

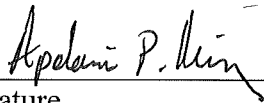
**RECEIVED**

By Alameda County Environmental Health 7:53 am, Dec 19, 2017

**December 13, 2017**

**RE:** Soil Vapor Investigation dated December 13, 2017  
217 North N Street, Livermore, CA  
Case Number: RO0003271

I declare, under penalty of perjury, that the information and/or recommendations contained in the above-referenced report are true and correct to the best of my knowledge.



\_\_\_\_\_  
Signature

Polo Munoz

\_\_\_\_\_  
Company Officer or Legal Representative Name

Project Manager, MidPen Housing Corp.

\_\_\_\_\_  
Title

12/13/17

\_\_\_\_\_  
Date



December 13, 2017

**1569.002.01.002**

A Report Prepared for:

MidPen Housing Corporation  
Attention: Mr. Apolonio Munoz  
303 Vintage Park Drive, Suite 250  
Foster City, California 94404

For Submittal to Oversight Agency:

Alameda County Environmental Health  
Attention: Mr. Jonathan Sanders  
Ms. Dilan Roe, PE  
1131 Harbor Bay Parkway  
Alameda, California 94502

Received by: \_\_\_\_\_

Date: \_\_\_\_\_

**Subject: Soil Vapor Investigation Report**  
**217 North N Street**  
**Livermore, California**  
**Site Cleanup Case R00003271**

Dear Mr. Sanders and Ms. Roe:

This report has been prepared by PES Environmental, Inc. (PES) to document the results of soil vapor sampling activities conducted at the vacant property located at 217 North N Street in Livermore, California (the site or subject property). The site location is shown on Plate 1, and the site plan is shown on Plate 2. The property is planned to be redeveloped with residential townhomes.

The investigation was conducted in accordance with the *Work Plan for Soil Vapor Investigation*<sup>1</sup> (Work Plan) prepared by PES on behalf of MidPen Housing Corporation (MidPen) for the City of Livermore, California, which owns the subject property. As indicated in the Work Plan, Alameda County Environmental Health Department (ACEHD) requested that a soil vapor investigation be conducted at the subject property to confirm whether elevated soil vapor conditions are present beneath the site.

Details of the active soil vapor investigation are discussed below.

---

<sup>1</sup> PES Environmental, Inc., 2017. *Work Plan for Soil Vapor Investigation, 217 North N Street, Livermore, California*. October 31.

**Mr. Jonathan Sanders and Ms. Dilan Roe**  
**December 13, 2017**  
**Page 2**

## **ACTIVE SOIL VAPOR INVESTIGATION**

In accordance with the Work Plan, the investigation activities on the site included collecting soil vapor samples at 22 locations (i.e., locations SV1 through SV22 [see Plate 2]). Soil vapor samples were initially collected beneath each of 10 proposed townhome buildings shown on Plate 2; based on the sample results, additional soil vapor samples were collected from 12 pre-selected step-out locations to further characterize and delineate conditions beneath the site.

Details of the investigation are discussed below.

### **Field Preparation Activities**

The following activities were performed prior to the commencement of field sampling activities:

- Coordinated with the subcontractors to schedule the investigation field activities;
- Contacted Underground Service Alert to schedule visits by public and private utility companies to locate their underground utilities. In addition, C. Cruz Sub-Surface Locators, Inc. (C. Cruz) of Milpitas, California, cleared the sampling locations for subsurface utilities; and
- Prepared a Health and Safety Plan for the sampling activities that complied with applicable federal, California Occupational Safety and Health Administration (OSHA), and Title 29 CFR 1910.120 guidelines.

A drilling permit from the Zone 7 Water Agency was not required because the soil vapor borings were shallower than 10 feet below ground surface (bgs) and groundwater was not anticipated to be encountered in the borings.

### **Soil Vapor Sampling Methods and Procedures**

The active soil vapor investigation was conducted on November 14 and 15, 2017. The investigation was conducted in accordance with the procedures presented in the Work Plan and outlined in the *Advisory for Active Soil Gas Investigations* (ASGI) published by DTSC, the California Regional Water Quality Control Board (RWQCB), Los Angeles region and the California RWQCB, San Francisco Bay Region dated July 2015<sup>2</sup>. Prior to sampling, PES verified that no significant rainfall event (of greater than 0.5 inches within a 24-hour period,

---

<sup>2</sup> DTSC, 2015. *Advisory - Active Soil Gas Investigations*. Jointly developed by the California Environmental Protection Agency Department of Toxic Substances Control (DTSC), and the California Regional Water Quality Control Board – Los Angeles Region (LARWQCB) and RWQCB - San Francisco Region (SFRWQCB). July.

**Mr. Jonathan Sanders and Ms. Dilan Roe**  
**December 13, 2017**  
**Page 3**

as described in the *Advisory*) had occurred within a 5-day period of the soil vapor sampling event. According to the Weather Underground website, the total rainfall for Livermore for the period of time between November 15, 2017 and October 1, 2017 is 0.48 inches, a nominal amount of rainfall following the summer dry season. As such, this sampling event is considered to represent a “dry season” monitoring event.

The temporary soil vapor sampling probes were installed with a direct-push rig operated by TEG Northern California Inc. (TEG) of Rancho Cordova, California. TEG is a licensed contractor possessing a valid C-57 water well contractor’s license issued by the State of California. All subsurface investigation work was conducted under the supervision of a California-registered geologist.

The probes were completed to a total depth of approximately 5.5 feet bgs and the soil vapor inlets were placed at a depth of approximately 5 feet bgs. Each soil probe was fitted with ¼-inch diameter Teflon® tubing. The probe tip (a plastic air diffuser) was placed approximately 6-inches above the bottom of the 1-foot thick sand pack that was installed at the bottom of the borehole. One foot of dry granular bentonite was placed above the sand pack, followed by hydrated bentonite to the surface. The soil vapor probes were allowed to equilibrate at least two hours before the soil vapor samples were collected.

Prior to purging and the collection of soil vapor samples, shut-in leak testing was performed. The shut-in test consisted of assembling the above-ground sampling apparatus (e.g., valves, lines and fittings downstream from the top of the probe), and evacuating the lines to a measured vacuum of approximately 100 inches of water column (in-H<sub>2</sub>O), then shutting the vacuum in with closed valves on opposite ends of the sampling train. A vacuum gauge was then used to assess if there was any observable loss of vacuum (for at least one minute) prior to purging and the collection of soil vapor samples. If observable vacuum loss was noted, then the sample train was re-assembled, and the shut-in test was repeated. This process was repeated as necessary until a successful shut-in test had been performed. A default of three purge volumes was purged prior to collection of each soil vapor sample.

A default of three purge volumes was extracted prior by TEG prior to collecting the soil vapor samples. The stagnant air was purged with a sampling syringe. The purge volume was calculated using the volumes of: (1) the internal volume of the tubing; (2) the void space of the sand pack around the probe tip; and (3) the void space of the dry bentonite in the annular space. In accordance with the ASGI, purging and collection of soil vapor samples was performed using a flow rate of 100 to 200 milliliters per minute (mL/min) and a low vacuum of less than 100 inches of water was maintained to mitigate ambient air breakthrough into samples.

**Mr. Jonathan Sanders and Ms. Dilan Roe**  
**December 13, 2017**  
**Page 4**

Following completion of the shut-in leak test and purging, a shroud box was positioned over the wellhead with the sample collection tubing passing through the bottom. Once in position, the sample train was connected to the sampling syringe. The shroud box (i.e., an inverted 5-gallon bucket) was then charged by spraying the tracer propellant 1,1-difluoroethane (1,1-DFA) into the shroud box. The shroud box was allowed to remain in place for the duration of sampling. Field quality assurance/quality control (QA/QC) samples for the investigation consisted of one duplicate sample per day and a daily probe blank sample. The soil vapor sample was collected by TEG using a syringe connected to a sampling port and immediately transferred to the mobile laboratory for chemical analysis. TEG collected duplicate soil vapor samples at locations SV3 and SV16. The soil vapor samples were analyzed by TEG's mobile laboratory for volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (U.S. EPA) Test Method 8260B.

Upon completion of sampling activities, each borehole was grouted to the surface using neat cement.

### **Soil Vapor Sampling Results**

The soil vapor results are presented on Table 1 and TEG's analytical report included in Appendix A. In addition, the tetrachloroethene (PCE) results are posted on Plate 3. As indicated on Table 1, PCE, toluene, and m,p-xylenes were the only constituents detected in the soil vapor samples. Also, 1,1-DFA (leak detection compound) was not detected in the samples. As expected, 1,1-DFA was detected at high concentrations in the two shroud samples that were analyzed (TEG report, Appendix A). The results for PCE, toluene, and m,p-xylenes are summarized below:

- PCE was detected at 12 of 22 locations at concentrations ranging from 100 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ , at location SV20) to  $780 \mu\text{g}/\text{m}^3$  (at location SV2). The concentrations at eight locations are above the PCE residential human health risk soil vapor Environmental Screening Level<sup>3</sup> (ESL) value of  $240 \mu\text{g}/\text{m}^3$ ;
- Toluene was detected at  $260 \mu\text{g}/\text{m}^3$  at location SV1, which is below the toluene residential human health risk ESL value of  $160,000 \mu\text{g}/\text{m}^3$ ; and
- m,p-xylenes were detected at  $220 \mu\text{g}/\text{m}^3$  at location SV1, which is below the xylenes residential human health risk ESL value of  $52,000 \mu\text{g}/\text{m}^3$ .

---

<sup>3</sup> SFRWQCB, 2016. *February 2016, Rev. 3, Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) Environmental Screening Levels (ESLs)*.

**Mr. Jonathan Sanders and Ms. Dilan Roe**  
**December 13, 2017**  
**Page 5**

Data quality for the soil vapor samples was assessed by implementing appropriate QA/QC procedures and through review of analytical data. The following is a summary of the data quality review:

- All samples were analyzed within the required holding times for the requested analyses;
- The leak check compound (1,1-DFA) was not detected in any of the soil vapor samples. This indicates an adequate seal was established in the soil vapor sampling trains;
- The probe blank samples were non-detect for all constituents;
- The results of the midpoint calibration and continuing midpoint calibration data were within acceptable ranges;
- The results for the surrogate recoveries were within acceptable ranges; and
- Results for the duplicate samples from locations SV3 and SV16 agreed with respect to quantity (within acceptable precision limits) and to detection of the target compound (i.e., PCE was detected at concentrations of 470  $\mu\text{g}/\text{m}^3$  and 410  $\mu\text{g}/\text{m}^3$  in the primary and duplicate samples, respectively). The duplicate result indicates acceptable quality of the data set.

## **SUMMARY AND CONCLUSIONS**

PCE was detected at 12 of 22 locations sampled during the investigation and the concentration at eight locations is above the PCE residential human health risk soil vapor ESL value of 240  $\mu\text{g}/\text{m}^3$ . The only other constituents detected in the soil vapor samples were toluene and m,p-xylenes at location SV1. The concentrations of toluene and m,p-xylenes are below their respective residential human health risk soil vapor ESL values. The highest concentrations of PCE were detected at locations SV1 (at 600  $\mu\text{g}/\text{m}^3$ ) and SV2 (at 780  $\mu\text{g}/\text{m}^3$ ) in the western portion of the site and location SV18 (at 620  $\mu\text{g}/\text{m}^3$ ) in the southern portion of the site. As shown on Plate 3, the PCE concentrations were generally highest in the western and southwestern portions of the site.

Similar to the conclusion reached for the adjacent Senior and Family Housing site to the west<sup>4</sup>, the source of PCE in soil vapor appears to be the result of either discharges of PCE into the sanitary sewer located in Chestnut Street and/or off-gassing from the underlying PCE groundwater plume emanating from off-site sources.

---

<sup>4</sup> PES Environmental, Inc., 2017. Final Corrective Action Plan, Senior and Family Housing, 1625-1635 Chestnut Street, Livermore, California. Site Cleanup Case R00003179. November 22.

**Mr. Jonathan Sanders and Ms. Dilan Roe**

**December 13, 2017**

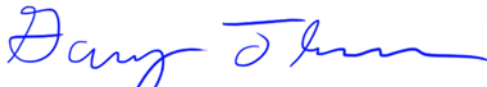
**Page 6**

As requested by ACEHD, a second round of soil vapor sampling will be conducted during the wet season, likely in January 2018. Based on the results of this sampling event and taking into risk assessment considerations, the need for, if any, for vapor intrusion mitigation will be evaluated.

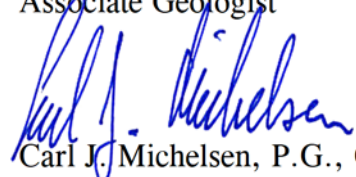
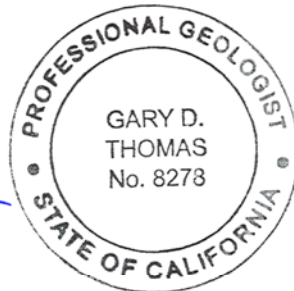
We trust that this is the information you require. Please call either of the undersigned if you have any questions.

Yours very truly,

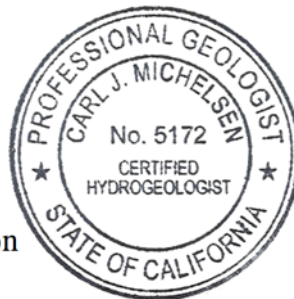
**PES ENVIRONMENTAL, INC.**



Gary D. Thomas, P.G.  
Associate Geologist



Carl J. Michelsen, P.G., C.HG  
Principal Geochemist



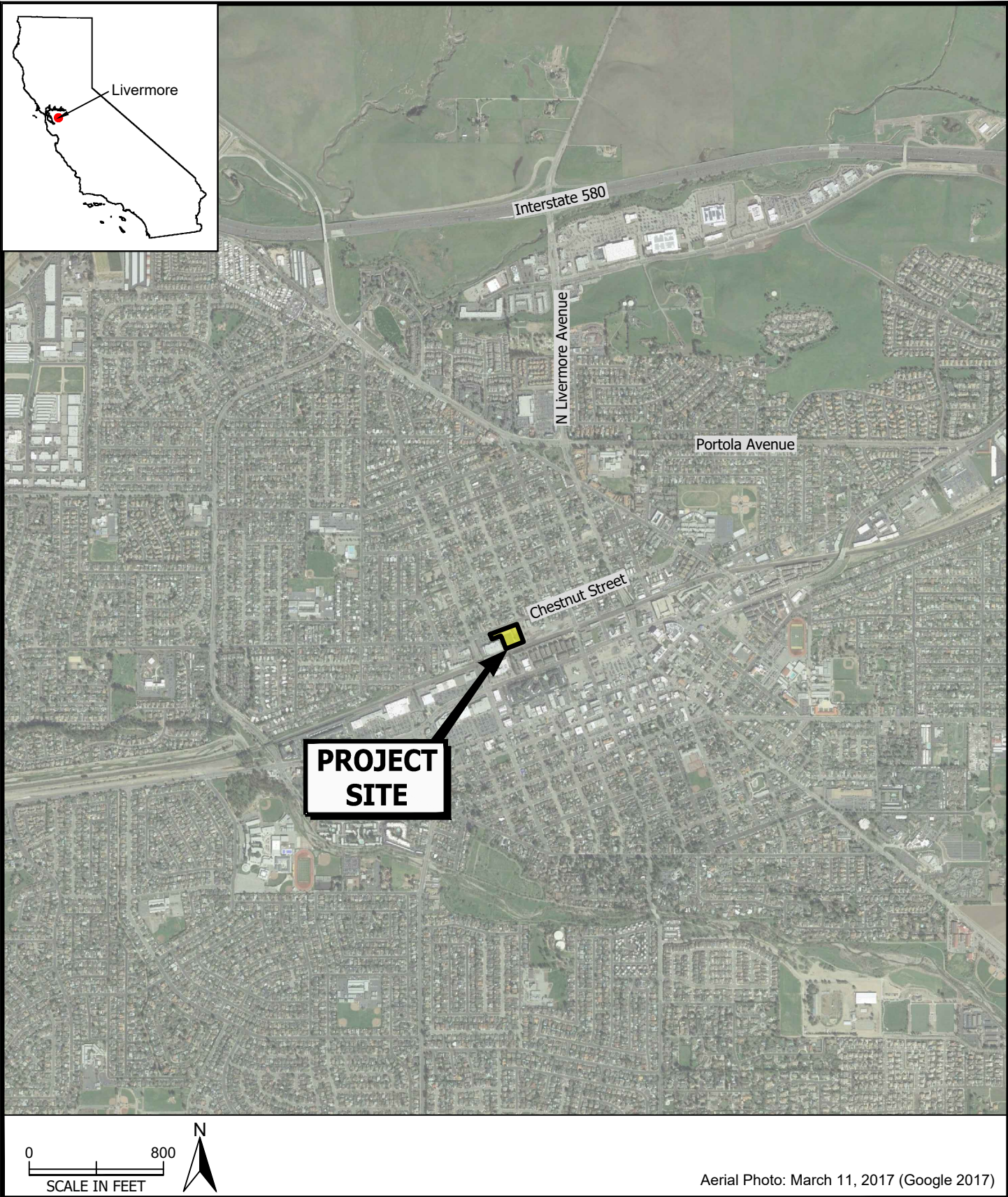
Attachments: Plate 1 – Site Location  
Plate 2 – Site Plan  
Plate 3 – PCE Soil Vapor Results

Table 1 – Summary of Soil Vapor Analytical Results

Appendix A – TEG Mobile Laboratory Data Report

**PLATES**





Aerial Photo: March 11, 2017 (Google 2017)

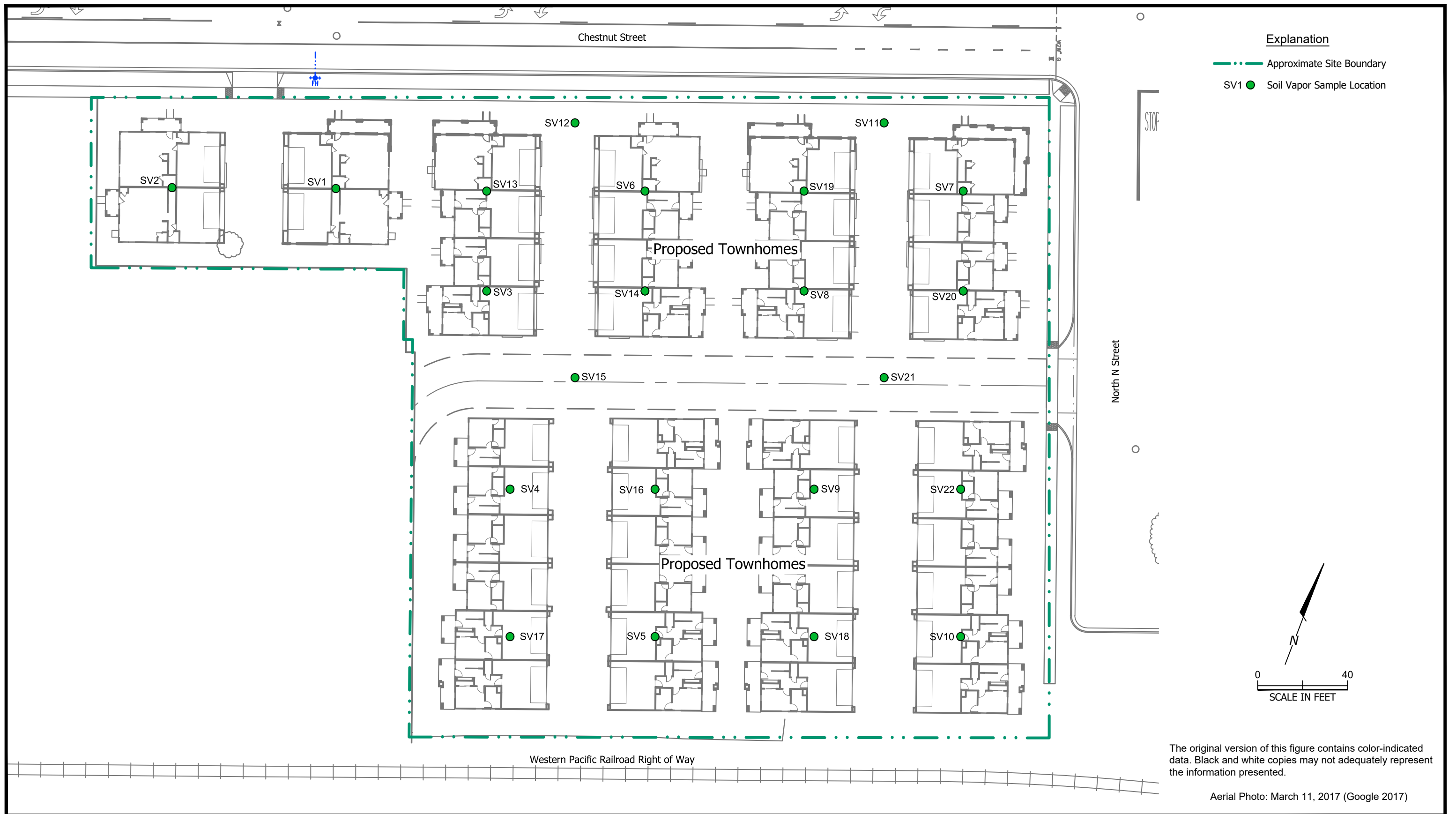


**PES Environmental, Inc.**  
Engineering & Environmental Services

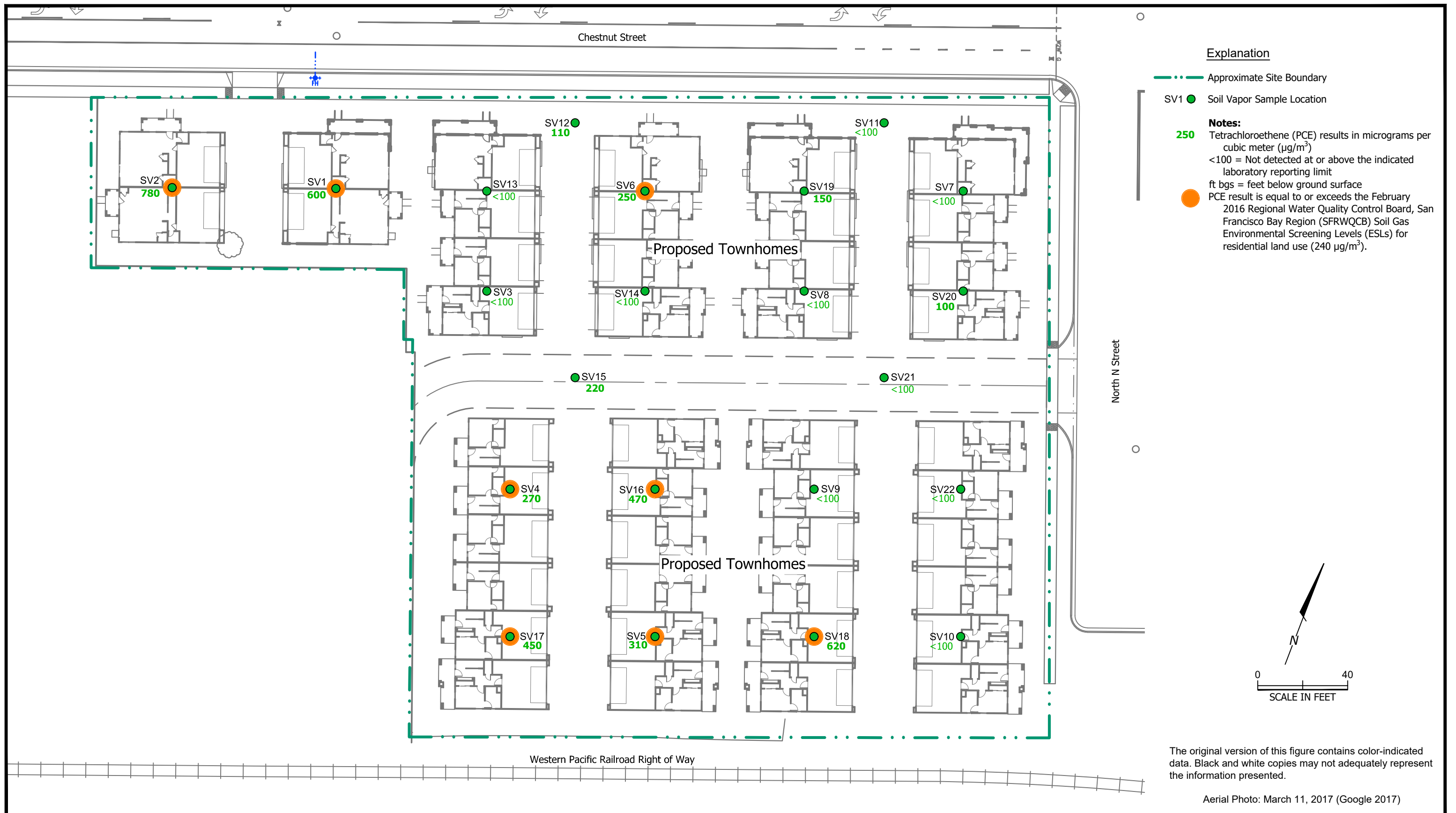
**Site Location**  
Soil Vapor Sampling Report  
217 North N Street  
Livermore, California

PLATE

**1**







**TABLES**

**Table 1**  
**Summary of Soil Vapor Analytical Results**  
**217 North N Street**  
**Livermore, California**

Sample Location	Sample Identification	Date Collected	Sample Depth (feet bgs)	Volatile Organic Compounds				1,1-DFA (Leak Check Compound) ( $\mu\text{g}/\text{m}^3$ )
				PCE ( $\mu\text{g}/\text{m}^3$ )	Toluene ( $\mu\text{g}/\text{m}^3$ )	m,p-Xylene ( $\mu\text{g}/\text{m}^3$ )	Other VOCs ( $\mu\text{g}/\text{m}^3$ )	
SV1	SV1	11/14/17	5.5	<b>600</b>	<b>260</b>	<b>220</b>	All ND	< 10,000
SV2	SV2	11/14/17	5.5	<b>780</b>	< 200	< 200	All ND	< 10,000
SV3	SV3	11/14/17	5.5	< 100	< 200	< 200	All ND	< 10,000
	SV3 dup	11/14/17	5.5	< 100	< 200	< 200	All ND	< 10,000
SV4	SV4	11/14/17	5.5	<b>270</b>	< 200	< 200	All ND	< 10,000
SV5	SV5	11/14/17	5.5	<b>310</b>	< 200	< 200	All ND	< 10,000
SV6	SV6	11/14/17	5.5	<b>250</b>	< 200	< 200	All ND	< 10,000
SV7	SV7	11/14/17	5.5	< 100	< 200	< 200	All ND	< 10,000
SV8	SV8	11/14/17	5.5	< 100	< 200	< 200	All ND	< 10,000
SV9	SV9	11/14/17	5.5	< 100	< 200	< 200	All ND	< 10,000
SV10	SV10	11/14/17	5.5	< 100	< 200	< 200	All ND	< 10,000
SV11	SV11	11/14/17	5.5	< 100	< 200	< 200	All ND	< 10,000
SV12	SV12	11/14/17	5.5	<b>110</b>	< 200	< 200	All ND	< 10,000
SV13	SV13	11/14/17	5.5	< 100	< 200	< 200	All ND	< 10,000
SV14	SV14	11/15/17	5.5	< 100	< 200	< 200	All ND	< 10,000
SV15	SV15	11/15/17	5.5	<b>220</b>	< 200	< 200	All ND	< 10,000
SV16	SV16	11/15/17	5.5	<b>470</b>	< 200	< 200	All ND	< 10,000
	SV16 dup	11/15/17	5.5	<b>410</b>	< 200	< 200	All ND	< 10,000
SV17	SV17	11/15/17	5.5	<b>450</b>	< 200	< 200	All ND	< 10,000
SV18	SV18	11/15/17	5.5	<b>620</b>	< 200	< 200	All ND	< 10,000
SV19	SV19	11/15/17	5.5	<b>150</b>	< 200	< 200	All ND	< 10,000
SV20	SV20	11/15/17	5.5	<b>100</b>	< 200	< 200	All ND	< 10,000
SV21	SV21	11/15/17	5.5	< 100	< 200	< 200	All ND	< 10,000
SV22	SV22	11/15/17	5.5	< 100	< 200	< 200	All ND	< 10,000
<b>Residential Human Health Risk Soil Gas ESL</b> <sup>(Note 1)</sup>				240	160,000	52,000	N/A	N/A

The soil vapor samples were collected and analyzed by TEG Northern California. The samples were analyzed by U.S. EPA Method 8260B.

Detections are shown in **bold**.

Results equal to or exceeding the residential human health risk soil gas ESLs are shaded.

**Abbreviations:**

bgs = below ground surface.

$\mu\text{g}/\text{m}^3$  = micrograms per cubic meter.

PCE = Tetrachloroethene.

VOCs = Volatile organic compounds.

< 100 = not detected at or above the specified laboratory reporting limit.

ND = Not detected at or above the laboratory reporting limit.

N/A = Not applicable.

**Note:**

1. ESL = February 2016 (Rev. 3) Regional Water Quality Control Board, San Francisco Bay Region (SFRWQCB) Residential Human Health Risk Soil Gas Environmental Screening Levels (ESLs).

**APPENDIX A**

**TEG MOBILE LABORATORY DATA REPORT**



22 November 2017

Mr. Carl Michelsen  
PES Environmental, Inc.  
7665 Redwood Blvd., Suite 200  
Novato, CA 94945

**SUBJECT: DATA REPORT - PES Environmental, Inc. Project # 1596.002.01.002  
217 North N Street Livermore, California**

**TEG Project # 71114F**

Mr. Michelsen:

Please find enclosed a data report for the samples analyzed from the above referenced project for PES Environmental. The samples were analyzed on site in TEG's mobile laboratory. TEG conducted a total of 26 analyses on 2 shroud samples and 24 soil vapor samples.

- 24 analyses on soil vapors for selected volatile organic hydrocarbons by EPA method 8260B.
- 2 analyses on shroud samples for 1,1-Difluoroethane by EPA method 8260B.

The results of the analyses are summarized in the enclosed tables. Applicable detection limits and calibration data are included in the tables.

TEG appreciates the opportunity to have provided analytical services to PES Environmental on this project. If you have any further questions relating to these data or report, please do not hesitate to contact us.

Sincerely,

Mark Jerpbak  
Director, TEG-Northern California



PES Environmental, Inc.  
 Project # 1596.002.01.002  
 217 North N Street  
 Livermore, California

TEG Project #71114F

EPA Method 8260B VOC Analyses of SOIL VAPOR in micrograms per cubic meter of Vapor

SAMPLE NUMBER:	Probe Blank	Syringe Blank	Shroud Sample	Shroud Sample	SV1	SV2	SV3	
SAMPLE DEPTH (feet):					5.5	5.5	5.5	
PURGE VOLUME:					3	3	3	
COLLECTION DATE:	11/14/17	11/15/17	11/14/17	11/15/17	11/14/17	11/14/17	11/14/17	
COLLECTION TIME:	8:33	6:07	7:23	5:47	10:31	10:54	11:18	
DILUTION FACTOR:	1	1	2000	2000	1	1	1	
	RL							
Dichlorodifluoromethane	100	nd	nd	--	--	nd	nd	nd
Vinyl Chloride	9	nd	nd	--	--	nd	nd	nd
Chloroethane	100	nd	nd	--	--	nd	nd	nd
Trichlorofluoromethane	100	nd	nd	--	--	nd	nd	nd
1,1-Dichloroethene	100	nd	nd	--	--	nd	nd	nd
1,1,2-Trichloro-trifluoroethane	100	nd	nd	--	--	nd	nd	nd
Methylene Chloride	100	nd	nd	--	--	nd	nd	nd
trans-1,2-Dichloroethene	100	nd	nd	--	--	nd	nd	nd
1,1-Dichloroethane	100	nd	nd	--	--	nd	nd	nd
cis-1,2-Dichloroethene	100	nd	nd	--	--	nd	nd	nd
Chloroform	60	nd	nd	--	--	nd	nd	nd
1,1,1-Trichloroethane	100	nd	nd	--	--	nd	nd	nd
Carbon Tetrachloride	30	nd	nd	--	--	nd	nd	nd
1,2-Dichloroethane	50	nd	nd	--	--	nd	nd	nd
Benzene	45	nd	nd	--	--	nd	nd	nd
Trichloroethene	100	nd	nd	--	--	nd	nd	nd
<b>Toluene</b>	200	nd	nd	--	--	260	nd	nd
1,1,2-Trichloroethane	85	nd	nd	--	--	nd	nd	nd
<b>Tetrachloroethene</b>	100	nd	nd	--	--	600	780	nd
Ethylbenzene	100	nd	nd	--	--	nd	nd	nd
1,1,1,2-Tetrachloroethane	100	nd	nd	--	--	nd	nd	nd
<b>m,p-Xylene</b>	200	nd	nd	--	--	220	nd	nd
o-Xylene	100	nd	nd	--	--	nd	nd	nd
1,1,2,2-Tetrachloroethane	100	nd	nd	--	--	nd	nd	nd
1,1 Difluoroethane (leak check)	10000	nd	nd	4.5E+07	1.7E+08	nd	nd	nd
Surrogate Recovery (DBFM)		89%	97%	97%	95%	100%	93%	99%
Surrogate Recovery (Toluene-d8)		103%	103%	101%	102%	105%	95%	102%
Surrogate Recovery (1,4-BFB)		95%	94%	93%	93%	99%	87%	95%

'RL' Indicates reporting limit at a dilution factor of 1  
 'nd' Indicates not detected at listed reporting limits

Analyses performed in TEG-Northern California's lab  
 Analyses performed by: Ms. Lorena Williams





PES Environmental, Inc.  
 Project # 1596.002.01.002  
 217 North N Street  
 Livermore, California

TEG Project #71114F

EPA Method 8260B VOC Analyses of SOIL VAPOR in micrograms per cubic meter of Vapor

SAMPLE NUMBER:	SV3	SV4	SV5	SV6	SV7	SV8	SV9	
	dup							
SAMPLE DEPTH (feet):	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
PURGE VOLUME:	3	3	3	3	3	3	3	
COLLECTION DATE:	11/14/17	11/14/17	11/14/17	11/14/17	11/14/17	11/14/17	11/14/17	
COLLECTION TIME:	11:18	11:59	12:22	12:45	13:29	13:06	13:52	
DILUTION FACTOR:	1	1	1	1	1	1	1	
	RL							
Dichlorodifluoromethane	100	nd	nd	nd	nd	nd	nd	
Vinyl Chloride	9	nd	nd	nd	nd	nd	nd	
Chloroethane	100	nd	nd	nd	nd	nd	nd	
Trichlorofluoromethane	100	nd	nd	nd	nd	nd	nd	
1,1-Dichloroethene	100	nd	nd	nd	nd	nd	nd	
1,1,2-Trichloro-trifluoroethane	100	nd	nd	nd	nd	nd	nd	
Methylene Chloride	100	nd	nd	nd	nd	nd	nd	
trans-1,2-Dichloroethene	100	nd	nd	nd	nd	nd	nd	
1,1-Dichloroethane	100	nd	nd	nd	nd	nd	nd	
cis-1,2-Dichloroethene	100	nd	nd	nd	nd	nd	nd	
Chloroform	60	nd	nd	nd	nd	nd	nd	
1,1,1-Trichloroethane	100	nd	nd	nd	nd	nd	nd	
Carbon Tetrachloride	30	nd	nd	nd	nd	nd	nd	
1,2-Dichloroethane	50	nd	nd	nd	nd	nd	nd	
Benzene	45	nd	nd	nd	nd	nd	nd	
Trichloroethene	100	nd	nd	nd	nd	nd	nd	
<b>Toluene</b>	200	nd	nd	nd	nd	nd	nd	
1,1,2-Trichloroethane	85	nd	nd	nd	nd	nd	nd	
<b>Tetrachloroethene</b>	100	nd	270	310	250	nd	nd	
Ethylbenzene	100	nd	nd	nd	nd	nd	nd	
1,1,1,2-Tetrachloroethane	100	nd	nd	nd	nd	nd	nd	
<b>m,p-Xylene</b>	200	nd	nd	nd	nd	nd	nd	
o-Xylene	100	nd	nd	nd	nd	nd	nd	
1,1,2,2-Tetrachloroethane	100	nd	nd	nd	nd	nd	nd	
1,1 Difluoroethane (leak check)	10000	nd	nd	nd	nd	nd	nd	
Surrogate Recovery (DBFM)		98%	91%	97%	100%	98%	93%	89%
Surrogate Recovery (Toluene-d8)		102%	99%	102%	102%	102%	94%	92%
Surrogate Recovery (1,4-BFB)		99%	92%	95%	94%	96%	89%	85%

'RL' Indicates reporting limit at a dilution factor of 1  
 'nd' Indicates not detected at listed reporting limits

Analyses performed in TEG-Northern California's lab  
 Analyses performed by: Ms. Lorena Williams



PES Environmental, Inc.  
 Project # 1596.002.01.002  
 217 North N Street  
 Livermore, California

TEG Project #71114F

EPA Method 8260B VOC Analyses of SOIL VAPOR in micrograms per cubic meter of Vapor

SAMPLE NUMBER:	SV10	SV11	SV12	SV13	SV14	SV15	SV16
SAMPLE DEPTH (feet):	5.5	5.5	5.5	5.5	5.5	5.5	5.5
PURGE VOLUME:	3	3	3	3	3	3	3
COLLECTION DATE:	11/14/17	11/14/17	11/14/17	11/14/17	11/15/17	11/15/17	11/15/17
COLLECTION TIME:	14:16	14:44	15:04	15:27	6:41	7:02	7:23
DILUTION FACTOR:	1	1	1	1	1	1	1
	RL						
Dichlorodifluoromethane	100	nd	nd	nd	nd	nd	nd
Vinyl Chloride	9	nd	nd	nd	nd	nd	nd
Chloroethane	100	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	100	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	100	nd	nd	nd	nd	nd	nd
1,1,2-Trichloro-trifluoroethane	100	nd	nd	nd	nd	nd	nd
Methylene Chloride	100	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	100	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	100	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	100	nd	nd	nd	nd	nd	nd
Chloroform	60	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane	100	nd	nd	nd	nd	nd	nd
Carbon Tetrachloride	30	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane	50	nd	nd	nd	nd	nd	nd
Benzene	45	nd	nd	nd	nd	nd	nd
Trichloroethene	100	nd	nd	nd	nd	nd	nd
<b>Toluene</b>	200	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	85	nd	nd	nd	nd	nd	nd
<b>Tetrachloroethene</b>	100	nd	nd	110	nd	nd	220 470
Ethylbenzene	100	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	100	nd	nd	nd	nd	nd	nd
<b>m,p-Xylene</b>	200	nd	nd	nd	nd	nd	nd
o-Xylene	100	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	100	nd	nd	nd	nd	nd	nd
1,1 Difluoroethane (leak check)	10000	nd	nd	nd	nd	nd	nd
Surrogate Recovery (DBFM)		99%	99%	88%	86%	98%	97%
Surrogate Recovery (Toluene-d8)		102%	101%	92%	92%	104%	107%
Surrogate Recovery (1,4-BFB)		96%	95%	85%	85%	96%	100%

'RL' Indicates reporting limit at a dilution factor of 1  
 'nd' Indicates not detected at listed reporting limits

Analyses performed in TEG-Northern California's lab  
 Analyses performed by: Ms. Lorena Williams



**PES Environmental, Inc.**  
**Project # 1596.002.01.002**  
**217 North N Street**  
**Livermore, California**

TEG Project #71114F

**EPA Method 8260B VOC Analyses of SOIL VAPOR in micrograms per cubic meter of Vapor**

SAMPLE NUMBER:		SV16	SV17	SV18	SV19	SV20	SV21	SV22
		dup						
SAMPLE DEPTH (feet):		5.5	5.5	5.5	5.5	5.5	5.5	5.5
PURGE VOLUME:		3	3	3	3	3	3	3
COLLECTION DATE:		11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17	11/15/17
COLLECTION TIME:		7:23	8:06	8:27	9:28	9:48	10:09	10:31
DILUTION FACTOR:		1	1	1	1	1	1	1
	RL							
<i>Dichlorodifluoromethane</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>Vinyl Chloride</i>	9	nd	nd	nd	nd	nd	nd	nd
<i>Chloroethane</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>Trichlorofluoromethane</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>1,1-Dichloroethene</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>1,1,2-Trichloro-trifluoroethane</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>Methylene Chloride</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>trans-1,2-Dichloroethene</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>1,1-Dichloroethane</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>cis-1,2-Dichloroethene</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>Chloroform</i>	60	nd	nd	nd	nd	nd	nd	nd
<i>1,1,1-Trichloroethane</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>Carbon Tetrachloride</i>	30	nd	nd	nd	nd	nd	nd	nd
<i>1,2-Dichloroethane</i>	50	nd	nd	nd	nd	nd	nd	nd
<i>Benzene</i>	45	nd	nd	nd	nd	nd	nd	nd
<i>Trichloroethene</i>	100	nd	nd	nd	nd	nd	nd	nd
<b>Toluene</b>	200	nd	nd	nd	nd	nd	nd	nd
<i>1,1,2-Trichloroethane</i>	85	nd	nd	nd	nd	nd	nd	nd
<b>Tetrachloroethene</b>	100	410	450	620	150	100	nd	nd
<i>Ethylbenzene</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>1,1,1,2-Tetrachloroethane</i>	100	nd	nd	nd	nd	nd	nd	nd
<b>m,p-Xylene</b>	200	nd	nd	nd	nd	nd	nd	nd
<i>o-Xylene</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>1,1,2,2-Tetrachloroethane</i>	100	nd	nd	nd	nd	nd	nd	nd
<i>1,1 Difluoroethane (leak check)</i>	10000	nd	nd	nd	nd	nd	nd	nd
<i>Surrogate Recovery (DBFM)</i>		95%	91%	87%	95%	90%	91%	92%
<i>Surrogate Recovery (Toluene-d8)</i>		104%	98%	94%	104%	98%	101%	118%
<i>Surrogate Recovery (1,4-BFB)</i>		93%	100%	99%	107%	104%	104%	109%

'RL' Indicates reporting limit at a dilution factor of 1  
 'nd' Indicates not detected at listed reporting limits

Analyses performed in TEG-Northern California's lab  
 Analyses performed by: Ms. Lorena Williams



PES Environmental, Inc.  
Project # 1596.002.01.002  
217 North N Street  
Livermore, California

TEG Project #71114F

CALIBRATION DATA - Calibration Check Compounds

	Vinyl Chloride	1,1 DCE	Chloroform	1,2 DCP	Toluene	Ethylbenzene
Midpoint	10.0	10.0	10.0	10.0	10.0	10.0

Continuing Calibration - Midpoint

11/14/17	9.8 98%	8.4 84%	10.7 107%	10.9 109%	11.4 114%	10.7 107%
11/15/17	10.9 109%	8.2 82%	11.0 110%	11.3 113%	10.7 107%	11.1 111%