



August 23, 2016

Mr. Paul Seidel
Oregon Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, OR 97232

VIA EMAIL: paul.seidel@state.or.us

Dear Paul:

Enclosed please find the Technical Memorandum ("TM") that describes the Indoor Air Evaluation at the Large Parts Campus ("LPC"). This work was performed in accordance with a work plan and correspondence approved by ODEQ. As described in the TM, while the results of the soil vapor samples are consistent with past results (order of magnitude), the sampling data from the indoor air investigation demonstrate that concentrations of TCE and PCE are below ODEQ's risk-based screening levels for indoor air and are safe for PCC's employees. In addition to the attached TM, these results will be included in the Remedial Investigation Report.

Please let me know if you have any questions or would like to discuss the TM.

Best Regards

A handwritten signature in black ink, appearing to be "Chris Myers", written in a cursive style.

Chris Myers

cc: Dan Halfley
Keith Johnson
Ruth Beyer
Jay Bower
Colette Gaona

Technical Memorandum

TO: Paul Seidel, Oregon Department of Environmental Quality,
Northwest Region Cleanup Section
Dan Hafley, Oregon Department of Environmental Quality,
Northwest Region Cleanup Section

cc: Chris Myers, PCC Structural, Inc.

FROM: Colette Gaona and Della Fawcett, RG

DATE: August 22, 2016

RE: **Indoor Air Evaluation**
PCC Structural, Inc.
Large Parts Campus
Portland, Oregon
Project No. 883002.040.044

Introduction

This technical memorandum (memorandum) has been prepared by Landau Associates, Inc. (LAI). The purpose of this memorandum is to present the results of the remedial investigation sub-slab soil vapor and supplemental passive indoor air sampling completed at the PCC Structural, Inc. (PCC) Large Parts Campus (LPC). The LPC is located at 4600 SE Harney Drive in Portland, Oregon (site; Figure 1).

On May 19, 2016, the Oregon Department of Environmental Quality (ODEQ) requested a scope of work for evaluating indoor air at the LPC (ODEQ 2016). A scope of work was submitted to ODEQ on May 27, 2016 (LAI 2016). ODEQ approved the scope on June 2, 2016, which included an evaluation of the use of trichloroethene (TCE) based solvent sprays at the LPC and inspection of the indoor monitoring wells and soil vapor sampling points. Except as noted herein, sampling was performed in accordance with the scope and procedures outlined in the Indoor Air Evaluation Work Plan (Work Plan; LAI 2016) and subsequent response to ODEQ's comments on the Work Plan (Bower 2016).

Background

The remedial investigation sub-slab soil vapor and soil gas sampling was performed in three rounds from 2010 through 2013 (LAI 2012). The initial two rounds of sampling consisted of a total of 140 sub-slab soil vapor and soil gas samples, including 9 samples collected from permanent, sub-slab vapor sampling locations. The third round consisted of sampling from 3 previously installed, permanent sampling locations and four additional, permanent sampling locations installed in 2012. There are a total of 13 permanent sub-slab vapor sampling locations, 11 interior and 2 exterior to the site buildings.

These samples were collected with Summa® canisters and analyzed for halogenated volatile organic compounds by U.S. Environmental Protection Agency (EPA) Method TO-15. TCE detections in soil vapor exceeded the then current risk-based concentration for potential vapor intrusion of 2,800 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) at multiple locations. The results of prior sampling are presented in Table 1.

In 2016, ODEQ decided to begin assessing screening values associated with potential developmental effects occurring over a short duration of exposure for TCE (ODEQ 2016). Based on EPA's recommendation, ODEQ established a recommended maximum indoor air concentration for TCE of $9 \mu\text{g}/\text{m}^3$ as protective against these potential effects (ODEQ 2016). Extrapolating from indoor air to soil vapor, ODEQ has estimated that a corresponding screening level in soil vapor is $9,000 \mu\text{g}/\text{m}^3$ (ODEQ 2016).

As described in the Work Plan, ODEQ directed PCC to perform indoor air sampling at three locations where historical TCE concentrations in sub-slab vapor exceeded the $9,000 \mu\text{g}/\text{m}^3$ screening level. To provide a representative sample of the indoor air concentrations, ODEQ requested that the indoor air monitoring utilize longer-term passive air samplers for a duration of 7 days. Additionally, a full round of soil vapor sampling at all 11 of the permanent indoor soil vapor sampling locations was conducted immediately following the passive indoor air sampling to allow for assessment of location-specific contaminant attenuation through the concrete floor slab.

Pre-Sampling Vapor Mitigation Activities

Prior to collecting any samples, the LPC staff and LAI conducted an evaluation of TCE use at the facility, inspected sub-slab penetrations in potential areas of vapor intrusion, and seal-coated some areas of floor as described below. PCC has discontinued the use of TCE-containing products within the facility; however, as described in the Work Plan, there have been some instances of employees purchasing and using TCE-based solvent sprays. The evaluation of TCE use was completed to further enforce and remind employees that the use of TCE-based solvent sprays is not allowed at the LPC. In addition, an inspection of slab penetrations was performed at each indoor groundwater monitoring well and permanent sub-slab soil vapor sampling point to check for air tightness and ensure that no significant vapor leakage is occurring from the sub-slab to the indoor air. Consistent with its approach at the Small Structural Business Operation (SSBO) facility, the floor areas surrounding VP-1 and VP-11 were sealed with an epoxy coating to mitigate potential vapor intrusion into indoor air through small cracks or holes. The floor area surrounding VP-8 was not sealed due to the high amount of traffic and current site operations in the area.

Sampling Procedures

The passive indoor air Radiello® samples were deployed on July 14, 2016. The samplers were placed in groups of three in the three targeted sampling areas described above (near VP-1, VP-8 and VP-11). One Radiello® sampler reserved for a duplicate sample was compromised at the time of deployment, and as a result, a duplicate sample was not collected. This deviation from the Work Plan was documented with ODEQ by email on July 21, 2016.

On July 21, 2016, the passive indoor air Radiello® samplers were retrieved, and after the Radiello® samplers were removed from the buildings, soil vapor samples were collected. Of the 11 permanent interior sub-slab soil vapor sampling points previously sampled at the LPC, 9 were located for sampling in July 2016. Interior sub-slab soil vapor sampling points VP-7 and VP-13 were not located prior to the sampling event. These sampling points appear to have been sealed over during maintenance operations at the LPC. Sub-slab soil vapor analytical results are provided on Table 2 and Figure 2, and Radiello® passive indoor air analytical results are provided on Table 3 and Figure 3.

Analytical Results

The analytical data were reviewed for quality assurance purposes and an EPA equivalent Level IIa data validation was performed. The results of the review indicate that data are acceptable for investigation purposes, and no qualification of the data is necessary. Laboratory reports are provided in Appendix A.

The sub-slab soil vapor samples were analyzed for tetrachloroethene (PCE), TCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride. The analytical results for the sub-slab soil vapor samples are presented in Table 2. Detected concentrations during the July 2016 sub-slab soil vapor sampling were generally higher than the prior maximum detected concentrations (Table 2); however, detected concentrations were typically within the same order of magnitude. TCE was detected at concentrations exceeding the 2,900 $\mu\text{g}/\text{m}^3$ risk-based concentration for potential vapor intrusion at five locations (VP-1, VP-5, VP-8, VP-11, and VP-12) and the 9,000 $\mu\text{g}/\text{m}^3$ acute exposure screening level at two locations (VP-1 and VP-8). PCE was detected at concentrations exceeding the screening level for potential vapor intrusion at two locations (VP-1 and VP-8).

The 7-day Radiello® passive indoor air samples were analyzed for TCE and PCE. The analytical results for the passive indoor air samples are presented in Table 3. The indoor air results for TCE ranged from non-detect to 1.9 $\mu\text{g}/\text{m}^3$. The indoor air results for PCE ranged from non-detect to 2.0 $\mu\text{g}/\text{m}^3$. There were no exceedances of the ODEQ risk-based concentrations for inhalation of indoor air (2.9 $\mu\text{g}/\text{m}^3$ for TCE; 47 $\mu\text{g}/\text{m}^3$ for PCE) or the recommended maximum indoor air concentration for acute exposure of TCE (9 $\mu\text{g}/\text{m}^3$) as shown on Table 3.

The 7-day Radiello® passive indoor air sample results indicate that detected concentrations of TCE and PCE in the sub-slab soil vapor are not significantly impacting indoor air or resulting in exposure for occupational workers above ODEQ screening levels for TCE in indoor air.

Limitations

This technical memorandum has been prepared for the exclusive use of PCC Structural, Inc. and regulatory agencies providing oversight on the work. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates, Inc. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, Inc., shall be at the user's sole risk. Landau Associates, Inc. warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.



Colette Gaona, EIT
Senior Scientist



Della Fawcett, RG
Senior Project Geologist

DMF/CMG/JRR/jln

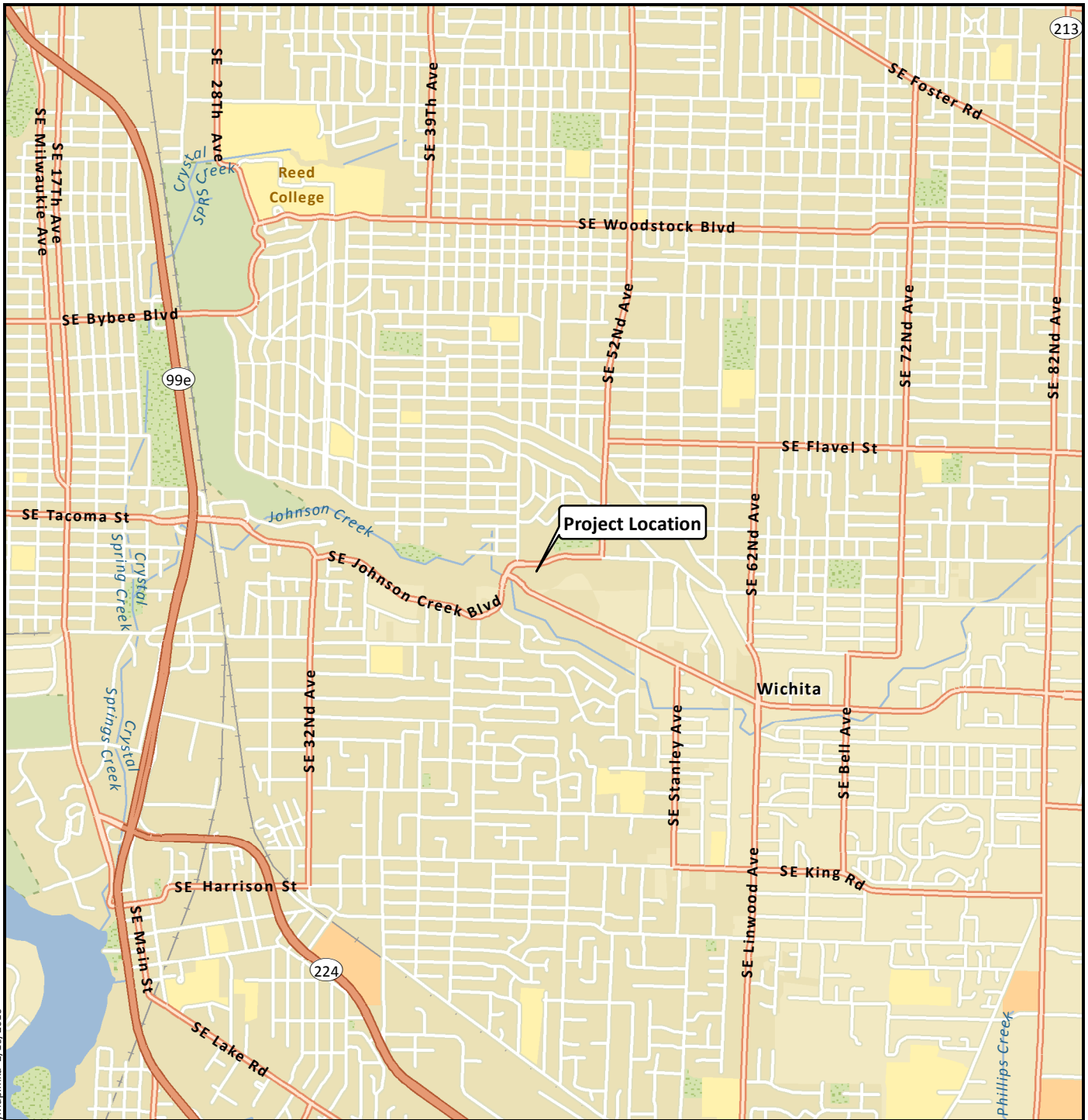
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Attachments:

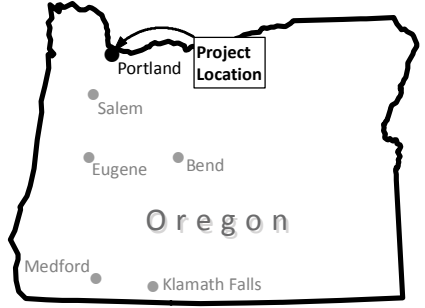
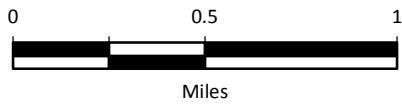
Figure 1 – Vicinity Map
Figure 2 – Soil Vapor Sampling Results
Figure 3 – Radiello® Passive Indoor Air Sampling Results
Table 1 – Historical Soil Vapor Analytical Results
Table 2 – Soil Vapor Analytical Results
Table 3 – Radiello® Passive Indoor Air Analytical Results
Appendix A – Laboratory Reports

References

- Bower. 2016. "Re: DEQ June 2, 2016 letter re: Indoor Air/Soil Vapor Workplan, PCC Structural – Large Parts Campus, ECSI #274. Jay Bower, Landau Associates, Inc. June 9.
- LAI. 2012. Technical Memorandum: Phase II Remedial Investigation, Quarterly Sub-Slab Vapor Sampling and Monitoring Well Installation. Landau Associates, Inc. August 1.
- LAI. 2013. Agency Review Draft: Remedial Investigation Report, PCC Structural, Inc., Large Parts Campus, Portland, Oregon. Landau Associates, Inc. July 17.
- LAI. 2016. Indoor Air Evaluation Work Plan, PCC Structural, Inc., Large Parts Campus, Portland Oregon. May 27.
- ODEQ 2016. Letter: Request for Sampling, Indoor Air, PCC Structural – Large Parts Campus, ECSI #274. From Paul Seidel, Oregon Department of Environmental Quality, to Chris Myers, PCC Structural, Inc. May 19.



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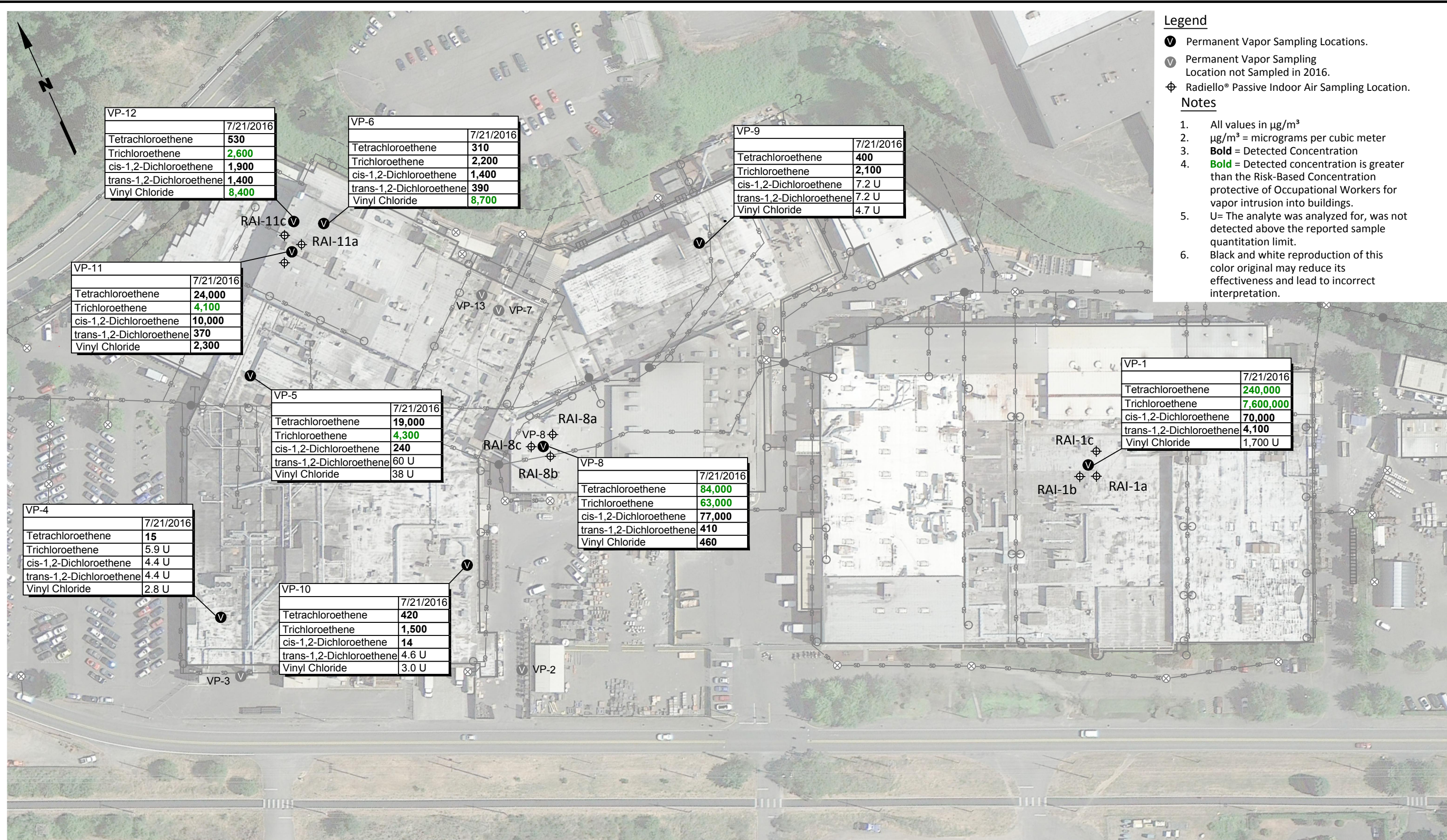
Data Source: Esri 2012



PCC Structural, Inc.
Large Parts Campus
Portland, Oregon

Vicinity Map

Figure
1



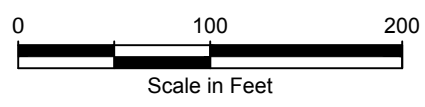
Legend

- Permanent Vapor Sampling Locations.
- Permanent Vapor Sampling Location not Sampled in 2016.
- ⊕ Radiello® Passive Indoor Air Sampling Location.

Notes

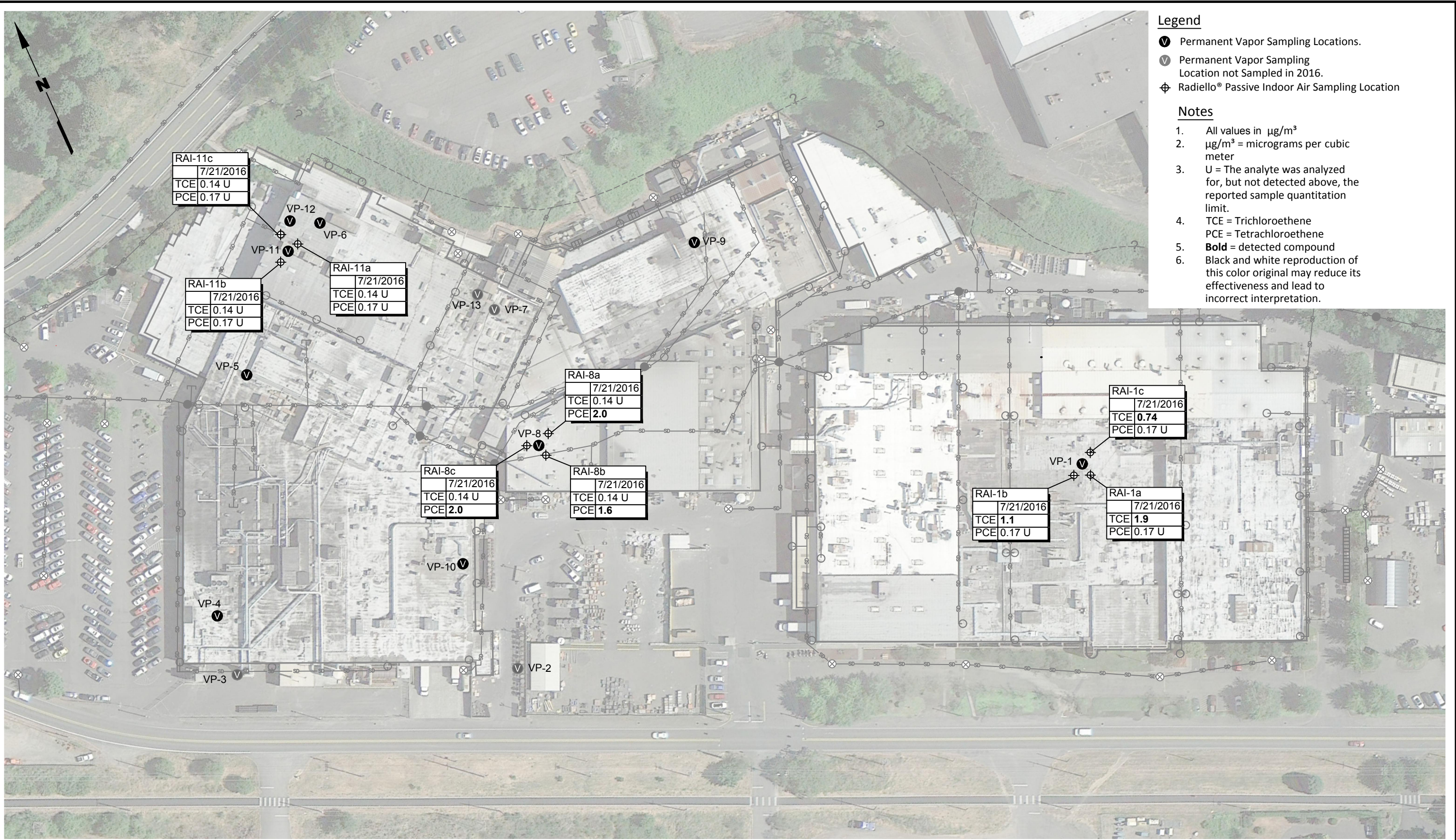
1. All values in µg/m³
2. µg/m³ = micrograms per cubic meter
3. **Bold** = Detected Concentration
4. **Green Bold** = Detected concentration is greater than the Risk-Based Concentration protective of Occupational Workers for vapor intrusion into buildings.
5. U= The analyte was analyzed for, was not detected above the reported sample quantitation limit.
6. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Base map source: Aerial Photo Provided by Google 2012, Base Drawing from PCC 1989



PCC Structural's, Inc.
Large Parts Campus
Portland, Oregon

Soil Vapor Sampling Results



Legend

- Permanent Vapor Sampling Locations.
- Permanent Vapor Sampling Location not Sampled in 2016.
- ⊕ Radiello® Passive Indoor Air Sampling Location

Notes

1. All values in µg/m³
2. µg/m³ = micrograms per cubic meter
3. U = The analyte was analyzed for, but not detected above, the reported sample quantitation limit.
4. TCE = Trichloroethene
PCE = Tetrachloroethene
5. **Bold** = detected compound
6. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Base map source: Aerial Photo Provided by Google 2012, Base Drawing from PCC 1989

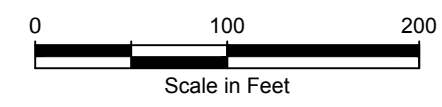


TABLE 1
Historical Soil Vapor Analytical Results
PCC Large Parts Campus
Portland, Oregon

	VP-1 1102239C-36A 02/08/2011	VP-1 1211278-01A 11/8/2012	VP-1 1303181-07A 3/6/2013	VP-2 1102239C-37A 02/08/2011	VP-3 1102239C-38A 02/08/2011	VP-4 1102239C-39A 02/08/2011	VP-5 1102239C-40A 02/08/2011	Dup of VP-5 VP-5 (A) 1102239C-41A 02/08/2011	VP-5 1211278-04A 11/8/2012	VP-5 1303181-06A 3/6/2013	VP-6 1102239C-42A 02/08/2011	VP-7 1102239C-43A 02/08/2011	VP-8 1102239C-44A 02/08/2011
HVOCs (µg/m³; TO-15)													
1,1,1-Trichloroethane	860	17000 U	9000	32 U	6.1 U	6.5 U	52 U	88 U	6.7 U	160 U	120 U	7.0 U	83 U
1,1,2,2-Tetrachloroethane	820 U	22000 U	2400 U	40 U	7.7 U	8.2 U	65 U	110 U	8.4 U	200 U	160 U	8.8 U	100 U
1,1,2-Trichloroethane	650 U	17000 U	1900 U	32 U	6.1 U	6.5 U	52 U	88 U	6.7 U	160 U	120 U	7.0 U	83 U
1,1-Dichloroethane	480 U	13000 U	1400 U	23 U	4.5 U	4.8 U	38 U	65 U	5 U	120 U	93 U	5.2 U	62 U
1,1-Dichloroethene	470 U	13000 U	1400 U	23 U	4.4 U	4.7 U	38 U	64 U	4.9 U	120 U	91 U	5.1 U	63
1,2-Dibromoethane (EDB)	910 U	24000 U	2700 U	44 U	8.6 U	9.1 U	73 U	120 U	9.4 U	230 U	180 U	9.9 U	120 U
1,2-Dichlorobenzene	720 U	19000 U	2100 U	35 U	6.7 U	7.2 U	57 U	97 U	7.4 U	180 U	140 U	7.8 U	92 U
1,2-Dichloroethane	480 U	13000 U	1400 U	23 U	4.5 U	4.8 U	38 U	65 U	5 U	120 U	93 U	5.2 U	62 U
1,2-Dichloropropane	550 U	15000 U	1600 U	27 U	5.2 U	5.5 U	44 U	75 U	5.7 U	140 U	100 U	6.0 U	70 U
1,3-Dichlorobenzene	720 U	19000 U	2100 U	35 U	6.7 U	7.2 U	57 U	97 U	7.4 U	180 U	140 U	7.8 U	92 U
1,4-Dichlorobenzene	720 U	19000 U	2100 U	35 U	6.7 U	7.2 U	57 U	97 U	7.4 U	180 U	140 U	7.8 U	92 U
Bromodichloromethane	800 U	21000 U	2400 U	39 U	7.5 U	8.0 U	64 U	110 U	8.2 U	200 U	150 U	8.6 U	100 U
Bromoform	1200 U	33000 U	3600 U	60 U	12 U	12 U	98 U	170 U	13 U	310 U	240 U	13 U	160 U
Bromomethane	460 U	12000 U	1400 U	22 U	4.3 U	4.6 U	37 U	63 U	48 U	1100 U	89 U	5.0 U	59 U
Carbon Tetrachloride	750 U	20000 U	2200 U	36 U	7.0 U	7.5 U	60 U	100 U	7.7 U	190 U	140 U	8.1 U	96 U
Chlorobenzene	550 U	15000 U	1600 U	27 U	5.2 U	5.5 U	44 U	74 U	5.7 U	140 U	100 U	5.9 U	70 U
Chloroethane	310 U	34000 U	3700 U	15 U	3.0 U	3.1 U	25 U	43 U	13 U	310 U	2100	4.1	40 U
Chloroform	580 U	16000 U	1700 U	28 U	5.5 U	5.8 U	46 U	79 U	9.4	140 U	110 U	11	74 U
Chloromethane	980 U	26000 U	2900 U	48 U	9.2 U	9.8 U	78 U	130 U	25 U	610 U	690	11 U	120 U
cis-1,2-Dichloroethene	11000	35000	40000	2400	4.4 U	4.7 U	140	170	28	180	1400	120	25000
cis-1,3-Dichloropropene	540 U	14000 U	1600 U	26 U	5.1 U	5.4 U	43 U	73 U	5.6 U	130 U	100 U	5.8 U	69 U
Dibromochloromethane	1000 U	27000 U	3000 U	49 U	9.5 U	10 U	81 U	140 U	10 U	250 U	200 U	11 U	130 U
Freon 11	670 U	18000 U	2000 U	32 U	6.3 U	6.7 U	53 U	91 U	6.9 U	170 U	130 U	7.2 U	86 U
Freon 12	590 U	16000 U	1800 U	29 U	5.5 U	5.9 U	47 U	80 U	6.1 U	150 U	110 U	34	75 U
Methylene Chloride	410 U	11000 U	1200 U	20 U	3.9 U	4.1 U	33 U	56 U	43 U	1000 U	80 U	4.5 U	53 U
Tetrachloroethene	2400	22000 U	56000	12000	7.6 U	8.1 U	20000 J	31000 J	520	43000	260	150	10000
trans-1,2-Dichloroethene	660	13000 U	1800	23 U	4.4 U	4.7 U	38 U	64 U	4.9 U	120 U	210	15	88
trans-1,3-Dichloropropene	540 U	14000 U	1600 U	26 U	5.1 U	5.4 U	43 U	73 U	5.6 U	130 U	100 U	5.8 U	69 U
Trichloroethene	180000	1600000	1500000	1100	6.0 U	6.4 U	1200	1400	170	1500	120 U	280	11000
Vinyl Chloride	300 U	8200 U	900 U	42	2.9 U	3.0 U	24 U	41 U	3.1 U	76 U	7100	23	160

HVOC = halogenated volatile organic compound
 U = Indicates the compound was undetected at the reported concentration.
 J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
 UJ = The analyte was not detected in the sample; the reported sample reporting limit is an estimate.
Bold = Detected compound.

TABLE 1
Historical Soil Vapor Analytical Results
PCC Large Parts Campus
Portland, Oregon

	VP-8	VP-8	VP-9	Dup of VP-10		VP-10	VP-11	VP-11	VP-12	VP-12	VP-13	VP-13
	1211278-06A 11/8/2012	1303181-05A 3/6/2013	1102239C-45A 02/08/2011	VP-10	VP-14	VP-10	VP-11	VP-11	VP-12	VP-12	VP-13	VP-13
	1211278-06A 11/8/2012	1303181-05A 3/6/2013	1102239C-45A 02/08/2011	1211278-07A 11/8/2012	1211278-08A 11/8/2012	1303181-01A 3/6/2013	1211278-02A 11/8/2012	1303181-02A 3/6/2013	1211278-03A 11/8/2012	1303181-03A 3/6/2013	1211278-05A 11/8/2012	1303181-04A 3/6/2013
HVOCs (µg/m³; TO-15)												
1,1,1-Trichloroethane	100 U	64 U	6.8	6.7 U	8.0	7.6	140 U	130 U	110 U	300 U	6.8 U	6.3 U
1,1,2,2-Tetrachloroethane	130 U	81 U	8.2 U	8.4 U	8.4 U	8.0 U	170 U	160 U	140 U	380 U	8.5 U	7.9 U
1,1,2-Trichloroethane	100 U	64 U	6.5 U	6.7 U	6.7 U	6.3 U	140 U	130 U	110 U	300 U	6.8 U	6.3 U
1,1-Dichloroethane	78 U	48 U	4.8 U	5 U	5 U	4.7 U	100 U	94 U	100	230 U	5 U	4.6 U
1,1-Dichloroethene	76 U	46 U	4.7 U	4.9 U	4.9 U	4.6 U	98 U	92 U	80 U	220 U	4.9 U	4.6 U
1,2-Dibromoethane (EDB)	150 U	90 U	9.1 U	9.4 U	9.4 U	8.9 U	190 U	180 U	150 U	430 U	9.5 U	8.8 U
1,2-Dichlorobenzene	120 U	71 U	7.2 U	7.4 U	7.4 U	7.0 U	150 U	140 U	120 U	340 U	7.4 U	6.9 U
1,2-Dichloroethane	78 U	48 U	4.8 U	5 U	5 U	4.7 U	100 U	94 U	82 U	230 U	5 U	4.6 U
1,2-Dichloropropane	89 U	54 U	5.5 U	5.7 U	5.7 U	5.4 U	110 U	110 U	93 U	260 U	5.7 U	5.3 U
1,3-Dichlorobenzene	120 U	71 U	7.2 U	7.4 U	7.4 U	7.0 U	150 U	140 U	120 U	340 U	7.4 U	6.9 U
1,4-Dichlorobenzene	120 U	71 U	7.2 U	7.4 U	7.4 U	7.0 U	150 U	140 U	120 U	340 U	7.4 U	6.9 U
Bromodichloromethane	130 U	79 U	8.0 U	8.2 U	8.2 U	7.8 U	170 U	160 U	140 U	380 U	8.3 U	7.7 U
Bromoform	200 U	120 U	12 U	13 U	13 U	12 U	260 U	240 U	210 U	580 U	13 U	12 U
Bromomethane	750 U	460 U	4.6 U	48 U	48 U	45 U	960 U	900 U	780 U	2200 U	48 U	45 U
Carbon Tetrachloride	120 U	74 U	7.5 U	7.7 U	7.7 U	7.3 U	160 U	140 U	130 U	350 U	7.8 U	7.2 U
Chlorobenzene	89 U	54 U	5.5 U	5.7 U	5.7 U	5.3 U	110 U	110 U	93 U	260 U	5.7 U	5.3 U
Chloroethane	200 U	120 U	3.1 U	13 U	13 U	12 U	260 U	240 U	210 U	590 U	13 U	12 U
Chloroform	94 U	57 U	37	6 U	6 U	5.7 U	120 U	110 U	98 U	270 U	8.6	5.6
Chloromethane	400 U	240 U	9.8 U	25 U	25 U	24 U	510 U	480 U	420 U	1200 U	26 U	24 U
cis-1,2-Dichloroethene	19000	13000	23	4.9 U	4.9 U	16	6500	11000	3000	3100	650	890
cis-1,3-Dichloropropene	87 U	53 U	5.4 U	5.6 U	5.6 U	5.3 U	110 U	100 U	91 U	250 U	5.6 U	5.2 U
Dibromochloromethane	160 U	100 U	10 U	10 U	10 U	9.9 U	210 U	200 U	170 U	480 U	10 U	9.8 U
Freon 11	110 U	66 U	6.7 U	6.9 U	6.9 U	6.5 U	140 U	130 U	110 U	310 U	7 U	6.5 U
Freon 12	95 U	58 U	11	6.1 U	6.1 U	5.7 U	120 U	110 U	100 U	280 U	6.1 U	5.7 U
Methylene Chloride	670 U	410 U	4.1 U	43 U	43 U	40 U	860 U	800 U	700 U	1900 U	43 U	40 U
Tetrachloroethene	150	9400	170	15	62	960	2200	53000	140 U	750	32	520
trans-1,2-Dichloroethene	100	69	4.7 U	4.9 U	4.9 U	4.6 U	210	400	1700	3100	16	22
trans-1,3-Dichloropropene	87 U	53 U	5.4 U	5.6 U	5.6 U	5.3 U	110 U	100 U	91 U	250 U	5.6 U	5.2 U
Trichloroethene	3100	6200	62	210	410	1000	1400	3800	110	300 U	700	1300
Vinyl Chloride	1600	120	3.8	3.1 U	3.1 U	3.0 U	1800	2100	9100	11000	3.2 U	2.9 U

HVOC = halogenated volatile organic compound

U = Indicates the compound was undetected at the reported concentration.

J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was not detected in the sample; the reported sample reporting limit is an estimate.

Bold = Detected compound.

Table 2
Soil Vapor Analytical Results
PCC Structurals, Inc.
Large Parts Campus
Portland, Oregon

Sample Location	Sample Date	Sample Type	Laboratory Sample ID	PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl Chloride
Screening Level ^a				47,000	2,900	--	--	2,800
Screening Level ^b				--	9,000	--	--	--
Units:				µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
VP-1	2/8/2011	N	1102239C-36A	2,400	180,000	11,000	660	300 U
	11/8/2012	N	1211278-01A	22,000 U	1,600,000	35,000	13,000 U	8,200 U
	3/6/2013	N	1303181-07A	56,000	1,500,000	40,000	1,800	900 U
	7/21/2016	N	1607483R1-01A	240,000	7,600,000	70,000	4,100	1,700 U
VP-2	2/8/2011	N	1102239C-37A	12,000	1,100	2,400	23 U	42
VP-3	2/8/2011	N	1102239C-38A	7.6 U	6 U	4.4 U	4.4 U	2.9 U
VP-4	2/8/2011	N	1102239C-39A	8.1 U	6.4 U	4.7 U	4.7 U	3 U
	7/21/2016	N	1607483R1-02A	15	5.9 U	4.4 U	4.4 U	2.8 U
VP-5	2/8/2011	N	1102239C-40A	20,000	1,200	140	38 U	24 U
	2/8/2011	FD	1102239C-41A	31,000	1,400	170	64 U	41 U
	11/8/2012	N	1211278-04A	520	170	28	4.9 U	3.1 U
	3/6/2013	N	1303181-06A	43,000	1,500	180	120 U	76 U
	7/21/2016	N	1607483R1-03A	19,000	4,300	240	60 U	38 U
VP-6	2/8/2011	N	1102239C-42A	260	120 U	1,400	210	7,100
	7/21/2016	N	1607483R1-04A	310	2,200	1,400	390	8,700
VP-7	2/8/2011	N	1102239C-43A	150	280	120	15	23
VP-8	2/8/2011	N	1102239C-44A	10,000	11,000	25,000	88	160
	11/8/2012	N	1211278-06A	150	3,100	19,000	100	1,600
	3/6/2013	N	1303181-05A	9,400	6,200	13,000	69	120
	7/21/2016	N	1607483R1-05A	84,000	63,000	77,000	410	460
VP-9	2/8/2011	N	1102239C-45A	170	62	23	4.7 U	3.8
	7/21/2016	N	1607483R1-06A	400	2,100	7.2 U	7.2 U	4.7 U
VP-10	11/8/2012	N	1211278-07A	15	210	4.9 U	4.9 U	3.1 U
	11/8/2012	FD	1211278-08A	62	410	4.9 U	4.9 U	3.1 U
	3/6/2013	N	1303181-01A	960	1,000	16	4.6 U	3 U
	7/21/2016	N	1607483R1-07A	420	1,500	14	4.6 U	3 U
VP-11	11/8/2012	N	1211278-02A	2,200	1,400	6,500	210	1,800
	3/6/2013	N	1303181-02A	53,000	3,800	11,000	400	2,100
	7/21/2016	N	1607483R1-08A	24,000	4,100	10,000	370	2,300
VP-12	11/8/2012	N	1211278-03A	140 U	110	3,000	1,700	9,100
	3/6/2013	N	1303181-03A	750	300 U	3,100	3,100	11,000
	7/21/2016	N	1607483R1-09A	530	2,600	1,900	1,400	8,400
VP-13	11/8/2012	N	1211278-05A	32	700	650	16	3.2 U
	3/6/2013	N	1303181-04A	520	1,300	890	22	2.9 U

Notes:

^a ODEQ Risk-Based Concentration protective of occupational workers for vapor intrusion into buildings.

^b ODEQ extrapolated soil vapor concentration based on the recommended maximum indoor air concentration for acute exposure of TCE (ODEQ 2016).

Bold = detected compound

 = detected concentration is greater than the risk-based screening level and/or the acute exposure screening level

-- = screening level not available

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Abbreviations and Acronyms:

µg/m³ = micrograms per cubic meter

N = primary sample

FD = field duplicate

PCE = tetrachloroethene

TCE = trichloroethene

Table 3
Radiello® Passive Indoor Air Analytical Results
PCC Structurals, Inc.
Large Parts Campus
Portland, Oregon

Analyte	Screening Level ^a	Screening Level ^b	Sample Location, Laboratory SDG, and Sample Date								
			RIA-1a 1607448 7/21/2016	RIA-1b 1607448 7/21/2016	RIA-1c 1607448 7/21/2016	RIA-8a 1607448 7/21/2016	RIA-8b 1607448 7/21/2016	RIA-8c 1607448 7/21/2016	RIA-11a 1607448 7/21/2016	RIA-11b 1607448 7/21/2016	RIA-11c 1607448 7/21/2016
Volatiles (µg/m³; Passive S.E.)											
Trichloroethene	2.9	9	1.9	1.1	0.74	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Tetrachloroethene	47	--	0.17 U	0.17 U	0.17 U	2.0	1.6	2.0	0.17 U	0.17 U	0.17 U

Notes:

^a ODEQ Risk-Based Concentration protective of inhalation in urban residential indoor air.

^b ODEQ recommended maximum indoor air concentration for acute exposure of TCE (ODEQ 2016).

Bold = detected compound

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Abbreviations and Acronyms:

µg/m³ = micrograms per cubic meter

ODEQ = Oregon Department of Environmental Quality

SDG = sample delivery group

Laboratory Reports

8/5/2016

Mr. James Raspen
Landau Associates, Inc.
333 SW 5th Ave.
Suite 700
Portland OR 97204

Project Name: PCC LPC
Project #: 0883002.040.042
Workorder #: 1607448

Dear Mr. James Raspen

The following report includes the data for the above referenced project for sample(s) received on 7/25/2016 at Air Toxics Ltd.

The data and associated QC analyzed by Passive S.E. RAD130/SKC are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

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

Regards,



Kelly Buettner
Project Manager

WORK ORDER #: 1607448

Work Order Summary

CLIENT:	Mr. James Raspen Landau Associates, Inc. 333 SW 5th Ave. Suite 700 Portland, OR 97204	BILL TO:	Accounts Payable Landau Associates, Inc. 130 2nd Avenue South Edmonds, WA 98020
PHONE:	503-542-1080	P.O. #	0883002.040.042
FAX:		PROJECT #	0883002.040.042 PCC LPC
DATE RECEIVED:	07/25/2016	CONTACT:	Kelly Buettner
DATE COMPLETED:	08/05/2016		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>
01A	RIA-8a	Passive S.E. RAD130/SKC
02A	RIA-8b	Passive S.E. RAD130/SKC
03A	RIA-8c	Passive S.E. RAD130/SKC
04A	RIA-1a	Passive S.E. RAD130/SKC
05A	RIA-1b	Passive S.E. RAD130/SKC
06A	RIA-1c	Passive S.E. RAD130/SKC
07A	RIA-11a	Passive S.E. RAD130/SKC
08A	RIA-11b	Passive S.E. RAD130/SKC
09A	RIA-11c	Passive S.E. RAD130/SKC
10A	Lab Blank	Passive S.E. RAD130/SKC
11A	LCS	Passive S.E. RAD130/SKC
11AA	LCSD	Passive S.E. RAD130/SKC

CERTIFIED BY: 
 Technical Director

DATE: 08/05/16

LABORATORY NARRATIVE
Passive SE by Mod EPA TO-17
Landau Associates, Inc.
Workorder# 1607448

Nine Radiello 130 (Solvent) samples were received on July 25, 2016. The laboratory analyzed the charcoal sorbent bed of the passive sampler following modified method EPA TO-17. The VOCs were chemically extracted using carbon disulfide and an aliquot of the extract was injected into a GC/MS for identification and quantification of volatile organic compounds (VOCs).

The mass of each target compound adsorbed by the sampler was converted to units of concentration using the sample deployment time and the sampling rate for each VOC. If sampling rates were calculated by the lab or the manufacturer, the concentration result has been flagged as an estimated value. Results are not corrected for desorption efficiency.

The reference method used for this procedure is EPA TO-17, which describes the collection of VOCs in ambient air using sorbents and analysis by GC/MS. Because TO-17 describes active sample collection using a pump and thermal desorption as the preparation step, several modifications are required. Modifications to TO-17 are listed in the table below:

<i>Requirement</i>	<i>TO-17</i>	<i>ATL Modifications</i>
Sample Collection	Pump pulls measured air volume through sorbent tube	VOCs in air adsorbed onto sorbent bed passively through diffusion
Sample Preparation	Thermal extraction	Solvent extraction
Sorbent tube conditioning	Condition newly packed tubes prior to use	Charcoal-based sorbent is a single use media and conditioning is conducted by vendor.
Instrumentation	Thermal desorption introduction system	Liquid injection introduction system
Internal Standard	Gas-phase internal standard introduced on the tube or focusing trap during analysis	Liquid-phase internal standard introduced on the tube at the time of extraction
Media and sample storage	<4 deg C, 30 days	Media shelf life is determined by vendor; sample hold-time is 6 months for the RAD130 and WMS. Sample preservation requirements are storage in a cool, solvent-free refrigerator and optional use of ice during shipping.
Internal Standard Recovery	+/-40% of daily CCV area	-50% to +100% of daily CCV area

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

The uptake rates were corrected based on average field temperatures if provided. In the absence of field temperatures, the uptake rates determined at 25 deg C were used.

To calculate ug/m³ concentrations in the Lab Blank, a sampling duration of 10080 minutes was applied. The assumed temperature used for the uptake rate is listed on the data page. If the field temperatures were provided, the rate was adjusted in the same manner as the field samples.

Definition of Data Qualifying Flags

Ten qualifiers may have been used on the data analysis sheets and indicate as follows:

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

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

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

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

N - The identification is based on presumptive evidence.

C - Estimated concentration due to calculated sampling rate

CN - See case narrative explanation.

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

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Summary of Detected Compounds VOCS BY PASSIVE SAMPLER - GC/MS

Client Sample ID: RIA-8a

Lab ID#: 1607448-01A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.10	0.17	1.2	2.0

Client Sample ID: RIA-8b

Lab ID#: 1607448-02A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.10	0.17	0.93	1.6

Client Sample ID: RIA-8c

Lab ID#: 1607448-03A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.10	0.17	1.2	2.0

Client Sample ID: RIA-1a

Lab ID#: 1607448-04A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	1.3	1.9

Client Sample ID: RIA-1b

Lab ID#: 1607448-05A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	0.79	1.1

Client Sample ID: RIA-1c

Lab ID#: 1607448-06A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	0.52	0.74

**Summary of Detected Compounds
VOCS BY PASSIVE SAMPLER - GC/MS**

Client Sample ID: RIA-11a

Lab ID#: 1607448-07A

No Detections Were Found.

Client Sample ID: RIA-11b

Lab ID#: 1607448-08A

No Detections Were Found.

Client Sample ID: RIA-11c

Lab ID#: 1607448-09A

No Detections Were Found.



Air Toxics

Client Sample ID: RIA-8a

Lab ID#: 1607448-01A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072813sim	Date of Collection:	7/21/16 11:04:00 AM
Dil. Factor:	1.00	Date of Analysis:	7/28/16 12:15 PM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	1.2	2.0

Temperature = 72.2F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130



Air Toxics

Client Sample ID: RIA-8b

Lab ID#: 1607448-02A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072814sim	Date of Collection:	7/21/16 11:05:00 AM
Dil. Factor:	1.00	Date of Analysis:	7/28/16 12:39 PM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	0.93	1.6

Temperature = 72.2F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130



Air Toxics

Client Sample ID: RIA-8c

Lab ID#: 1607448-03A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072815sim	Date of Collection:	7/21/16 11:09:00 AM
Dil. Factor:	1.00	Date of Analysis:	7/28/16 01:04 PM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	1.2	2.0

Temperature = 72.2F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130



Air Toxics

Client Sample ID: RIA-1a

Lab ID#: 1607448-04A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072816sim	Date of Collection:	7/21/16 11:22:00 AM
Dil. Factor:	1.00	Date of Analysis:	7/28/16 01:29 PM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	1.3	1.9
Tetrachloroethene	0.10	0.17	Not Detected	Not Detected

Temperature = 79.4F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130



Air Toxics

Client Sample ID: RIA-1b

Lab ID#: 1607448-05A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072817sim	Date of Collection:	7/21/16 11:40:00 AM
Dil. Factor:	1.00	Date of Analysis:	7/28/16 01:53 PM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	0.79	1.1
Tetrachloroethene	0.10	0.17	Not Detected	Not Detected

Temperature = 79.4F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130



Air Toxics

Client Sample ID: RIA-1c

Lab ID#: 1607448-06A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072818sim	Date of Collection:	7/21/16 11:44:00 AM
Dil. Factor:	1.00	Date of Analysis:	7/28/16 02:18 PM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	0.52	0.74
Tetrachloroethene	0.10	0.17	Not Detected	Not Detected

Temperature = 79.4F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130



Air Toxics

Client Sample ID: RIA-11a

Lab ID#: 1607448-07A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072819sim	Date of Collection:	7/21/16 12:01:00 PM
Dil. Factor:	1.00	Date of Analysis:	7/28/16 02:43 PM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	Not Detected	Not Detected

Temperature = 72.2F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130



Air Toxics

Client Sample ID: RIA-11b

Lab ID#: 1607448-08A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072820sim	Date of Collection:	7/21/16 12:02:00 PM
Dil. Factor:	1.00	Date of Analysis:	7/28/16 03:08 PM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	Not Detected	Not Detected

Temperature = 72.2F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130



Air Toxics

Client Sample ID: RIA-11c

Lab ID#: 1607448-09A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072821sim	Date of Collection:	7/21/16 12:05:00 PM
Dil. Factor:	1.00	Date of Analysis:	7/28/16 03:33 PM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	Not Detected	Not Detected

Temperature = 72.2F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1607448-10A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072805sim	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	7/28/16 09:00 AM
		Date of Extraction:	7/28/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	Not Detected	Not Detected

Temperature = 79.4F , duration time = 10080 minutes.

Container Type: Radiello 130 (Solvent)

Surrogates	%Recovery	Method Limits
Toluene-d8	101	0-130



Air Toxics

Client Sample ID: LCS

Lab ID#: 1607448-11A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072803sim	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	7/28/16 08:11 AM
		Date of Extraction:	7/28/16

Compound	%Recovery	Method Limits
Trichloroethene	101	70-130
Tetrachloroethene	102	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130



Air Toxics

Client Sample ID: LCSD

Lab ID#: 1607448-11AA

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	c072804sim	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	7/28/16 08:35 AM
		Date of Extraction:	7/28/16

Compound	%Recovery	Method Limits
Trichloroethene	103	70-130
Tetrachloroethene	102	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130

8/4/2016

Mr. James Raspen
Landau Associates, Inc.
333 SW 5th Ave.
Suite 700
Portland OR 97204

Project Name: PCC LPC
Project #: 0883002.040.042
Workorder #: 1607483

Dear Mr. James Raspen

The following report includes the data for the above referenced project for sample(s) received on 7/25/2016 at Air Toxics Ltd.

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

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

Regards,



Kelly Buettner
Project Manager

WORK ORDER #: 1607483

Work Order Summary

CLIENT:	Mr. James Raspen Landau Associates, Inc. 333 SW 5th Ave. Suite 700 Portland, OR 97204	BILL TO:	Accounts Payable Landau Associates, Inc. 130 2nd Avenue South Edmonds, WA 98020
PHONE:	503-542-1080	P.O. #	0883002.040.042
FAX:		PROJECT #	0883002.040.042 PCC LPC
DATE RECEIVED:	07/25/2016	CONTACT:	Kelly Buettner
DATE COMPLETED:	08/04/2016		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	VP-1	TO-15	7.8 "Hg	14.9 psi
02A	VP-4	TO-15	2.8 "Hg	14.7 psi
03A	VP-5	TO-15	3.3 "Hg	14.9 psi
04A	VP-6	TO-15	3.7 "Hg	15 psi
05A	VP-8	TO-15	4.7 "Hg	14.8 psi
06A	VP-9	TO-15	2.2 "Hg	15.1 psi
07A	VP-10	TO-15	4.5 "Hg	14.7 psi
08A	VP-11	TO-15	5.1 "Hg	14.9 psi
09A	VP-12	TO-15	0.1 psi	14.9 psi
10A	Lab Blank	TO-15	NA	NA
10B	Lab Blank	TO-15	NA	NA
10C	Lab Blank	TO-15	NA	NA
11A	CCV	TO-15	NA	NA
11B	CCV	TO-15	NA	NA
11C	CCV	TO-15	NA	NA
12A	LCS	TO-15	NA	NA
12AA	LCSD	TO-15	NA	NA
12B	LCS	TO-15	NA	NA
12BB	LCSD	TO-15	NA	NA
12C	LCS	TO-15	NA	NA
12CC	LCSD	TO-15	NA	NA

CERTIFIED BY: 

DATE: 08/04/16

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-15-9, UT NELAP CA0093332015-6, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2015, Expiration date: 10/17/2016.

Eurofins Air Toxics Inc. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

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

LABORATORY NARRATIVE
EPA Method TO-15
Landau Associates, Inc.
Workorder# 1607483

Nine 1 Liter Summa Canister samples were received on July 25, 2016. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

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

Receiving Notes

Despite the use of flow controllers for sample collection, the final canister vacuums for sample VP-12 was measured at ambient pressure. These ambient pressure readings were confirmed by the laboratory upon sample receipt.

OR Per client instructions, the analysis was cancelled.

Analytical Notes

Dilution was performed on samples VP-1, VP-5 and VP-9 due to the presence of high level target species.

Dilution was performed on samples VP-6 and VP-12 due to the presence of high level non-target species.

Definition of Data Qualifying Flags

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

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

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

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

N - The identification is based on presumptive evidence.

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

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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

Client Sample ID: VP-1

Lab ID#: 1607483-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
trans-1,2-Dichloroethene	680	1000	2700	4100
Trichloroethene	680	1400000	3600	7600000
cis-1,2-Dichloroethene	680	18000	2700	70000
Tetrachloroethene	680	36000	4600	240000

Client Sample ID: VP-4

Lab ID#: 1607483-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Tetrachloroethene	1.1	2.2	7.5	15

Client Sample ID: VP-5

Lab ID#: 1607483-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
cis-1,2-Dichloroethene	15	61	60	240
Trichloroethene	15	800	81	4300
Tetrachloroethene	15	2800	100	19000

Client Sample ID: VP-6

Lab ID#: 1607483-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	19	3400	49	8700
trans-1,2-Dichloroethene	19	98	76	390
Trichloroethene	19	410	100	2200
cis-1,2-Dichloroethene	19	350	76	1400
Tetrachloroethene	19	46	130	310

Client Sample ID: VP-8

Lab ID#: 1607483-05A

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

Client Sample ID: VP-8

Lab ID#: 1607483-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	12	180	30	460
trans-1,2-Dichloroethene	12	100	47	410
Trichloroethene	12	12000	64	63000
cis-1,2-Dichloroethene	12	19000	47	77000
Tetrachloroethene	12	12000	81	84000

Client Sample ID: VP-9

Lab ID#: 1607483-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.8	400	9.8	2100
Tetrachloroethene	1.8	59	12	400

Client Sample ID: VP-10

Lab ID#: 1607483-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
cis-1,2-Dichloroethene	1.2	3.5	4.6	14
Trichloroethene	1.2	280	6.3	1500
Tetrachloroethene	1.2	62	8.0	420

Client Sample ID: VP-11

Lab ID#: 1607483-08A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	12	900	31	2300
trans-1,2-Dichloroethene	12	94	48	370
Trichloroethene	12	760	65	4100
cis-1,2-Dichloroethene	12	2500	48	10000
Tetrachloroethene	12	3500	82	24000

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

Client Sample ID: VP-12

Lab ID#: 1607483-09A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	20	3300	51	8400
trans-1,2-Dichloroethene	20	350	79	1400
Trichloroethene	20	480	110	2600
cis-1,2-Dichloroethene	20	490	79	1900
Tetrachloroethene	20	78	140	530

Client Sample ID: VP-1

Lab ID#: 1607483-01A

EPA METHOD TO-15 GC/MS

File Name:	14h00024	Date of Collection: 7/21/16 12:58:00 PM
Dil. Factor:	136	Date of Analysis: 8/3/16 10:09 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	680	Not Detected	1700	Not Detected
trans-1,2-Dichloroethene	680	1000	2700	4100
Trichloroethene	680	1400000	3600	7600000
cis-1,2-Dichloroethene	680	18000	2700	70000
Tetrachloroethene	680	36000	4600	240000

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	94	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	95	70-130



Air Toxics

Client Sample ID: VP-4

Lab ID#: 1607483-02A

EPA METHOD TO-15 GC/MS

File Name:	17073009	Date of Collection:	7/21/16 10:48:00 AM
Dil. Factor:	2.20	Date of Analysis:	7/30/16 02:41 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.1	Not Detected	2.8	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Trichloroethene	1.1	Not Detected	5.9	Not Detected
Tetrachloroethene	1.1	2.2	7.5	15
trans-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected

Container Type: 1 Liter Summa Canister

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

Client Sample ID: VP-5

Lab ID#: 1607483-03A

EPA METHOD TO-15 GC/MS

File Name:	17072917	Date of Collection:	7/21/16 1:38:00 PM
Dil. Factor:	30.2	Date of Analysis:	7/29/16 11:37 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	15	Not Detected	38	Not Detected
cis-1,2-Dichloroethene	15	61	60	240
Trichloroethene	15	800	81	4300
Tetrachloroethene	15	2800	100	19000
trans-1,2-Dichloroethene	15	Not Detected	60	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	97	70-130



Air Toxics

Client Sample ID: VP-6

Lab ID#: 1607483-04A

EPA METHOD TO-15 GC/MS

File Name:	14h00021	Date of Collection:	7/21/16 2:08:00 PM
Dil. Factor:	3.84	Date of Analysis:	8/3/16 09:03 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	19	3400	49	8700
trans-1,2-Dichloroethene	19	98	76	390
Trichloroethene	19	410	100	2200
cis-1,2-Dichloroethene	19	350	76	1400
Tetrachloroethene	19	46	130	310

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	94	70-130



Air Toxics

Client Sample ID: VP-8

Lab ID#: 1607483-05A

EPA METHOD TO-15 GC/MS

File Name:	14h00023	Date of Collection:	7/21/16 12:38:00 PM
Dil. Factor:	2.38	Date of Analysis:	8/3/16 09:47 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	12	180	30	460
trans-1,2-Dichloroethene	12	100	47	410
Trichloroethene	12	12000	64	63000
cis-1,2-Dichloroethene	12	19000	47	77000
Tetrachloroethene	12	12000	81	84000

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	97	70-130

Client Sample ID: VP-9

Lab ID#: 1607483-06A

EPA METHOD TO-15 GC/MS

File Name:	17073008	Date of Collection: 7/21/16 1:14:00 PM
Dil. Factor:	3.65	Date of Analysis: 7/30/16 02:15 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.8	Not Detected	4.7	Not Detected
cis-1,2-Dichloroethene	1.8	Not Detected	7.2	Not Detected
Trichloroethene	1.8	400	9.8	2100
Tetrachloroethene	1.8	59	12	400
trans-1,2-Dichloroethene	1.8	Not Detected	7.2	Not Detected

Container Type: 1 Liter Summa Canister

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

Client Sample ID: VP-10

Lab ID#: 1607483-07A

EPA METHOD TO-15 GC/MS

File Name:	17073007	Date of Collection: 7/21/16 10:22:00 AM
Dil. Factor:	2.35	Date of Analysis: 7/30/16 01:48 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.2	Not Detected	3.0	Not Detected
cis-1,2-Dichloroethene	1.2	3.5	4.6	14
Trichloroethene	1.2	280	6.3	1500
Tetrachloroethene	1.2	62	8.0	420
trans-1,2-Dichloroethene	1.2	Not Detected	4.6	Not Detected

Container Type: 1 Liter Summa Canister

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

Client Sample ID: VP-11

Lab ID#: 1607483-08A

EPA METHOD TO-15 GC/MS

File Name:	14h00019	Date of Collection:	7/21/16 1:54:00 PM
Dil. Factor:	2.43	Date of Analysis:	8/3/16 08:13 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	12	900	31	2300
trans-1,2-Dichloroethene	12	94	48	370
Trichloroethene	12	760	65	4100
cis-1,2-Dichloroethene	12	2500	48	10000
Tetrachloroethene	12	3500	82	24000

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	94	70-130



Air Toxics

Client Sample ID: VP-12

Lab ID#: 1607483-09A

EPA METHOD TO-15 GC/MS

File Name:	14h00020	Date of Collection:	7/21/16 2:24:00 PM
Dil. Factor:	4.00	Date of Analysis:	8/3/16 08:39 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	20	3300	51	8400
trans-1,2-Dichloroethene	20	350	79	1400
Trichloroethene	20	480	110	2600
cis-1,2-Dichloroethene	20	490	79	1900
Tetrachloroethene	20	78	140	530

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	94	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	97	70-130

Client Sample ID: Lab Blank

Lab ID#: 1607483-10A

EPA METHOD TO-15 GC/MS

File Name:	17072907	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/29/16 01:38 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	101	70-130

Client Sample ID: Lab Blank

Lab ID#: 1607483-10B

EPA METHOD TO-15 GC/MS

File Name:	17073005	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/30/16 12:08 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	99	70-130

Client Sample ID: Lab Blank

Lab ID#: 1607483-10C

EPA METHOD TO-15 GC/MS

File Name:	14h00006a	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 8/3/16 12:50 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	5.0	Not Detected	13	Not Detected
trans-1,2-Dichloroethene	5.0	Not Detected	20	Not Detected
Trichloroethene	5.0	Not Detected	27	Not Detected
cis-1,2-Dichloroethene	5.0	Not Detected	20	Not Detected
Tetrachloroethene	5.0	Not Detected	34	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	93	70-130



Air Toxics

Client Sample ID: CCV

Lab ID#: 1607483-11A

EPA METHOD TO-15 GC/MS

File Name:	17072906	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/29/16 12:50 PM

Compound	%Recovery
Vinyl Chloride	108
cis-1,2-Dichloroethene	108
Trichloroethene	102
Tetrachloroethene	99
trans-1,2-Dichloroethene	105

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	101	70-130



Air Toxics

Client Sample ID: CCV

Lab ID#: 1607483-11B

EPA METHOD TO-15 GC/MS

File Name:	17073002	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/30/16 10:11 AM

Compound	%Recovery
Vinyl Chloride	108
cis-1,2-Dichloroethene	106
Trichloroethene	101
Tetrachloroethene	101
trans-1,2-Dichloroethene	104

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	101	70-130

Client Sample ID: CCV

Lab ID#: 1607483-11C

EPA METHOD TO-15 GC/MS

File Name:	14h00003a	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 8/3/16 11:37 AM

Compound	%Recovery
Vinyl Chloride	91
trans-1,2-Dichloroethene	96
Trichloroethene	99
cis-1,2-Dichloroethene	100
Tetrachloroethene	97

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	99	70-130



Air Toxics

Client Sample ID: LCS

Lab ID#: 1607483-12A

EPA METHOD TO-15 GC/MS

File Name:	17072904	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/29/16 11:28 AM

Compound	%Recovery	Method Limits
Vinyl Chloride	106	70-130
cis-1,2-Dichloroethene	102	70-130
Trichloroethene	103	70-130
Tetrachloroethene	99	70-130
trans-1,2-Dichloroethene	104	70-130

Container Type: NA - Not Applicable

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



Air Toxics

Client Sample ID: LCSD

Lab ID#: 1607483-12AA

EPA METHOD TO-15 GC/MS

File Name:	17072905	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/29/16 11:55 AM

Compound	%Recovery	Method Limits
Vinyl Chloride	109	70-130
cis-1,2-Dichloroethene	104	70-130
Trichloroethene	104	70-130
Tetrachloroethene	99	70-130
trans-1,2-Dichloroethene	106	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	100	70-130



Air Toxics

Client Sample ID: LCS

Lab ID#: 1607483-12B

EPA METHOD TO-15 GC/MS

File Name:	17073003	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/30/16 10:56 AM

Compound	%Recovery	Method Limits
Vinyl Chloride	108	70-130
cis-1,2-Dichloroethene	101	70-130
Trichloroethene	103	70-130
Tetrachloroethene	99	70-130
trans-1,2-Dichloroethene	104	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	100	70-130

Client Sample ID: LCSD

Lab ID#: 1607483-12BB

EPA METHOD TO-15 GC/MS

File Name:	17073004	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/30/16 11:22 AM

Compound	%Recovery	Method Limits
Vinyl Chloride	111	70-130
cis-1,2-Dichloroethene	105	70-130
Trichloroethene	103	70-130
Tetrachloroethene	100	70-130
trans-1,2-Dichloroethene	107	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130



Air Toxics

Client Sample ID: LCS

Lab ID#: 1607483-12C

EPA METHOD TO-15 GC/MS

File Name:	14h00004a	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 8/3/16 12:12 PM

Compound	%Recovery	Method Limits
Vinyl Chloride	98	70-130
trans-1,2-Dichloroethene	98	70-130
Trichloroethene	103	70-130
cis-1,2-Dichloroethene	102	70-130
Tetrachloroethene	100	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	95	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	102	70-130

Client Sample ID: LCSD

Lab ID#: 1607483-12CC

EPA METHOD TO-15 GC/MS

File Name:	14h00005a	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 8/3/16 12:32 PM

Compound	%Recovery	Method Limits
Vinyl Chloride	95	70-130
trans-1,2-Dichloroethene	100	70-130
Trichloroethene	104	70-130
cis-1,2-Dichloroethene	101	70-130
Tetrachloroethene	99	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	101	70-130