S

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.10E+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	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	2.10E+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	2.10E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	1.94E-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)
2.3E-07	6.2E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

Scenario 2
Scenario 1 Values Except Average Soil Temperature is 15°C

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.10E+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 (cm²)
15	152.4	15	S		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.5	0.43	0.15	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.00E-07	0.703	7.04E-08	4,000	2.10E+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	8,071	3.45E-03	1.46E-01	1.77E-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	2.10E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	1.94E-02

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

END

Scenario 2
Scenario 1 Values Except Average Soil Temperature is 15°C

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.3E-07	6.2E-04

MESSAGE SUMMARY BELOW:

END

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Scenario 3
Scenario 1 Values Except Soil Type = CL

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (□g/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.10E+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	CL		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Scenario 3
Scenario 1 Values Except Soil Type = CL

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	0.202	1.29E-09	0.891	1.15E-09	4,000	2.10E+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	2.10E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	1.94E-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

Scenario 3
Scenario 1 Values Except Soil Type = CL

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.3E-07	6.2E-04

MESSAGE SUMMARY BELOW:

END

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Scenario 4
Scenario 1 Values Except Soil Type = SI

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.10E+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)
SI	1.5	0.43	0.15	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Scenario 4
Scenario 1 Values Except Soil Type = SI

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	2.10E+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	2.10E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	1.94E-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

Scenario 4
Scenario 1 Values Except Soil Type = SI

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.3E-07	6.2E-04

MESSAGE SUMMARY BELOW:

END

Scenario 5
Scenario 1 Values Except
Sampling Depth = 76.20 cm (2.5 ft)

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.10E+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	76.2	24	S		

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Scenario 5
Scenario 1 Values Except
Sampling Depth = 76.20 cm (2.5 ft)

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)
61.2	0.280	0.257	1.02E-07	0.703	7.15E-08	4,000	2.10E+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	61.2

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	2.10E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	1.41E-03	2.96E-02

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

END

Scenario 5
Scenario 1 Values Except
Sampling Depth = 76.20 cm (2.5 ft)

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)
3.5E-07	9.5E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

Scenario 6
Scenario 1 Values Except
Sampling Depth = 304.8 cm (10 ft)

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.10E+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 (cm²)
15	304.8	24	S		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.5	0.43	0.15	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Scenario 6
Scenario 1 Values Except
Sampling Depth = 304.8 cm (10 ft)

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)
289.8	0.280	0.257	1.02E-07	0.703	7.15E-08	4,000	2.10E+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	289.8

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	2.10E+01	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	5.44E-04	1.14E-02

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

END

Scenario 6
Scenario 1 Values Except
Sampling Depth = 304.8 cm (10 ft)

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)
1.4E-07	3.7E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

Scenario 7
Scenario 1 Values Except
Benzene Concentration = 100 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

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

MORE ↓

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

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

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	0.257	1.02E-07	0.703	7.15E-08	4,000	1.00E+02	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	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	6.86E-03	5.00E+03	3.50E+10	9.22E-04	9.22E-02

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

END

Scenario 7
Scenario 1 Values Except
Benzene Concentration = 100 ug/m^3

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)
1.1E-06	2.9E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

Scenario 8
Scenario 1 Values Except
Benzene Concentration = 1,000 ug/m^3

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

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

Soil Gas Concentration Data

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

MORE ↓

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

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Scenario 8
Scenario 1 Values Except
Benzene Concentration = 1,000 ug/m^3

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.280	0.257	1.02E-07	0.703	7.15E-08	4,000	1.00E+03	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	6.86E-03	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+03	1.25	8.33E+01	6.86E-03	5.00E+03	3.50E+10	9.22E-04	9.22E-01

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

END

RESULTS SHEET

Scenario 8
Scenario 1 Values Except
Benzene Concentration = 1,000 ug/m^3

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.1E-05	2.9E-02

MESSAGE SUMMARY BELOW:

END