July 14, 2008

VIA ALAMEDA COUNTY FTP SITE

Mr. Paresh Khatri
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: **Additional Soil Gas Sampling Report**
Former Exxon Station
5175 Broadway Street
Oakland, California
ACEH Fuel Leak Case No. RO0000139

Dear Mr. Khatri:

On behalf of Rockridge Heights, LLC, Pangea Environmental Services, Inc. has prepared this *Additional Soil Gas Sampling Report* for the subject site. This report describes offsite soil gas and subslab gas sampling performed in response to ACEH letter dated June 10, 2008.

If you have any questions or comments, please call me at (510) 435-8664 or email briddell@pangeaenv.com.

Sincerely,
Pangea Environmental Services, Inc.

Bob Clark-Riddell, P.E.
Principal Engineer

Attachment: *Additional Soil Gas Sampling Report*

cc: Rockridge Heights, LLC, C/O Gary Feiner, 34 Schooner Hill, Oakland, California 94618
Vera Stanovich, 1956 Stratton Circle, Walnut Creek, California 94598
SWRCB Geotracker (Electronic copy)

ADDITIONAL SOIL GAS SAMPLING REPORT

Former Exxon Station
5175 Broadway
Oakland, California

July 14, 2008

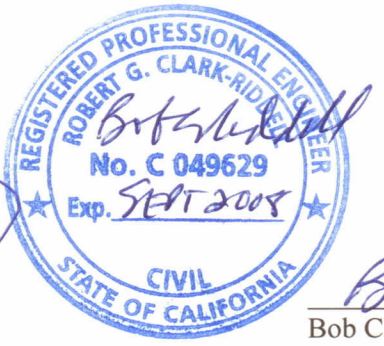
Prepared for:

Rockridge Heights, LLC
C/O Gary Feiner
34 Schooner Hill
Oakland, California 94618

Prepared by:

Pangea Environmental Services, Inc.
1710 Franklin Street, Suite 200
Oakland, California 94612

Written by:



David S. Diamond, Ph.D., C.Hg.
Senior Hydrogeologist

Bob Clark-Riddell, P.E.
Principal Engineer

INTRODUCTION

On behalf of Rockridge Heights, LLC, Pangea Environmental Services, Inc. (Pangea) prepared this *Soil Gas Sampling Report* (report) for the subject site. The work was recommended in Pangea's *Additional Soil Gas Sampling and Well Installation Report* (Report) dated October 23, 2007 and approved in an Alameda County Environmental Health (ACEH) letter dated June 10, 2008 (Appendix A). Some of the sampling locations proposed in the Report were moved based on the configuration of the partial subsurface basement in the adjacent residential building. The site background, soil/subslab gas sampling, and our conclusions and recommendations are described below.

SITE BACKGROUND

Site Location and Description

The subject property is located at 5175 Broadway Street, at the southwest corner of the intersection of Broadway and Coronado Avenue in Oakland, California in Alameda County (Figure 1). The site is approximately 0.6 miles south-southeast of Highway 24 and approximately 2.3 miles east of Interstate 80 and the San Francisco Bay. The property is relatively flat lying, with a slight slope to the south-southwest, and lies at an elevation of approximately 160 feet above mean sea level. Topographic relief in the area surrounding the site also slopes generally towards the south-southwest. The western site boundary is the top of an approximately 10 foot high retaining wall that separates the site from an adjacent apartment complex.

The property has been vacant since 1979 and was formerly occupied by an Exxon Service Station used for fuel sales and automobile repair. The site is approximately 13,200 square feet in area with about 10% of the area occupied by a vacant station/garage structure. The majority of the ground surface is paved with concrete and/or asphalt. Land use to the west and northwest is residential, including apartment buildings and single family homes. Properties to the northeast, east and south of the site are commercial. The site and adjacent properties are shown on Figure 2.

Summary of Previous Environmental Investigations

Environmental compliance work commenced when three 8,000-gallon steel single-walled USTs, associated piping, and a 500-gallon steel single-walled waste oil tank were removed in January 1990. Tank Protect Engineering, Inc. (TPE) conducted the tank removal and observed holes in all four tanks. Groundwater was reportedly observed to stabilize in the UST excavation between 10.5 and 11 feet bgs. Approximately 700 tons of contaminated soil was excavated during tank removal and was subsequently remediated and reused for onsite backfill by TPE. In April 1990, TPE installed and sampled monitoring wells MW-1, MW-2 and MW-3. In June 1991, Soil Tech Engineering (STE), subsequently renamed Environmental Soil Tech Consultants (ESTC), installed monitoring wells STMW-4 and STMW-5. Groundwater monitoring was conducted on the

site intermittently until October 2002. Golden Gate Tank Removal (GGTR) performed additional assessment in January and February 2006, including collection of soil and/or groundwater samples from ten onsite soil borings. In June 2006, the property was purchased by Rockridge Heights, LLC. Pangea commenced quarterly groundwater monitoring at the site in July 2006. Additional assessment was performed by Pangea in January, March and April 2007, including the destruction of four monitoring wells and installation of twelve new wells to help define the vertical and lateral extent of groundwater contamination. In April 2007, Pangea conducted a dual phase extraction/air sparging test (DPE/AS) to evaluate potentially applicable remedial alternatives for remediating residual site contaminants. Details of the additional assessment are included in Pangea's *Site Investigation Report* dated July 17, 2007, while the DPE/AS testing findings are reported in Pangea's *Feasibility Test Report and Interim Remedial Action Plan* (IRAP) dated July 20, 2007. For additional consideration of soil gas conditions, Pangea presents soil vapor concentrations from DPE testing on Table 1 and Figure 2 (Note that these vapor concentrations are not fully comparable to soil gas concentrations obtained from shallower gas probes with limited purging methods). Additional soil gas and subslab gas sampling was performed in June 2008, as described below.

SOIL/SUBSLAB GAS SAMPLING

To evaluate shallow subsurface gas conditions near and beneath offsite buildings, Pangea conducted soil and subslab gas sampling from six temporary probe locations on June 17, 2008. The sampling locations, shown on Figure 2, included four shallow soil gas probes (SG-4 through SG-7) and re-sampling of two existing subslab gas probes (SS-1 and SS-2). Sample depth intervals and soil gas analytical results are summarized on Table 1. The sampling procedures are described below.

Temporary soil gas probes (SGPs) SG-4 through SG-7 were installed adjacent to the eastern and/or southern sides of the apartment building immediately west of the site at 5230 Coronado Avenue. During soil gas sampling activities, Pangea met with the property owner and gained access to the basement at 5230 Coronado Avenue. The basement is approximately level with the outside grade at the southern end of the building and gets deeper below grade toward the northern end of the building. The basement is used for storage, and includes a concrete floor, plywood walls and vents.

The existing subslab gas probe (SS) sampling locations were located inside the commercial building at 5151 Broadway on the northern side of this offsite building near impacted onsite wells MW-7B and MW-7C (Figure 2). All of the SGP and SS locations were downgradient of the source as the shallow groundwater appears to have mounded in the former UST excavation, and the apparent gradient radiates outwards towards the east, south and west as shown on Figure 3.

To prepare for the soil gas sampling, access agreements were obtained from the owners of the offsite private properties to allow site assessment activity, and a site safety plan (SSP) was prepared to protect site workers.

Fieldwork was performed by Pangea project manager Morgan Gillies and staff hydrologist Bryce Taylor under the supervision of Bob Clark-Riddell, a California Registered Professional Civil Engineer.

The subslab/soil gas sampling was conducted in general accordance with procedures described in Pangea's Standard Operating Procedures (SOPs) for Subslab and Soil Gas Sampling (Appendix B). The overall procedure involved using a rotohammer and solid extensions to drill a hole to approximately 4 ft depth (SG-4), 4.5 ft depth (SG-5) and 3.5 ft depth (SG-6 and SG-7), removing the extensions, and installing the hollow extensions with new sample tubing and sampling tip to approximately 0.5 ft deeper than the solid extensions. Technicians then pull the sample tip open 2 inches to expose the subsurface formation, remove the hollow extensions, and place approximately 6 inches of sand around the sample tip and a bentonite seal from the top of the sand to the surface. The sample tubing was then connected to the sampling manifold using a Swagelok fitting to facilitate soil gas sampling. Note that when Pangea installed the subslab probes in September 2007 a sampling tip was used for the subslab probes instead of the drilling void described in Pangea's SOP. The use of a sampling tip allowed subslab sample probe construction to be similar to soil gas sampling point construction.

Pangea installed the sample probes with an AMS gas vapor probe kit and collected soil gas samples using laboratory-supplied equipment. K-Prime provided sampling assemblies and certified Summa canisters for sampling and purging. The Summa canisters were supplied under a vacuum of approximately 30 inches of mercury. Prior to sample collection from the probes, vacuum/leak tests were conducted on the sampling assembly with a purging Summa canister. The vacuum/leak tests confirmed no leakage and maintained the initial vacuum in the sampling manifold system. After a minimum of 10 minutes of vacuum/leak testing, the purging Summa canister was opened to purge the manifold/probe assembly. Upon completion of purging of approximately three times the ambient volume of air in the assembly/probe, the sampling Summa canister was opened for sample collection. The pre-set valve regulated the vapor flow to approximately 150 to 200 milliliters of air per minute. After approximately 7 or more minutes, the vacuum within the Summa canisters decreased to below 5 inches of mercury but not below 1 inch of mercury and the canister valve was closed.

To further evaluate potential leakage within the sampling system, an air tight leak-check enclosure was placed over the sampling point and sampling assembly (summa canisters and manifold). Isopropyl alcohol was applied to gauze placed inside the leak-check enclosure along with an additional leak-check summa canister for collection of air from within the enclosure, facilitating comparison to any isopropyl alcohol concentrations detected in the sampling summa canister. The air flow regulators for the sample and leak check summa canisters were calibrated and set identically. Additionally, the enclosure was monitored for isopropyl alcohol with a photo ionization detector (PID) to ensure that there was a sufficient concentration of isopropyl alcohol in the air inside the enclosure. After sample collection, SGP locations SG-4 through SG-7 and subslab probes SS-1 and SS-2 were capped and left for future sampling, if merited.

Soil/Subslab Gas Analytical Results

Soil/subslab gas samples were collected within Summa canisters and submitted for analysis to K-Prime, Inc. of Santa Rosa, California, a State-certified laboratory. Soil gas samples were analyzed by Total Organics Method 3 (TO-3) for total petroleum hydrocarbons as gasoline (TPHg) and by Total Organics Method 15 (TO-15) for benzene, toluene, ethylbenzene, xylene(s) (BTEX) and isopropanol. The soil/subslab gas samples were collected from approximately 4-4.5 ft bgs for sample SG-4, from approximately 4.5-5 ft bgs for SG-5, from approximately 3.5-4 ft bgs for SG-6 and SG-7, and approximately 0.7 ft bgs for subslab locations SS-1 and SS-2. Soil/subslab gas analytical results and sample depth intervals are summarized on Table 1 and Figure 2. The laboratory analytical report is included in Appendix B.

Contaminant concentrations detected in the *soil gas* probes were compared to the shallow soil gas Environmental Screening Levels (ESLs) established by the San Francisco Regional Water Quality Control Board (RWQCB). The *subslab* sample results were compared to the ESL for indoor air multiplied by 100 (multiplying the indoor air ESL by 100 is to compensate for subslab air having to travel through the concrete slab to reach potential receptors) in accordance with Department of Toxic Substances Control/Cal – EPA, *Vapor Intrusion Guidance Document – Final Interim,* December 15, 2004.

No hydrocarbon concentrations were detected above RWQCB ESLs in SGPs SG-5 and SG-7 or subslab probes SS-1 and SS-2, but concentrations in SG-4 and SG-6 *did* exceed ESLs. Soil gas probe SG-4 contained the highest detected concentrations of TPHg (830,000 µg/m^3), benzene (5,930 concentration µg/m^3) and ethylbenzene (17,200 µg/m^3), which all exceed the shallow soil gas ESLs for residential and commercial site use. Soil gas probe SG-6 contained a TPHg concentration of 13,000 µg/m^3, which exceeds the residential ESL for TPHg (10,000 µg/m^3), but is below the commercial ESL (29,000 µg/m^3). Isopropanol was not detected in any of the subslab or soil gas samples.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our soil/subslab gas sampling, Pangea offers the following conclusions and recommendations:

- Subsurface soil gas and subslab gas are impacted by hydrocarbons, although the area consistently exceeding conservative RWQCB ESLs has been delineated to the southeastern portion of the residential building at 5230 Coronado Avenue. To further evaluate subsurface soil gas conditions near the ESL exceedances, Pangea recommends conducting subslab gas sampling in the basement of the residential building at 5230 Coronado Avenue to delineate the extent of the soil gas plume. The proposed subslab gas sampling locations are shown on Figure 2.

- The lack of detected concentrations in subslab probe SS-1 this event, where a benzene concentration of 24.1 µg/m^3 was detected during sampling in September 2007, suggests that seasonal influences may have affected benzene concentrations in subslab gas and that ESLs may only be sporadically exceeded at that location.

- Pangea recommends implementing site remediation at the 5175 property, which will improve soil gas conditions onsite and on the adjacent parcels.

ATTACHMENTS

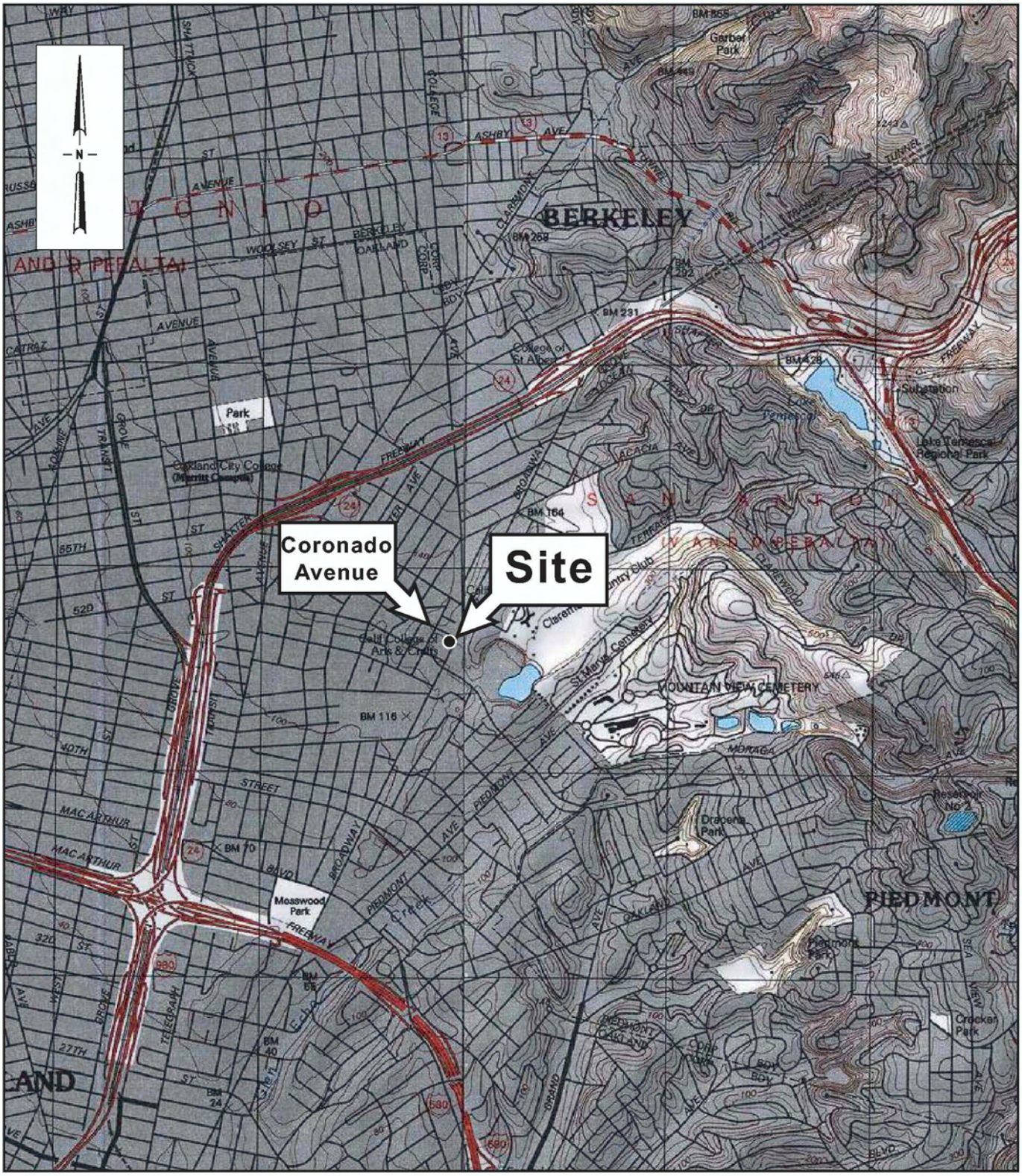
Figure 1 – Site Location Map
Figure 2 – Soil Gas and Subslab Gas Concentration Map
Figure 3 – Groundwater Elevation Contour and Hydrocarbon Concentration Map (Shallow)

Table 1 – Soil Gas Analytical Results

Appendix A – Agency Correspondence
Appendix B – Standard Operating Procedures
Appendix C – Laboratory Analytical Report

\\Pangeamail\pangea common\PROJECTS\Rockridge Heights - 5175 Broadway, Oakland\Reports\Soil Gas - Well Install Rpt\DraftReport-Soil Gas-Well Install Rpt.doc

7/16/2007



SOURCE: TOPO! MAPS

0 1/8 1/4 1/2 1

SCALE : 1" = 1/4 MILE

Figure 1

Former Exxon Station
5175 Broadway
Oakland, California

PANGEA

Site Location Map

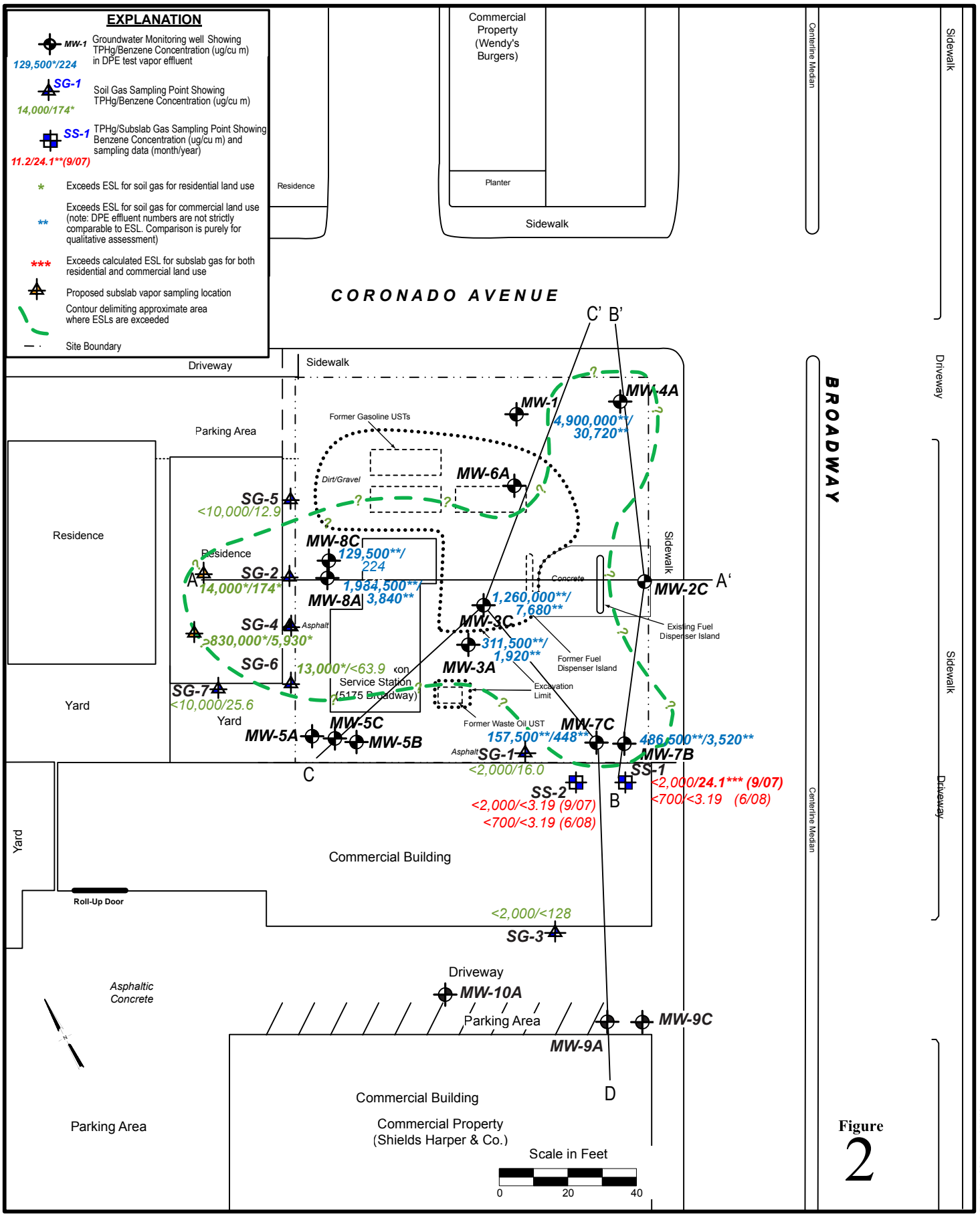


Figure 2

Former Exxon Station
5175 Broadway
Oakland, California

Soil Gas and Subslab Gas Concentration Map

PANGEA

Rockridge SCM map.ai 7/7/08

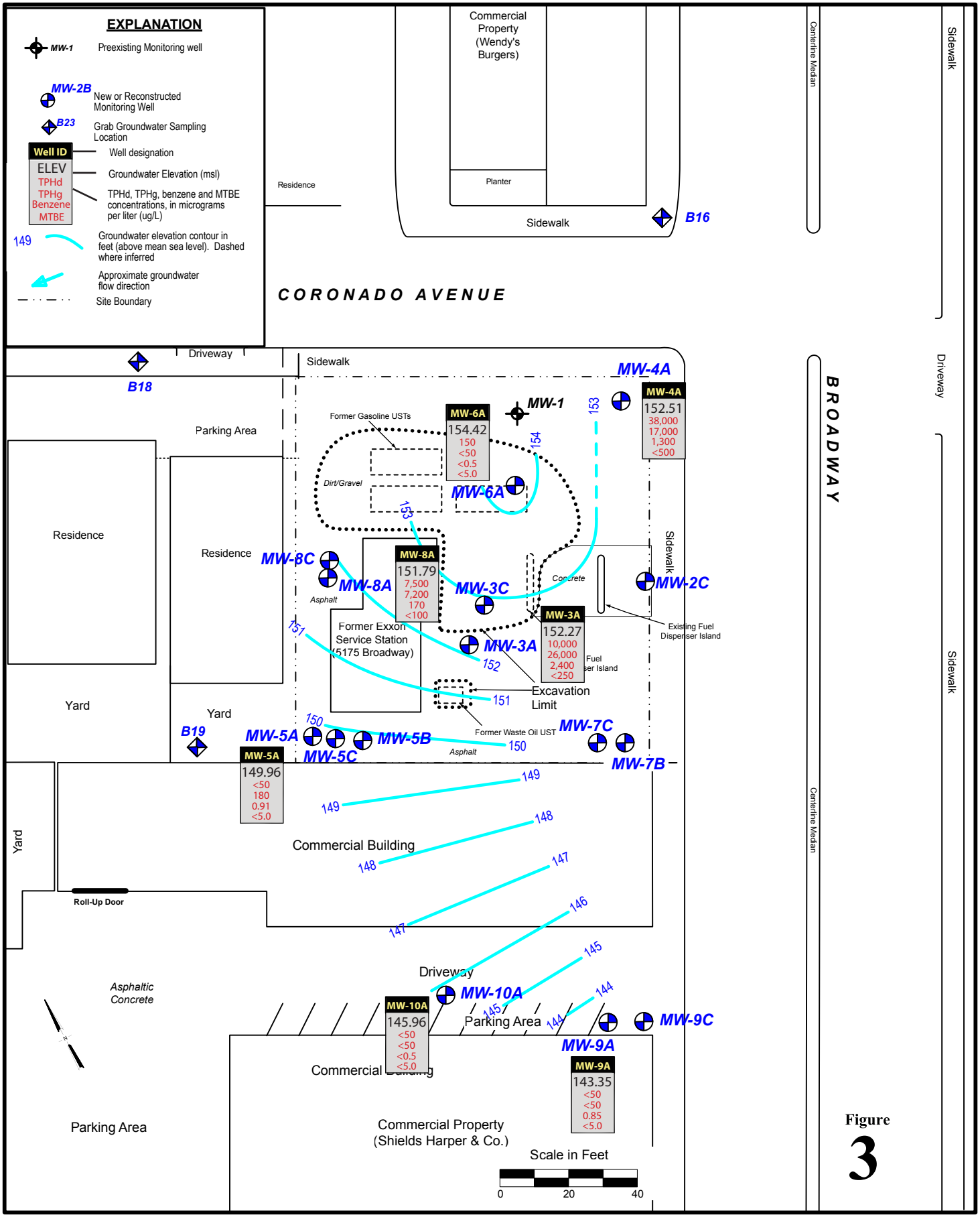


Figure 3

Former Exxon Station
5175 Broadway
Oakland, California

Groundwater Elevation Contour and Hydrocarbon Concentration Map (Shallow)
March 15, 2008

PANGEA

Pangea

Table 1. Soil Gas Analytical Data - Rockridge Heights, 5175 Broadway, Oakland, California

Boring/ Sample ID	Date Sampled	Sample Depth (ft - ft bgs)	Benzene	Toluene	Ethylbenzene	Xylene (M+P)	Xylene (O)	TPH Gasoline (C2-C10)	Isopropanol	Notes
			ug/m^3							
Residential ESL for shallow **soil gas**:			84	63,000	980	21,000	21,000	10,000	--	For SG samples
Commercial ESL for shallow **soil gas**:			280	180,000	3,300	58,000	58,000	29,000	--	For SG samples
Residential ESL for **subslab gas** (indoor air X 100):			8.4	6,300	98	2,100	2,100	1,000	--	For SS samples
Commercial ESL for **subslab gas** (indoor air X 100):			14	8,800	160	2,900	2,900	1,400	--	For SS samples
Soil Gas Probe Samples										
SG-4	6/17/2008	4.0-4.5	**5,930**	<754	**17,200**	15,600	<868	**830,000**	<983	
SG-5	6/17/2008	4.5-5.0	12.9	7.08	61.4	57.2	<4.34	<10,000	<492	
SG-6	6/17/2008	3.5-4.0	<63.9	<75.4	97.9	<86.8	<86.8	**13,000**	<490	
SG-7	6/17/2008	3.5-4.0	25.6	10.8	<4.34	4.78	<4.34	<10,000	<492	
SG-1	9/12/2007	3.8-4.0	16.0	294	6.21	19.6	5.91	<2000	85.4	
SG-2	9/12/2007	3.8-4.0	**174**	200	93.6	77.2	<21.7	**14,000**	70.1	
SG-3	9/12/2007	2.5-2.7	<128	151	<174	<174	<174	<2000	21,300	Isoproponal = 0.7% of total sample volume*
Subslab Gas Samples										
SS-1	6/17/2008	0.5-0.7	<3.19	<3.77	<4.34	<4.34	<4.34	<700	<492	
SS-2	6/17/2008	0.5-0.7	<3.19	<3.77	<4.34	<4.34	<4.34	<700	<492	
SS-1	9/12/2007	0.5-0.7	**24.1**	187	5.38	16.8	5.91	<2000	11.2	
SS-2	9/12/2007	0.5-0.7	<3.19	5.24	<4.34	<4.34	<4.34	<2000	<4.92	Leak Check Sample not analyzed - no detected Isopropanol.
Leak Check Samples										
SS-1 Check	9/12/2007	--	--	--	--	--	--	--	622,000	
SG-1 Check	9/12/2007	--	--	--	--	--	--	--	5,900,000	
SG-2 Check	9/12/2007	--	--	--	--	--	--	--	1,070,000	
SG-3 Check	9/12/2007	--	--	--	--	--	--	--	3,020,000	
Extracted Soil Vapor During DPE Testing										
MW-3A	4/17/2007	9.0-14.0**	**1,920**	--	--	--	--	**311,500**	--	From DPE Testing
MW-4A	4/17/2007	8.0-15.0**	**30,720**	--	--	--	--	**4,900,000**	--	From DPE Testing
MW-8A	4/19/2007	8.0-15.0**	**3,840**	--	--	--	--	**1,984,500**	--	From DPE Testing
MW-7B	4/17/2007	15.5-18.5**	**3,520**	--	--	--	--	**486,500**	--	From DPE Testing
MW-3C	4/19/2007	22.0-27.0**	**7,680**	--	--	--	--	**1,260,000**	--	From DPE Testing
MW-7C	4/19/2007	20.0-25.0**	**448**	--	--	--	--	**157,500**	--	From DPE Testing
MW-8C	4/19/2007	20.0-25.0**	224	--	--	--	--	**129,500**	--	From DPE Testing

Abbreviations:

SG-1 = Soil Gas Sample

SS-1 = Subslab Sample

ug/m3 = Micrograms per cubic meter of air results calculated by laboratory from parts per billion results using normal temperature and pressure (NPT).

ft - ft bgs = Depth interval below ground surface (bgs) in feet.

Volatile organic compounds by EPA Method TO-15 (partial list), uses GC/MS scan.

< n = Chemical not present at a concentration in excess of detection limit shown.

MRL = Method reporting limit. Laboratory reporting limit based on parts per billion on volume to volume basis (ppbv/v) and converted to ug/m3.

ESL = Environmental Screening Level for Shallow Soil Gas with Residential and Commercial/Industrial Land Use, for samples less than five feet below a building foundation or ground surface (Table E).

ESL for indoor air multiplied by 100 for samples collected below foundation concrete slab per Department of Toxic Substances Control/Cal - EPA *Vapor Intrusion Guidance Document - Final Interim* December 15, 2004.

ESL established by the SFBRWQCB, Interim Final - February 2005, and amended in November 2006.

DPE = Dual phase extraction.

Bold = Concentrations above ESLs for Residential and/or Commercial Land Use for shallow soil gas (SG samples) and for indoor air multiplied by 100 (SS samples).

* = Since the air flow regulators on the sampling and leak check summa canisters were setup identically, the percentage of sample that leaked from ambient air within the leak-check enclosure into the sample probe can be determined by dividing the concentration of isopropanol in the sample canister by the concentration of isopropanol in the leak-check canister.

** = Likely that vapor flow was from the shallow portion of the screened interval, once exposed by dual phase extraction (DPE).

APPENDIX A

Agency Correspondence

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

June 10, 2008

Mojdeh Mehdizadeh
c/o Mohammed H. Mehdizadeh
678 La Corso Drive
Walnut Creek, CA 94598

Rockridge Heights, LLC
c/o Gary Feiner
34 Schooner Hill
Oakland, CA 94618

Subject: Fuel Leak Case No. RO0000139 and Geotracker Global ID T0600100882, Mehdizadeh Property, 5175 Broadway, Oakland, CA 94611

Dear Mr. Mehdizadeh and Mr. Feiner:

Alameda County Environmental Health (ACEH) staff has reviewed the case file for the above-referenced site including the recently submitted documents entitled, "Feasibility Test Report and Interim Remedial Action plan," dated July 20, 2007 and the "Soil Gas Sampling and Well Installation Report," dated October 23, 2007, which were prepared by Pangea Environmental Services, Inc. (Pangea) for the subject site. Pangea proposes to implement interim remedial action consisting of an excavation to 15 feet bgs to remove hydrocarbon impacted soil and subsequently install a bio-sparge system. Pangea also proposes to conduct additional soil gas sampling along the eastern edge of the residential building at 5230 Coronado Avenue, including collecting additional sub-slab vapor sampling from step-out locations.

ACEH generally concurs with the proposed soil vapor sampling scope of work and requests that you address the following technical comments, perform the proposed work subsurface investigation work, and send us the technical reports described below. However, further clarification regarding the interim remedial action (IRA) is necessary so that an adequate evaluation can be performed. Therefore, the IRA is not approved at this time. Please address the comments below and submit the technical report requested by the date specified below.

TECHNICAL COMMENTS

1. **Additional Soil Gas and Off-site Sub-slab Soil Vapor Sampling** – Pangea proposes to conduct additional soil gas sampling along the eastern edge of the residential building at 5230 Coranado Avenue. Pangea also recommends re-sampling subslab locations SS-1 and SS-2 using existing sampling probes. If contaminant concentrations are detected above the ESLs, Pangea will conduct additional subslab sampling at step-out locations to delineate the extent of hydrocarbon contamination in soil vapor.

   During the previous soil vapor sampling event, significant isopropyl alcohol breakthrough was detected in soil vapor samples. In order to collect the most representative samples as possible and to minimize leaks in the sampling train, it is recommended that soil vapor wells or probes are constructed with the sampling device and all fittings placed under a shroud with pliable weather-stripping along its base to maintain a tracer gas atmosphere. The shroud should ensure that there is tracer gas around all sampling connections. The shroud should

have a port for inserting a monitoring and sampling device (e.g. Photo Ionization Detector) to ensure that tracer gas atmosphere is maintained. Please conduct the vapor sampling and submit a report by the date specified below.

2. **Interim Remedial Action Plan (IRAP)** – Pangea proposes to excavate hydrocarbon impacted soils at the site to a depth of approximately 15 feet below the ground surface (bgs). Following the over-excavation, Pangea proposes to install a bio-venting system to remediate the remaining in-place impacted soil and groundwater at the site. Based on a review of the existing data, it appears that a majority of soil impact approximately lies between 8 and 15 feet bgs, with a maximum of 34 mg/kg TPH-g detected between 2 to 3 feet bgs and 970 mg/kg TPH-g detected at 10 feet bgs. However, no soil samples below the depth of 15 feet bgs appear to have been collected. The groundwater contamination appears to extend to a depth of nearly 25 feet bgs based on "grab" groundwater samples collected at the site, which detected concentrations up to 32,000 µg/L TPH-g and 1,200 µg/L benzene at approximately 25 feet bgs. First of all, the proposed excavation does not appear adequately justified based on the soil sample analytical data. In addition, ACEH is concerned that the proposed sub-grade parking constructed at a depth of 10 feet bgs will change the risk scenario evaluated at the site since the sub-grade parking floor will be constructed within impacted soil and groundwater. Also, the fill material between the bottom of the excavation at 15 feet bgs and the bottom of the sub-grade parking floor at 10 feet bgs was not specified and the disposition of the slightly impacted overburden soil does was also not specified. Lastly, depth to groundwater at the site has been measured to range between approximately 7½ feet to 12 feet bgs. ACEH is concerned that impacted groundwater may be inadvertently be discharged to the storm drain should a construction dewatering system or a permanent dewatering system be installed at the site. Please address the above mentioned concerns and submit a Corrective Action Plan (CAP) by the date specified below.

3. **Site Conceptual Model** – A redevelopment project has been proposed at the site, which includes sub-grade parking, ground-level commercial and residential with additional residential on subsequent floors. Since the risk evaluation conducted at the site does not appear to account for change in site conditions (i.e. removal of vadose zone soils, etc.), it may be advantageous to develop a site conceptual model (SCM), which synthesizes all the analytical data and evaluates all potential exposure pathways and potential receptors that may exist at the site, including identifying or developing site cleanup objectives and goals. At a minimum, the SCM should include:

   (1) Local and regional plan view maps that illustrate the location of sources (former facilities, piping, tanks, etc.) extent of contamination, direction and rate of groundwater flow, potential preferential pathways, and locations of receptors;

   (2) Geologic cross section maps that illustrate subsurface features, man-made conduits, and lateral and vertical extent of contamination;

   (3) Plots of chemical concentrations versus time;

   (4) Plots of chemical concentrations versus distance from the source;

(5) Summary tables of chemical concentrations in different media (i.e. soil, groundwater, and soil vapor); and

(6) Well logs, boring logs, and well survey maps;

(7) Discussion of likely contaminant fate and transport.

If data gaps (i.e. potential contaminant volatilization to indoor air or contaminant migration along preferential pathways due to air sparging, etc.) are identified in the SCM, please include a proposed scope of work to address those data gaps in the CAP due by the date specified below.

4. **Corrective Action Plan** – Once the soil vapor plume is adequately delineated, a Feasibility Study/Corrective Action Plan (FS/CAP) prepared in accordance with Title 23, California Code of Regulations, Section 2725 appears appropriate. The FS/CAP must include a concise background of soil and groundwater investigations performed in connection with this case and an assessment of the residual impacts of the chemicals of concern (COCs) for the site and the surrounding area where the unauthorized release has migrated or may migrate. The FS/CAP should also include, but not limited to, a detailed description of site lithology, including soil permeability, and most importantly, contamination cleanup levels and cleanup goals, in accordance with the San Francisco Regional Water Quality Control Board Basin Plan and appropriate ESL guidance for all COCs and for the appropriate groundwater designation. Please note that soil cleanup levels should ultimately (within a reasonable timeframe) achieve water quality objectives (cleanup goals) for groundwater in accordance with San Francisco Regional Water Quality Control Board Basin Plan. Please propose appropriate cleanup levels and cleanup goals in accordance with 23 CCR Section 2725, 2726, and 2727 in the FS/CAP.

   The FS/CAP must evaluate at least three viable alternatives for remedying or mitigating the actual or potential adverse effects of the unauthorized release(s) in addition to the "no action" and "monitored natural attenuation" remedial alternatives. Each alternative shall be evaluated for cost-effectiveness and the Responsible Party must propose the most cost-effective corrective action.

5. **Redevelopment / Construction Schedule** – ACEH understands that the proposed site redevelopment has been approved by the City of Oakland's Planning Department. In an interest to continue site remediation in conjunction with the proposed redevelopment, please submit a proposed construction schedule by the date specified below. Please note that ACEH does not wish to hinder site redevelopment, however, it is imperative that site remediation is initiated in a timely fashion so that unanticipated delays with site redevelopment are not incurred.

TECHNICAL REPORT REQUEST

Please submit technical reports to Alameda County Environmental Health (Attention: Paresh Khatri), according to the following schedule:

- **July 24, 2008 –** Soil Vapor Sampling Report & Construction Schedule
- **July 30, 2008 -** Quarterly Monitoring Report (2nd Quarter 2008)
- **September 8, 2008** – SCM and CAP
- **October 30, 2008 -** Quarterly Monitoring Report (3rd Quarter 2008)
- **January 30, 2009 -** Quarterly Monitoring Report (4th Quarter 2008)
- **April 30, 2009 -** Quarterly Monitoring Report (1st Quarter 2009)

These reports are being requested pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to an unauthorized release from a petroleum UST system, and require your compliance with this request.

ELECTRONIC SUBMITTAL OF REPORTS

ACEH's Environmental Cleanup Oversight Programs (LOP and SLIC) require submission of reports in electronic form. The electronic copy replaces paper copies and is expected to be used for all public information requests, regulatory review, and compliance/enforcement activities. Instructions for submission of electronic documents to the Alameda County Environmental Cleanup Oversight Program FTP site are provided on the attached "Electronic Report Upload Instructions."

Submission of reports to the Alameda County FTP site is an addition to existing requirements for electronic submittal of information to the State Water Resources Control Board (SWRCB) Geotracker website. In September 2004, the SWRCB adopted regulations that require electronic submittal of information for all groundwater cleanup programs. For several years, responsible parties for cleanup of leaks from underground storage tanks (USTs) have been required to submit groundwater analytical data, surveyed locations of monitoring wells, and other data to the Geotracker database over the Internet. Beginning July 1, 2005, these same reporting requirements were added to Spills, Leaks, Investigations, and Cleanup (SLIC) sites. Beginning July 1, 2005, electronic submittal of a complete copy of all reports for all sites is required in Geotracker (in PDF format). Please visit the SWRCB website for more information on these requirements (http://www.swrcb.ca.gov/ust/electronic_submittal/report_rqmts.shtml).

PERJURY STATEMENT

All work plans, technical reports, or technical documents submitted to ACEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge." This letter must be signed by an officer or legally authorized representative of your company. Please include a cover letter satisfying these requirements with all future reports and technical documents submitted for this fuel leak case.

PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6735, 6835, and 7835.1) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately registered or certified professional. For your submittal to be considered a valid technical report, you are to present site specific data, data interpretations, and recommendations prepared by an appropriately licensed professional and include the professional registration stamp, signature, and statement of professional certification. Please ensure all that all technical reports submitted for this fuel leak case meet this requirement.

UNDERGROUND STORAGE TANK CLEANUP FUND

Please note that delays in investigation, later reports, or enforcement actions may result in your becoming ineligible to receive grant money from the state's Underground Storage Tank Cleanup Fund (Senate Bill 2004) to reimburse you for the cost of cleanup.

AGENCY OVERSIGHT

If it appears as though significant delays are occurring or reports are not submitted as requested, we will consider referring your case to the Regional Board or other appropriate agency, including the County District Attorney, for possible enforcement actions. California Health and Safety Code, Section 25299.76 authorizes enforcement including administrative action or monetary penalties of up to $10,000 per day for each day of violation.

If you have any questions, please call me at (510) 777-2478 or send me an electronic mail message at paresh.khatri@acgov.org.

Sincerely,

Paresh C. Khatri
Hazardous Materials Specialist

Donna L. Drogos, PE
Supervising Hazardous Material Specialist

Enclosure: ACEH Electronic Report Upload (ftp) Instructions

cc: Bob Clark-Riddell, Pangea Environmental Services, Inc., 1710 Franklin Street, Suite 200, Oakland, CA 94612
Leroy Griffin, Oakland Fire Department, 250 Frank H. Ogawa Plaza, Ste. 3341, Oakland, CA 94612-2032
Donna Drogos, ACEH
Paresh Khatri, ACEH
File

APPENDIX B

Standard Operating Procedures

STANDARD OPERATING PROCEDURES FOR SOIL GAS SAMPLING

1.0 PURPOSE

This standard operating procedure (SOP) describes the procedures for collecting shallow soil gas vapor samples using temporary vapor probes and evacuated, stainless-steel Summa canisters. The SOP is modified from procedures and information presented in California Regional Water Quality Control Board – Los Angeles Region (LARWQCB), 1997, Cal/EPA 2004, and discussions (September 2006) with K Prime (Santa Rosa, California) laboratory staff.

2.0 REQUIRED EQUIPMENT

- Drill rig or hammer drill with 1" bit and smaller bits (slightly larger than vapor probe tip)
- Tubing for cleaning boring
- Vapor probes and tubing with Swagelok threaded compression fitting and vapor-tight cap.
- Rubber stopper or Teflon disk
- Powdered bentonite or expanding Portland cement
- 6-Liter Summa canister (evacuated with approximately 30" Hg vacuum) with vacuum gauge for purging and leak testing
- 6-Liter Summa canister with vacuum gauge for each sample (including duplicates)
- 1-Liter Summa canister for leak-check compound
- K Prime Inc. stainless-steel sampling manifold (see Figure 2) (request that laboratory leak-check manifold prior to mobilization)
- Leak-check compound (e.g. isopropyl alcohol) and absorbent material (e.g. gauze)
- Photoionization detector (PID)
- Isobutylene for PID calibration
- Tedlar bags for sampling leak-check compound
- Leak-check enclosure (plastic container with flexible weatherstripping and openings for vapor probe tubing and for sampling enclosure atmosphere)
- Record-keeping materials
- Latex or nitrile gloves

3.0 PROCEDURES

3.1 Boring Clearance

Prior to installing temporary soil vapor probes, ensure that a utility clearance has been conducted to ensure that subsurface utility and rebar locations have been identified and marked.

3.2 Vapor Probe Installation

1. To protect surfaces, lay plastic sheeting around the probe location.
2. Use a rotary hammer drill or concrete-coring equipment to create an approximately 1-inch or greater diameter hole that penetrates the slab.
3. In general, the drive rod is driven to a predetermined depth and then pulled back to expose the inlets of the soil gas probe either by exposing a short screened section or by leaving a disposable drop-off tip in the hole. After sample collection, both the drive rod and tubing are removed.

4. During installation of the probe, hydrated bentonite should be used to seal around the drive rod at ground surface to prevent ambient air intrusion from occurring.
5. The inner soil gas pathway from probe tip to the surface should be continuously sealed (e.g., a sampling tube attached to a screw adapter fitted with an o-ring and connected to the probe tip) to prevent infiltration.
6. Equilibration Time: During probe emplacement, subsurface conditions are disturbed. To allow for subsurface conditions to equilibrate, the following equilibration times are recommended:

   For probes installed with the direct push method where the drive rod remains in the ground, purge volume test, leak test, and soil gas sampling should not be conducted for at least 20 minutes following probe installation.

   For probes installed with the direct push method where the drive rod does not remain in the ground, purge volume test, leak test, and soil gas sampling should not be conducted for at least 30 minutes following probe installation.

   For probes installed with hollow stem drilling methods, purge volume test, leak test, and soil gas sampling should not be conducted for at least 48 hours (depending on site lithologic or drilling conditions) after the soil gas probe installation.
7. Probe installation time should be recorded in the field log book.
8. Decontamination: After each use, drive rods and other reusable components should be properly decontaminated to prevent cross contamination. These methods include:

   3-stage wash and rinse (e.g., wash equipment with a non-phosphate detergent, rinse with tap water, and finally rinse with distilled water); and/or

   Steam-cleaning.

3.3 Vapor Sampling

During vapor sampling, record all valve open/close times and canister/manifold vacuum readings at each step.

Setup

1. Calculate and record the volume of the sampling assembly, tubing vapor probe, and any permeable annular space around the vapor probe tip.

   Volume =3.14 x (1/2*ID) x (1/2*ID) *L,

   where ID = tubing or manifold inside diameter and L = length of tubing/manifold segment.
2. Wear latex or nitrile gloves while handling sampling equipment. Change gloves whenever a new sample is collected and after handling leak-check compound.
3. Replace the vapor probe cap with a closed Swagelok valve. Connect the sampling manifold to the vapor probe, sample Summa canister and purge Summa canister using Swagelok fittings and stainless-steel, Teflon or Tygon tubing. Check all fittings for tightness (do not overtighten).
4. Close all valves. Record pre-test vacuum readings on both canisters.

Flow and Leak Check

1. Open both manifold valves and valve on purge Summa canister. Do *not* open valve on sample port. Allow manifold/tubing vacuum to stabilize at approximately 30” Hg.

2. Close purge canister valve and wait at least 10 minutes. Monitor manifold vacuum gauge to test for leaks. If the vacuum decreases, rectify the leak before proceeding.

3. If vacuum is stable, open purge canister valve and open vapor probe valve. After approximately *5 seconds*, close the canister valve and estimate flow rate by recording the elapsed time after valve closure for manifold vacuum to drop to 5" vacuum, as indicated on the following chart (specific to K-Prime sampling manifold)

K PRIME, INC. SOIL GAS MANIFOLD FLOW RATE AND VACUUM LEVEL ESTIMATES

T (seconds)	PV	F (ml/minute)
5	0	135
10	5	115
15	10	90
30	15	60
120	20	40
480	25	20

Source: K Prime, Inc. – July 24, 2006

NOTES:
T = Time duration from full vacuum to less than 5" vacuum after closing purge canister.
PV = Approximate vapor probe vacuum level based on measured T
F = Approximate sampling flow rate based on measured T

4. This procedure should also be conducted several times at the beginning of sampling to ensure that flow rate is sufficient. If no significant flow is attained, either the sampling line is plugged or the vapor probe is positioned in an impermeable or saturated layer. Such a situation should be rectified before sample collection.

5. Place absorbent materials (e.g., gauze) *lightly* moistened (e.g., five drops) with leak-check compound (isopropyl alcohol) inside the leak-check enclosure. Do not allow liquid to come in direct contact with tubing or sampling assembly.

6. Place leak-check enclosure over vapor probe and seal to floor using weatherstripping or duct tape. Ensure that PID has been calibrated with isobutylene gas. Note that the isopropyl alcohol response factor is approximately 5.6 (i.e. a reading of 2 ppm on the PID indicates 5.6 x 2 = 11.2 ppm of isopropyl alcohol in the sample). Record both the observed PID reading and the calculated isopropyl alcohol concentration. If the PID reading is below 10 ppm, slowly reapply leak-check compound.

7. Record PID reading for leak-check enclosure at least once every 5 minutes during purging and sampling. Slowly reapply leak-check compound if PID reading drops more than 20% below initial readings in an attempt to return to the initial readings.

Purge and Sample

1. Open purge canister valve and vapor probe valve and purge the appropriate number of purge volumes. For vapor sampling in support of risk-assessments for regulatory review, a step-purge test should be conducted at a "worst case" sampling point, using 1, 3 and 7 purge volumes to determine the appropriate purge volume that yields the highest target compound concentration. For soil gas screening, or where a purge test is not feasible, purge approximately 3 to 5 purge volumes of the tubing and sampling assembly. Do *not* over-purge. Include the purging conducted during the leak-check step above in the purge

volume.

2. Close purge canister valve and open sample canister valve. Sampling should take approximately 30 minutes for a 6-liter Summa canister.
3. During sampling, the integrated flow rate should be checked periodically by closing the sample canister valve and checking the elapsed time versus the sampling volume. Sampling volume for a 6-liter canister can be estimated based on the following table.

Relationship between Final Canister Vacuum and Volume Sampled

Final Vacuum ("Hg)	0	2.5	5	7.5	10	12.5	15	17.5	20
Volume Sampled (L)	6	5.5	5	4.5	4	3.5	3	2.5	2

Source: Air Toxics, Inc.

4. Close sampling canister valve when vacuum decreases to between 1" and 5" mercury. Do *not* allow vacuum to fall below this range.
5. Use a 1-liter Summa canister to collect a sample from the leak-check enclosure. Submit canister for analysis of leak-check compound only.
6. Disassemble sampling assembly, and cap (or remove and restore) vapor sampling point.
7. Fill out chain-of-custody form, including analysis for chemicals of concern and leak-check compound. Also analyze for oxygen, carbon dioxide and methane. Include final vacuum reading and serial numbers of canister and flow restrictor.
8. Collect at least one duplicate sample per site per sampling event from the sampling point with the anticipated highest vapor concentrations. The duplicate sample should be collected by attaching a fresh sample canister following collection of the initial sample. If a new manifold is used, follow the same purging and sampling procedures used for the original sample. If the same manifold is used, collect a sample without further purging, using the same sampling procedures used for the original sample

Decontamination and Decommissioning

9. Use separate sampling manifold and tubing for each sample location. Return equipment to laboratory for decontamination.
10. Backfill soil vapor probe holes with bentonite slurry.

REFERENCES

California Regional Water Quality Control Board – Los Angeles Region (LARWQCB), 1997, Interim guidance for active soil gas investigation, February 25.

Cal/EPA, 2003, Advisory – Active soil gas investigations, California Environmental Protection Agency, Department of Toxic Substances Control, January 28.

Cal/EPA, 2004, Interim final guidance for the evaluation and mitigation of subsurface vapor intrusion to indoor air, California Environmental Protection Agency, Department of Toxic Substances Control, December 15 (revised February 7, 2005).

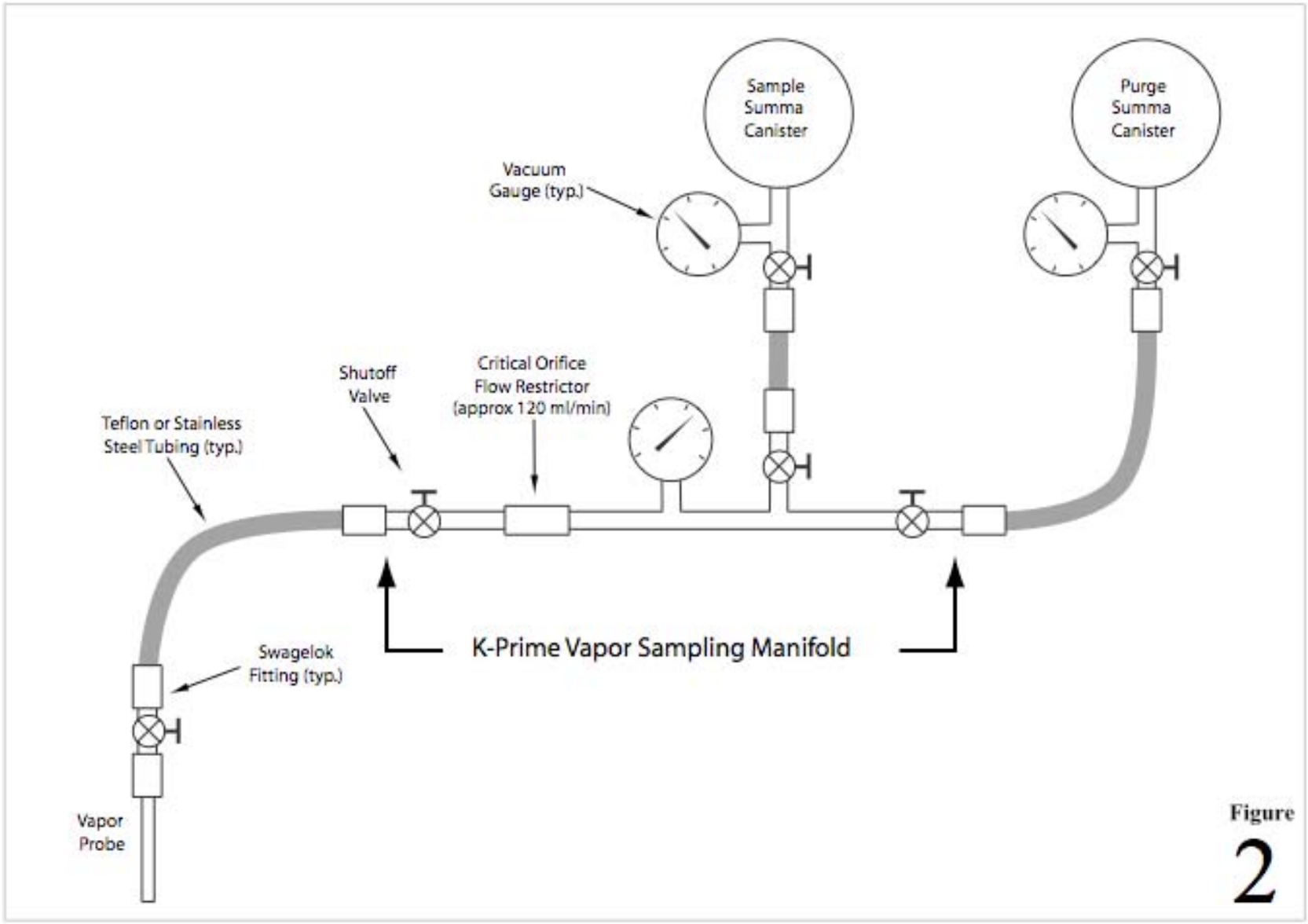


Figure
2

Subslab and Soil Vapor Sampling Manifold Schematic

PANGEA

STANDARD OPERATING PROCEDURE FOR SUBSLAB VAPOR SAMPLING

1.0 PURPOSE

This standard operating procedure (SOP) describes the procedures for collecting subslab vapor samples using evacuated, stainless-steel Summa canisters for the purpose of assessing risk to building occupants. The SOP is modified from procedures and information presented in Cal/EPA 2004; DiGiulio and others, 2006; DiGiulio, 2003; and discussions (September 2006) with K Prime (Santa Rosa, California) laboratory staff.

2.0 REQUIRED EQUIPMENT

- Hammer drill with 1" bit and smaller bits (slightly larger than vapor probe tip)
- Tubing for cleaning boring
- Stainless-steel or Teflon vapor probe tubing with Swagelok threaded compression fitting and vapor-tight cap.
- Rubber stopper or Teflon disk
- Powdered bentonite or expanding Portland cement
- 6-Liter Summa canister (evacuated with approximately 30" Hg vacuum) with vacuum gauge for purging and leak testing
- 6-Liter Summa canister with vacuum gauge for each sample (including duplicates)
- 1-Liter Summa canister for leak-check compound
- K Prime Inc. stainless-steel sampling manifold (see Figure 2) (request that laboratory leak-check manifold prior to mobilization)
- Leak-check compound (e.g. isopropyl alcohol) and absorbent material (e.g. gauze)
- Photoionization detector (PID)
- Isobutylene for PID calibration
- Tedlar bags for sampling leak-check compound
- Leak-check enclosure (plastic container with flexible weatherstripping and openings for vapor probe tubing and for sampling enclosure atmosphere)
- Record-keeping materials
- Latex or nitrile gloves

3.0 PROCEDURES

3.1 Boring Clearance

Prior to installing subslab vapor probes, ensure that a utility clearance has been conducted to ensure that subsurface utility and rebar locations have been identified and marked.

3.2 Vapor Probe Construction

1. To protect interior surfaces, lay plastic sheeting around the probe location.
2. Use a rotary hammer drill to create an approximately 2-inch deep, 1-inch diameter hole that *partially* penetrates the slab. Use a piece of flexible tubing to blow or vacuum concrete debris and dust from the hole. Do not blow or vacuum after the slab has been completely penetrated.
3. Drill a smaller diameter *inner hole* in the center of the outer hole, periodically blowing dust and debris from the hole until the slab is penetrated. The diameter of the inner hole

should exceed the diameter of the vapor probe tip by approximately 1/16". The inner hole should be drilled completely through the slab and several inches into the subslab material (baserock or soil) to form a cavity (see Figure 1).

4. Place a tightly fitting rubber stopper or a Teflon disk with a pass-through for the vapor probe at the bottom of the outer hole. The purpose of the stopper is to stop moisture from the annular seal from leaking into subslab materials. If a lubricant is needed, use only high-vacuum silicone grease.
5. Insert the capped vapor probe tubing through the stopper. The fitting may either be constructed flush, or may protrude above the slab, depending on location and susceptibility to damage. The vapor probe tubing should be cut prior to insertion so that the tip does not protrude below the concrete slab.
6. Mix quick-drying Portland expanding cement with water and backfill the annulus of the vapor probe boring to the surface with the cement mixture. A hydrated bentonite mixture (mix bentonite and water outside the hole) may be used in lieu of cement if the probe is temporary and will not be disturbed prior to sampling

3.3 Vapor Sampling

During vapor sampling, record all valve open/close times and canister/manifold vacuum readings at each step.

Setup

1. Ensure that at least two weeks have elapsed since installation of the subslab vapor probe(s) and that at least 5 days have elapsed since measurable precipitation or irrigation of areas adjacent to the building.
2. Calculate and record the volume of the sampling assembly, tubing and vapor probe.

   Volume =3.14 x (1/2*ID) x (1/2*ID) *L,

   where ID = tubing or manifold inside diameter and L = length of tubing/manifold segment.
3. Wear latex or nitrile gloves while handling sampling equipment. Change gloves whenever a new sample is collected and after handling leak-check compound.
4. Replace the vapor probe cap with a closed Swagelok valve. Connect the sampling manifold to the vapor probe, sample Summa canister and purge Summa canister using Swagelok fittings and stainless-steel, Teflon or Tygon tubing. Check all fittings for tightness (do not overtighten).
5. Close all valves. Record pre-test vacuum readings on both canisters.

Flow and Leak Check

1. Open both manifold valves and valve on purge Summa canister. Do *not* open valve on sample port. Allow manifold/tubing vacuum to stabilize at approximately 30" Hg.
2. Close purge canister valve and wait at least 10 minutes. Monitor manifold vacuum gauge to test for leaks. If the vacuum decreases, rectify the leak before proceeding.
3. If vacuum is stable, open purge canister valve and open vapor probe valve. After approximately *5 seconds*, close the canister valve and estimate flow rate by recording the elapsed time after valve closure for manifold vacuum to drop to 5" vacuum, as indicated on the following chart (specific to K-Prime sampling manifold)

K PRIME, INC. SOIL GAS MANIFOLD FLOW RATE AND VACUUM LEVEL ESTIMATES

T (seconds)	PV	F (ml/minute)
5	0	135
10	5	115
15	10	90
30	15	60
120	20	40
480	25	20

Source: K Prime, Inc. – July 24, 2006

NOTES:
T = Time duration from full vacuum to less than 5" vacuum after closing purge canister.
PV = Approximate vapor probe vacuum level based on measured T
F = Approximate sampling Flow rate based on measured T

4. This procedure should also be conducted several times at the beginning of sampling to ensure that flow rate is sufficient. If no significant flow is attained, either the sampling line is plugged or the vapor probe is positioned in an impermeable or saturated layer. Such a situation should be rectified before sample collection.
5. Place absorbent materials (e.g., gauze) *lightly* moistened (e.g., five drops) with leak-check compound (isopropyl alcohol) around each connection at the vapor probe/slab interface. Do not allow liquid to come in direct contact with tubing or sampling assembly.
6. Place leak-check enclosure over vapor probe and seal to floor using weatherstripping or duct tape. Ensure that PID has been calibrated with isobutylene gas. Note that the isopropyl alcohol response factor is approximately 5.6 (i.e. a reading of 2 ppm on the PID indicates 5.6 x 2 = 11.2 ppm of isopropyl alcohol in the sample). Record both the observed PID reading and the calculated isopropyl alcohol concentration. If the PID reading is below 10 ppm, slowly reapply leak-check compound.
7. Record PID reading for leak-check enclosure at least once every 5 minutes during purging and sampling. Slowly reapply leak-check compound if PID reading drops more than 20% below initial readings in an attempt to return to the initial readings.

Purge and Sample

1. Open purge canister valve and vapor probe valve and purge approximately 5 purge volumes of the tubing and sampling assembly (DeGiulio and others, 2006). Do *not* over-purge. Include the purging conducted during the leak-check step above in the purge volume.
2. Close purge canister valve and open sample canister valve. Sampling should take approximately 30 minutes for a 6-liter Summa canister.
3. During sampling, the integrated flow rate should be checked periodically by closing the sample canister valve and checking the elapsed time versus the sampling volume. Sampling volume for a 6-liter canister can be estimated based on the following table.

Relationship between Final Canister Vacuum and Volume Sampled

Final Vacuum ("Hg)	0	2.5	5	7.5	10	12.5	15	17.5	20
Volume Sampled (L)	6	5.5	5	4.5	4	3.5	3	2.5	2

Source: Air Toxics, Inc.

4. Close sampling canister valve when vacuum decreases to between 1" and 5" mercury. Do *not* allow vacuum to fall below this range.
5. Use a 1-liter Summa canister to collect a sample from the leak-check enclosure. Submit canister for analysis of leak-check compound only.
6. Disassemble sampling assembly, and cap (or remove and restore) vapor sampling point.
7. Fill out chain-of-custody form, including analysis for chemicals of concern and leak-check compound. Also analyze for oxygen, carbon dioxide and methane. Include final vacuum reading and serial numbers of canister and flow restrictor.
8. Collect at least one duplicate sample per site per sampling event from the sampling point with the anticipated highest vapor concentrations. The duplicate sample should be collected by attaching a fresh sample canister following collection of the initial sample. If a new manifold is used, follow the same purging and sampling procedures used for the original sample. If the same manifold is used, collect a sample without further purging, using the same sampling procedures used for the original sample

Decontamination

9. Use separate sampling assembly and tubing for each sample location. Return equipment to laboratory for decontamination.

REFERENCES

Cal/EPA, 2004, Interim final guidance for the evaluation and mitigation of subsurface vapor intrusion to indoor air, California Environmental Protection Agency, Department of Toxic Substances Control,December 15 (revised February 7, 2005).

Dominic DiGiulio, 2003, Standard Operating Procedure (SOP) for installation of sub-slab vapor probes and sampling using EPA Method TO-15 to support vapor intrusion investigations, U.S. Environmental Protection Agency, Office of Research and Development, National Risk Management Research Laboratory, Ground-Water and Ecosystem Restoration Division, Ada, Oklahoma (included as Appendix C of Colorado Department of Public Health and Environment, 2004, Draft Indoor Air Guidance, Hazardous Materials and Waste Division), September

DiGiulio, D.C., and Cynthia J. Pau, C., Cody, R., Willey, R., Clifford, S., Kahn, P., Mosley R., Lee, A., and Christensen, K., 2006, Assessment of vapor intrusion in homes near the Raymark Superfund Site using basement and sub-slab air samples, U.S. Environmental Protection Agency, Office Of Research and Development, National Risk Management Research Laboratory, Cincinnati, OH 45268, March.

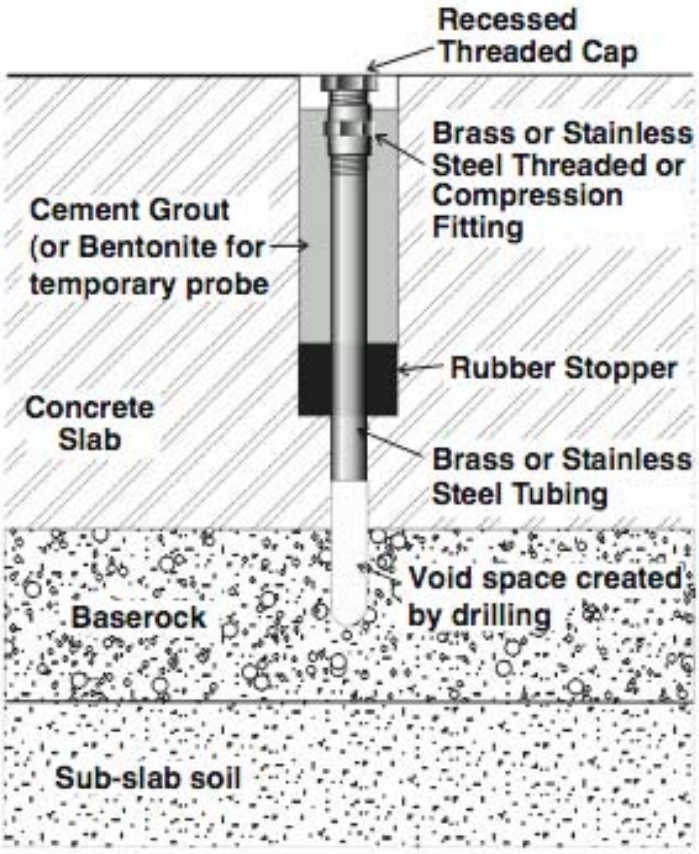


Figure
1

Subslab Vapor Probe Schematic

PANGEA

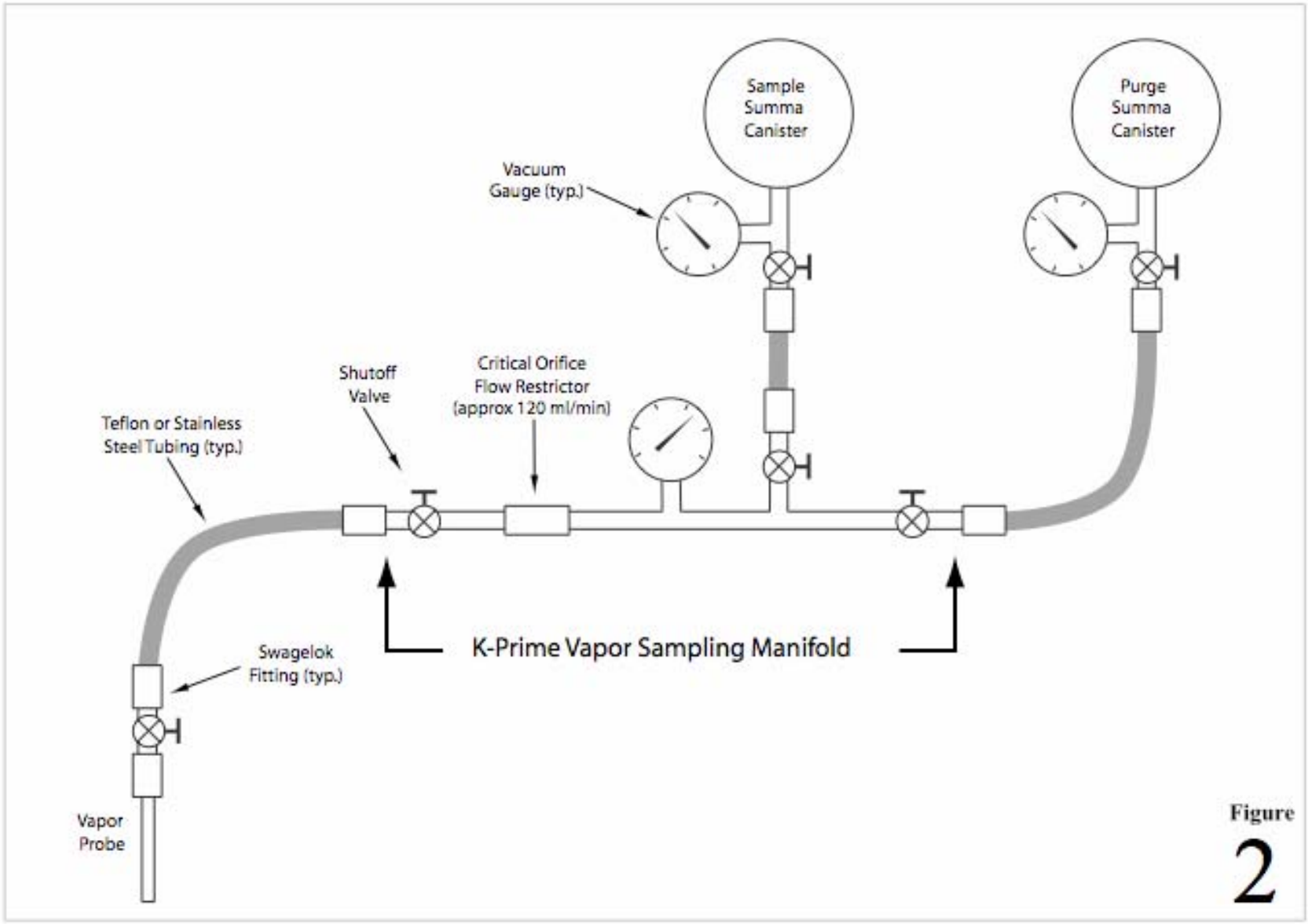


Figure
2

Subslab and Soil Vapor Sampling Manifold Schematic

PANGEA

APPENDIX C

Laboratory Analytical Report

K PRIME, Inc.

CONSULTING ANALYTICAL CHEMISTS

3621 Westwind Blvd.
Santa Rosa CA 95403
Phone: 707 527 7574
FAX: 707 527 7879

TRANSMITTAL

DATE: 06/27/08

TO: MR. MORGAN GILLIES
PANGEA ENVIRONMENTAL SERVICES
1710 FRANKLIN ST., STE. 200
OAKLAND, CA 94612

Phone: 510-435-8664
Fax: 510-836-3709
Email: mgillies@pangeaenv.com

ACCT: 4525
PROJ: ROCKRIDGE HEIGHTS

FROM: Richard A. Kagel, Ph.D. RAK 6/27/08
Laboratory Director

SUBJECT: LABORATORY RESULTS FOR YOUR PROJECT ROCKRIDGE HEIGHTS

Enclosed please find K Prime's laboratory reports for the following samples:

SAMPLE ID	TYPE	DATE	TIME	KPI LAB #
SS-1	AIR	06/17/08	10:30	69791
LEAK CHECK SS-1	AIR	06/17/08	10:30	69792
SS2	AIR	06/17/08	9:28	69793
LEAK CHECK SS-2	AIR	06/17/08	9:29	69794
SG-4	AIR	06/17/08	12:56	69795
LEAK CHECK SG-4	AIR	06/17/08	13:00	69796
SG-5	AIR	06/17/08	13:40	69797
LEAK CHECK SG-5	AIR	06/17/08	13:40	69798
SG-6	AIR	06/17/08	14:58	69799
LEAK CHECK SG-6	AIR	06/17/08	14:58	69800
SG-7	AIR	06/17/08	15:55	69801
LEAK CHECK SG-7	AIR	06/17/08	15:55	69802

The above listed sample group was received on 06/18/08 and tested as requested on the chain of custody document.

Please call me if you have any questions or need further information.
Thank you for this opportunity to be of service.

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 4525
CLIENT PROJECT: ROCKRIDGE HEIGHTS

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO15 (GC-MS-SCAN)

SAMPLE ID:	SS-1
LAB NO:	69791
SAMPLE TYPE:	AIR
DATE SAMPLED:	6/17/08
TIME SAMPLED:	10:30
BATCH ID:	062408A01
DATE ANALYZED:	6/26/08

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
BENZENE	71-43-2	1.00	ND	3.19	ND
TOLUENE	108-88-3	1.00	ND	3.77	ND
ETHYLBENZENE	100-41-4	1.00	ND	4.34	ND
XYLENE (M+P)	1330-20-7	1.00	ND	4.34	ND
XYLENE (O)	95-47-6	1.00	ND	4.34	ND
ISOPROPANOL	67-63-0	200	ND	492	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: _____
DATE: 6/27/08

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 4525
CLIENT PROJECT: ROCKRIDGE HEIGHTS

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO15 (GC-MS-SCAN)

SAMPLE ID:	SS2
LAB NO:	69793
SAMPLE TYPE:	AIR
DATE SAMPLED:	6/17/08
TIME SAMPLED:	9:28
BATCH ID:	062408A01
DATE ANALYZED:	6/26/08

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
BENZENE	71-43-2	1.00	ND	3.19	ND
TOLUENE	108-88-3	1.00	ND	3.77	ND
ETHYLBENZENE	100-41-4	1.00	ND	4.34	ND
XYLENE (M+P)	1330-20-7	1.00	ND	4.34	ND
XYLENE (O)	95-47-6	1.00	ND	4.34	ND
ISOPROPANOL	67-63-0	200	ND	492	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: _____
DATE: 6/27/08

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 4525
CLIENT PROJECT: ROCKRIDGE HEIGHTS

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO15 (GC-MS-SCAN)

SAMPLE ID:	SG-4
LAB NO:	69795
SAMPLE TYPE:	AIR
DATE SAMPLED:	6/17/08
TIME SAMPLED:	12:56
BATCH ID:	062408A01
DATE ANALYZED:	6/26/08

COMPOUND NAME	CAS NO.	PPB (V/V) MRL	PPB (V/V) SAMPLE CONC	µg/cu. m MRL	µg/cu. m SAMPLE CONC
BENZENE	71-43-2	200	1860	639	5930
TOLUENE	108-88-3	200	ND	754	ND
ETHYLBENZENE	100-41-4	200	3960	868	17200
XYLENE (M+P)	1330-20-7	200	3600	868	15600
XYLENE (O)	95-47-6	200	ND	868	ND
ISOPROPANOL	67-63-0	400	ND	983	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: _____
DATE: 6/27/08

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 4525
CLIENT PROJECT: ROCKRIDGE HEIGHTS

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO15 (GC-MS-SCAN)

SAMPLE ID:	SG-5
LAB NO:	69797
SAMPLE TYPE:	AIR
DATE SAMPLED:	6/17/08
TIME SAMPLED:	13:40
BATCH ID:	062408A01
DATE ANALYZED:	6/26/08

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
BENZENE	71-43-2	1.00	4.04	3.19	12.9
TOLUENE	108-88-3	1.00	1.88	3.77	7.08
ETHYLBENZENE	100-41-4	1.00	14.1	4.34	61.4
XYLENE (M+P)	1330-20-7	1.00	13.2	4.34	57.2
XYLENE (O)	95-47-6	1.00	ND	4.34	ND
ISOPROPANOL	67-63-0	200	ND	492	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: _____
DATE: 6/27/08

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 4525
CLIENT PROJECT: ROCKRIDGE HEIGHTS

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO15 (GC-MS-SCAN)

SAMPLE ID:	SG-6
LAB NO:	69799
SAMPLE TYPE:	AIR
DATE SAMPLED:	6/17/08
TIME SAMPLED:	14:58
BATCH ID:	062408A01
DATE ANALYZED:	6/26/08

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
BENZENE	71-43-2	20.0	ND	63.9	ND
TOLUENE	108-88-3	20.0	ND	75.4	ND
ETHYLBENZENE	100-41-4	20.0	22.6	86.8	97.9
XYLENE (M+P)	1330-20-7	20.0	ND	86.8	ND
XYLENE (O)	95-47-6	20.0	ND	86.8	ND
ISOPROPANOL	67-63-0	200	ND	490	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: _____
DATE: 6/27/08

K PRIME, INC.
LABORATORY REPORT

K PRIME PROJECT: 4525
CLIENT PROJECT: ROCKRIDGE HEIGHTS

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO15 (GC-MS-SCAN)

SAMPLE ID:	SG-7
LAB NO:	69801
SAMPLE TYPE:	AIR
DATE SAMPLED:	6/17/08
TIME SAMPLED:	15:55
BATCH ID:	062408A01
DATE ANALYZED:	6/26/08

		PPB (V/V)		µg/cu. m	
COMPOUND NAME	**CAS NO.**	**MRL**	**SAMPLE CONC**	**MRL**	**SAMPLE CONC**
BENZENE	71-43-2	1.00	8.02	3.19	25.6
TOLUENE	108-88-3	1.00	2.87	3.77	10.8
ETHYLBENZENE	100-41-4	1.00	ND	4.34	ND
XYLENE (M+P)	1330-20-7	1.00	1.10	4.34	4.78
XYLENE (O)	95-47-6	1.00	ND	4.34	ND
ISOPROPANOL	67-63-0	200	ND	492	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

APPROVED BY: _____
DATE: 6/27/08

K PRIME, INC.

LABORATORY METHOD BLANK REPORT

METHOD BLANK ID: B06240801
SAMPLE TYPE: AIR

BATCH ID: 062408A01
DATE ANALYZED: 6/24/08

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO15 (GC-MS-SCAN)

COMPOUND NAME	CAS NO.	PPB (V/V) MRL	PPB (V/V) SAMPLE CONC	µg/cu. m MRL	µg/cu. m SAMPLE CONC
BENZENE	71-43-2	0.50	ND	1.60	ND
TOLUENE	108-88-3	0.50	ND	1.88	ND
ETHYLBENZENE	100-41-4	0.50	ND	2.17	ND
XYLENE (M+P)	1330-20-7	0.50	ND	2.17	ND
XYLENE (O)	95-47-6	0.50	ND	2.17	ND
ISOPROPANOL	67-63-0	100	ND	246	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT
MRL - METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
µg/cu. m VALUES ARE CALCULATED FROM PPB RESULTS USING NORMAL TEMPERATURE AND PRESSURE (NPT).

K PRIME, INC.
LABORATORY QUALITY CONTROL REPORT

LAB CONTROL ID: L06240801
LAB CONTROL DUPLICATE ID: D06240801

SAMPLE TYPE: AIR
BATCH ID: 062408A01
DATE ANALYZED: 6/24/08

METHOD: VOC'S IN AIR
REFERENCE: EPA METHOD TO 15 (GC-MS-SCAN)

COMPOUND NAME	SPIKE ADDED (PPB)	REPORTING LIMIT (PPB)	SAMPLE CONC (PPB)	SPIKE CONC (PPB)	SPIKE REC (%)	REC LIMITS (%)
1,1-DICHLOROETHENE	10.0	0.50	ND	7.81	78.1	60 - 140
TRICHLOROETHENE	10.0	0.50	ND	8.48	84.8	60 - 140
BENZENE	10.0	0.50	ND	8.64	86.4	60 - 140
TOLUENE	10.0	0.50	ND	8.61	86.1	60 - 140
TETRACHLOROETHENE	10.0	0.50	ND	8.43	84.3	60 - 140

COMPOUND NAME	SPIKE ADDED (PPB)	SPIKE DUP CONC (PPB)	SPIKE DUP REC (%)	RPD (%)	QC LIMITS RPD (%)	QC LIMITS REC (%)
1,1-DICHLOROETHENE	10.0	7.51	75.1	3.92	25	60 - 140
TRICHLOROETHENE	10.0	8.28	82.8	2.39	25	60 - 140
BENZENE	10.0	8.53	85.3	1.28	25	60 - 140
TOLUENE	10.0	8.44	84.4	1.99	25	60 - 140
TETRACHLOROETHENE	10.0	8.16	81.6	3.25	25	60 - 140

NOTES:
NA - NOT APPLICABLE OR AVAILABLE
ND - NOT DETECTED AT OR ABOVE THE STATED REPORTING LIMIT

K PRIME, INC.

LABORATORY REPORT

K PRIME PROJECT: 4525
CLIENT PROJECT: ROCKRIDGE HEIGHTS

BATCH ID: 062008A01

METHOD: TPH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

UNITS: UG/M3

SAMPLE ID	LAB NO.	SAMPLE TYPE	DATE SAMPLED	TIME SAMPLED	DATE ANALYZED	MRL	SAMPLE CONC
SS-1	69791	AIR	6/17/08	10:30	6/20/08	700	ND
SS2	69793	AIR	6/17/08	9:28	6/20/08	700	ND
SG-4	69795	AIR	6/17/08	12:56	6/20/08	10000	830000
SG-5	69797	AIR	6/17/08	13:40	6/20/08	10000	ND
SG-6	69799	AIR	6/17/08	14:58	6/20/08	10000	13000
SG-7	69801	AIR	6/17/08	15:55	6/20/08	10000	ND

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE
MRL - METHOD REPORTING LIMIT

APPROVED BY: [signature]
DATE: 6/27/08

K PRIME, INC.
LABORATORY QC REPORT

METHOD BLANK ID: B06200801
LAB CONTROL SAMPLE ID: L06200801
LAB CONTROL DUPLICATE ID: D06200801
BATCH ID: 062008A01

METHOD: TPH C2-C10 AS HEXANE
REFERENCE: EPA TO 3

SAMPLE TYPE: AIR
UNITS: UG/M3

METHOD BLANK

COMPOUND NAME	REPORTING LIMIT	SAMPLE CONC
TPH AS C6	700	ND

ACCURACY (LAB CONTROL SAMPLE)

COMPOUND NAME	EXPECTED CONC	MEASURED CONC	PERCENT RECOVERY	LIMITS (PERCENT)
TPH AS C6	586000	569000	97.1	60-140

PRECISION (LAB CONTROL DUPLICATE)

COMPOUND NAME	SAMPLE RESULT	DUPLICATE RESULT	RPD (PERCENT)	LIMITS (PERCENT)
TPH AS C6	569000	595000	4.47	±30

NOTES:
ND - NOT DETECTED AT OR ABOVE THE STATED METHOD REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

K PRIME, INC.

CHAIN OF CUSTODY RECORD

CONSULTING ANALYTICAL CHEMISTS 3621 Westwind Blvd., Santa Rosa, CA 95403 PHONE: (707) 527-7574 FAX: (707) 527-7879

Client/Project ID	Address/Phone	ANALYSES	KPI Project No.
Paygea / Rockridge Heights	(510)838-3700 1170 Franklin St., Oakland		
Project Location: 5175 Broadway, Oakland	Client Project No.: 5175 Broadway		
Contact: Morgan Gillies	Sampler (Signature):		

Sample Identification No.	Date	Time	Lab Sample No.	Type of Sample	No. of Containers	TPHg, BTEX	Isopropyl Alcohol						Expected Turnaround Time	Remarks
SS-1	6/17/08	1030	69791	Air	1	X	X						5 Day TAT	
Leak Check SS-1		1030	69792											HOLD see note
SS-2		928	69793			X	X							
Leak Check SS-2		929	69794											HOLD see note
SG-4		1256	69795			X	X							
Leak Check SG-4		1300	69796											HOLD see note
SG-5		1340	69797			X	X							
Leak Check SG-5		1340	69798											HOLD see note
SG-6		1458	69799			X	X							
Leak Check SG-6		1458	69800											HOLD see note
SG-7		1555	69801			X	X							
Leak Check SG-7		1555	69802											HOLD see note

Relinquished by: (Signature)	Received by: (Signature)	Date	Time
6/18/08		6/18/08	12:55
Relinquished by: (Signature)	Received by: (Signature)	Date	Time
		6/18/08	2:45
Relinquished by: (Signature)	Received by: (Signature)	Date	Time

Disposal Method

Disposed by: (Signature) | Date | Time

Please prepare EDF. Results to mgillies@paygaeu.com
If Isopropyl Alcohol is detected in a sample, then analyze the corresponding leak check summa for isopropyl alcohol.