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555 Cordova Street
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Subject: Indoor Air and Subslab Soil Gas Assessment Report, for Karen's RV and Taylor Leasing (ARRC lease properties LP-072 and LP-125, respectively), Anchorage, Alaska

Dear Mr. Lidren:

The Alaska Railroad Corporation (ARRC) and Geosphere, Inc. have prepared this Indoor Air and Subslab Soil Gas Assessment Report in order to address renewed vapor intrusion concerns at the Karen's RV and Taylor Leasing business locations in Anchorage, Alaska. The ARRC owns the building and property at the Karen's RV and the property at the Taylor Leasing location (ARRC lease properties LP-072 and LP-125, respectively). The Karen's RV and Taylor Leasing sites are identified by the Alaska Department of Environmental Conservation (ADEC) as File Number 2100.38.447.

The objective of this work is to measure selected chlorinated volatile organic compound (CVOC) concentrations in indoor air and subslab soil gas in the Karen's RV and Taylor Leasing buildings. The soil gas results have been utilized with the indoor air results to perform a multiple lines-of-evidence vapor intrusion (VI) evaluation for the site. The CVOCs of interest at the sites include tetrachloroethylene (PCE), trichloroethylene (TCE), dichloroethylene (DCE) and vinyl chloride (VC). Vapor intrusion is the general term given to migration of vapors from a contaminant source in the subsurface into indoor air.

This indoor air and subslab soil gas report provides a brief site history and summary of the current conceptual site model (CSM), outlines objectives and methodology used when conducting the air sampling, and summarizes the results of the analytical sampling program conducted in April 2018.

BACKGROUND

The land at both locations is owned by the ARRC and leased to the business operators (i.e. Karen's RV and Taylor Leasing). The properties overlie a TCE and PCE groundwater plume that appears to emanate from an upgradient property not owned by the ARRC. The potential risks associated with TCE vapor intrusion at the sites was investigated and documented in 2009, by Geosphere, Inc. In 2009, three subslab soil gas samples were collected from the Karen's RV building and three subslab soil gas samples were collected from the Taylor Leasing building. The soil gas samples were analyzed for volatile organic compounds using the TO-15 laboratory method. The 2009 subslab soil gas results are shown in Table 1 and the sample locations are shown in Figure 1. TCE and PCE were detected in the subslab soil gas, while DCE and VC were not detected. The maximum TCE concentration detected at each building was used as input to the Johnson and Ettinger vapor intrusion model (EPA, 2004; the J and E model was specifically identified as being an acceptable calculation tool in ADEC guidance documents in 2009), and the sites were found to present acceptable risk.

Table 1 Summary of Existing Sub-Slab Soil Gas Laboratory Results & COPC Screening

Karen's RV	Sample Location			
Compound Name	Karen's North (ug/M^3)	Karen's Middle 1 (ug/M^3)	Karen's Middle 2 (ug/M^3; field duplicate)	Karen's South (ug/M^3)
Trichloroethene	610	22	22	110
Tetrachloroethene	9.1	ND (7.5)	ND (7.4)	ND (8.1)
1,1-Dichloroethene	ND (4.6)	ND (4.4)	ND (4.3)	ND (4.7)
cis-1,2-Dichloroethene	ND (4.6)	ND (4.4)	ND (4.3)	ND (4.7)
trans-1,2-Dichloroethene	ND (5.2)	ND (5)	ND (4.9)	ND (5.4)
Vinyl Chloride	ND (2.9)	ND (2.8)	ND (2.8)	ND (3)

Taylor Leasing	Sample Location			
Compound Name	Taylor North 1 (ug/M^3; lab duplicate)	Taylor North 1 (ug/M^3)	Taylor Middle (ug/M^3)	Taylor South (ug/M^3)
Trichloroethene	3,900	3,800	2,400	1,300
Tetrachloroethene	2,200.0	2,000	190	3,900
1,1-Dichloroethene	ND (14)	ND (14)	ND (8.6)	ND (12)
cis-1,2-Dichloroethene	ND (14)	ND (14)	ND (8.6)	ND (12)
trans-1,2-Dichloroethene	ND (16)	ND (16)	ND (9.8)	ND (13)
Vinyl Chloride	ND (9.3)	ND (9.3)	ND (5.5)	ND (7.4)

In September 2016, the Alaska Department of Environmental Conservation (ADEC) sent a letter to the Alaska Railroad Corporation (ARRC) expressing concern about the potential for vapor intrusion to present unacceptable risk for building occupants at the Karen's RV and Taylor Leasing properties. The ADEC letter of September 2016 requested that new TCE toxicity data (that became available in 2013) be addressed and raised four additional concerns. The new TCE toxicity data is summarized in an ADEC fact sheet (dated January 8, 2014). The ADEC fact sheet established vapor intrusion, indoor air risk based target TCE concentrations of 2 ug/m^3 and 8.4 ug/m^3 for residential and commercial/industrial scenarios, respectively. The ARRC wrote a response to the ADEC September letter (October, 2016), attended a meeting with the ADEC (November, 2016), provided information on building attenuation factors for relatively large commercial buildings with bay doors (February, 2017), proposed third party review of the Geosphere 2009 report by Robbie Ettinger, the co-author of the J and E model (May and June 2017), and exchanged emails and letters with the ADEC regarding sampling of indoor air and subslab soil gas at both the Karen's RV and Taylor Leasing sites. In October 2017, the ADEC sent a letter to the ARRC requesting a vapor intrusion work plan for both the Karen's RV and Taylor Leasing sites. A work plan was prepared in response to the ADEC letter of October 19, 2017 and the ADEC approved the work plan (March 2018). On November 8, 2017 the ADEC updated its' vapor intrusion guidance and updated guidance set indoor air target levels of 2.0 and 2.2 ug/m^3 for residential and commercial indoor air.

GENERAL SITE CONDITIONS

As described above, the Karen's RV and Taylor Leasing sites overlie a TCE groundwater plume that appears to emanate from an upgradient property not owned by the ARRC. The ARRC understands that groundwater sampling of the TCE plume has not been conducted since 2009.

Lease Property LP-072 is currently occupied by Karen's RV, a recreational vehicle repair and maintenance company. The only building on the site is a modern, steel frame, warehouse style building, approximately 176 feet long by 70 feet wide. The site outside of the building is used for recreational vehicle parking. The building has a slab on grade foundation, and the slab appeared to be relatively thick (9 to 11-inches) in the holes drilled to install the soil gas probes. There are no floor drains in the building and the concrete slab was not significantly cracked (only one, narrow or closed crack a few feet long was observed). The building was reportedly originally constructed to serve as a tire warehouse. The northeastern corner of the building has a small framed office and parts storage area. There is a paint bay in the northwestern corner of the building and a restroom in the southeastern corner. Just north of the restroom there is a small break room for employees. The remainder of the building is one large open space. Heat is supplied by gas-fired space heaters suspended from the ceiling. There are large garage doors on the north and south side of the building. The recreational vehicle repair and maintenance operations include activities such as welding, painting, furniture repair, upholstery repair, laminate counter and table repair, plumbing system repair, winterizing, awning installation, appliance installation and electrical system work. The company does not appear to do engine, drive train or chassis work on the recreational vehicles. The slab floor did not appear significantly stained. Chemicals observed in the building included paints, glues, mastics, battery terminal cleaner and propylene glycol.

Lease Property LP-125 is currently occupied by Taylor Leasing. The only building on the site is an older, Quonset style building, approximately 100 feet long by 50 feet wide. The site outside of the building is used for vehicle and trailer parking. The building has a slab on grade foundation, and the slab appeared to be about 6 to 8-inches thick in the holes drilled to install the soil gas probes. There is a floor drain in the southern portion of the building and at least 2 additional floor penetrations reportedly used to brace equipment which straightens the frames of damaged vehicles. In addition, the concrete slab was cracked in several places. The southwestern corner of the building has a small framed office area which is routinely occupied. The northeastern corner of the building has a small break room, the southeastern corner of the building has small framed storage area, and there are restrooms near the center of the building. The seam between the floor slab and the foundation wall in the southwestern corner office was observed to be sealed with a flexible caulk. The remainder of the building is one large space with an approximately 10 foot high wall dividing the southern half of the building from the northern half. The heat for the main building space is supplied by gas-fired space heaters suspended from the ceiling and by waste oil heaters. There are large garage doors on the north and south side of the building. The primary personnel door for the building is on the south side of the building. Operations in the building currently include taxi cab maintenance in the southern half of the building and trailer construction in the northern half of the building. The slab floor appeared to be significantly stained with motor oil and glycol. Chemicals observed in the building included motor oils, penetrating lubricants (e.g. WD-40), paints, glues, brake cleaner, battery terminal cleaner and ethylene glycol.

Conceptual Site Model

Human receptors include current and future site workers in the Karen's RV and Taylor Leasing buildings, current and future site visitors. The indoor air and subslab soil gas sampling work is focused on the vapor intrusion pathway. Volatile organic compounds (VOCs) may migrate into Karen's RV and Taylor Leasing buildings by diffusive and/or advective transport through cracks in the building slab and/or preferential pathways (such as penetrations for building utilities).

Regarding other contaminant exposure pathways, there is not a known area of surface or subsurface soil contamination exceeding ADEC Method Two soil cleanup levels on the ARRC lease lots – so soil direct contact and outdoor air inhalation pathways are considered incomplete or insignificant. Both buildings use water supplied by the Anchorage Water and Wastewater Utility -- so the groundwater exposure pathways are currently incomplete. There is a groundwater plume extending under both buildings that exceeded ADEC Method Two groundwater cleanup levels prior to 2009 – so the groundwater ingestion and dermal contact pathways and volatilization from groundwater pathway may potentially be complete in the future.

SITE REGULATORY FRAMEWORK

Indoor air results are assessed using ADEC Target Levels found in the VI Guidance for Contaminated Sites (ADEC, 2017a).

Work has been conducted in accordance with the following documents:

- *Vapor Intrusion Guidance for Contaminated Sites* (ADEC, 2017a)
- *Oil and Other Hazardous Substances Pollution Control* (ADEC, 2017b)

INDOOR AIR SAMPLING OBJECTIVES

The objective of the work was to measure indoor air CVOC concentrations and subslab soil gas CVOC concentrations in the Karen's RV and Taylor Leasing buildings. In addition, Radon-222 concentrations were measured in indoor air and subslab soil gas in order to help characterize the building the attenuation factors, assess the potential contribution of indoor CVOC sources and validate of the conclusions stated in the Geosphere 2009 report. The soil gas results are utilized with the indoor air results to perform a multiple lines-of-evidence vapor intrusion (VI) evaluation for the site.

SAMPLING ACTIVITIES

Fieldwork was conducted between April 16 and April 19, 2018, so that the 2018 soil gas data are collected in the different season the soil gas data collected in September of 2009. The scope of the sampling included the following:

1. Collecting three subslab soil gas samples and a duplicate in the Karen's RV building using the subslab soil gas probes installed in 2009. The subslab samples included Summa canister samples for CVOC analysis by laboratory method TO-15, and Tedlar bag samples for Radon-222 analysis using alpha scintillation counting in accordance with established EPA protocols.
2. Collecting three indoor air samples in the Karen's RV building for CVOC analysis by laboratory method TO-15, and three Tedlar bag samples for Radon-222 analysis.

3. Collecting three subslab soil gas samples and a duplicate in the Taylor Leasing building using the subslab soil gas probes installed in 2009. The subslab samples included Summa canister samples for CVOC analysis by laboratory method TO-15, and Tedlar bag samples for Radon-222 analysis using alpha scintillation counting in accordance with established EPA protocols.
4. Collecting three indoor air samples in the Taylor Leasing building for CVOC analysis by laboratory method TO-15, and three Tedlar bag samples for Radon-222 analysis.

The subslab soil gas sampling used the soil gas probes installed in 2009. The probes were inspected on November 1, 2017 and prior to sampling in April of 2018 and appeared to be in good condition (i.e. the Swagelok plugs were tight and the Swagelok probes were firmly grouted into place). The probe locations are shown in Figure 1. A helium leak-check was conducted at each subslab sampling location, as described in the SOP in the work plan. Two of the probes at Karen's RV and two of the probes at Taylor Leasing had subslab helium readings of zero ppm helium. One of the soil gas probes at Karen's RV and one of the soil gas probes at Taylor Leasing passed the initial helium leak test but did have subslab helium detections. The soil gas sampling ports were sealed with "FIX-IT-ALL" gypsum patching compound as per the SOP and the helium leak test was repeated. Both sample ports again passed the helium leak test and had lower helium detections after being re-sealed, allowing the soil gas samples to be collected. The helium concentrations measured under the leak-check enclosure and in the subslab soil gas were recorded in the field notes and are presented in Table 2. While conducting the helium leak-check and collecting the subslab soil gas samples the quantity of subslab soil gas removed was minimized to the extent practicable. Work was conducted by Lawrence Acomb of Geosphere, who meets the ADEC definition of a Qualified Environmental Professional (QEP), as defined by 18 AAC 75.990(100). Mr. Russ Grandel, of the ARRC, participated in the collection of several gas samples in both buildings. ADEC building inventory and indoor air sampling questionnaire forms are attached.

The standard operating procedures (SOPs) that were used while performing the sampling were presented in the work plan. Outdoor air samples were not collected because the ARRC does not expect there to be significant outdoor CVOC concentrations and because any results obtained from the outdoor air sample would not contribute to the understanding of the vapor intrusion issue.

The subslab soil gas samples for CVOC analysis were collected using 1-liter Summa canisters equipped with flow controllers limiting flow to about 100 to 200 milliliter per minute. The indoor air samples for CVOC analysis were collected using 6-liter Summa canisters equipped with 24-hour flow controllers. The vacuum levels in the Summa gas canisters were checked prior to collecting samples and all vacuum levels were in the 25 to 29 inches of mercury range. The vacuum levels in the canister were rechecked in the lab before analysis and all canisters had vacuums greater than 1-inch of mercury, as shown in Table 3. The subslab soil gas samples and indoor air samples for Radon-222 analysis were collected in Tedlar bags. The Tedlar bags were only partially inflated so the bags could accommodate sample expansion during shipping (the Tedlar bags were the only objects in the cooler used for shipping – that is, there will not sharp objects in the sample cooler that could puncture the Tedlar bags).

Indoor air sample locations in the Karen's RV building included one indoor sample in the office on the northeast side of the building and one sample each near the north and south subslab sample

locations in the main work area of the building. The north and south subslab sample locations had the highest concentrations measured in the Karen's RV building, in the 2009 sampling event.

Indoor air sample locations in the Taylor Leasing building included: one indoor sample in the office on the southwest side of the building, and one sample each near the north and south subslab sample locations in the main work area of the building. The north subslab sample location had the highest TCE concentration and the south sample location had the highest PCE concentration measured in the Karen's RV building, in the 2009 sampling event.

Table 2 Helium (He) Leak Test Results & Corrective Actions

Sample/ Location	Helium (% under hood)	Helium (% subslab)	pass/fail?	notes
Karen's Middle sub slab	100%	0.00%	pass	--
Karen's North sub slab	100%	0.09%	pass	
Karen's North sub slab repeated test	100%	0.015%	pass	fix-it-all & water used to seal probe
Karen's South sub slab	100%	0.00%	pass	--
Taylor North sub slab	100%	0.00%	pass	--
Taylor Middle sub slab	100%	0.12%	pass	--
Taylor Middle sub slab repeated test	100%	0.00%	pass	fix-it-all & water used to seal probe
Taylor South sub slab	100%	0.00%	pass	--

Helium leak test criteria: pass = <1%; fail = >1%

Table 3 Manifold & Summa Canister Vacuums Before sampling and Summa Canister Vacuums Before Lab Testing

Sample/ Location	Analysis	Collection Date	Canister Vacuum before sampling	Canister Vacuum at Lab	Manifold Vacuum (leak check vacuum pulled by peristaltic pump)
Karen's North Indoor Air	Modified TO-15 SIM	4/17/2018	28" Hg	7.3" Hg	NA
Karen's South Indoor Air	Modified TO-15 SIM	4/17/2018	28" Hg	5.9" Hg	NA
Karen's Office Indoor Air	Modified TO-15 SIM	4/17/2018	30.5" Hg	6.1" Hg	NA
Taylor North Indoor Air	Modified TO-15 SIM	4/19/2018	27.5" Hg	11.8" Hg	NA
Taylor South Indoor Air	Modified TO-15 SIM	4/19/2018	29.5" Hg	5.9" Hg	NA
Taylor Office Indoor Air	Modified TO-15 SIM	4/19/2018	30" Hg	5.7" Hg	NA

Sample/ Location	Analysis	Collection Date	Canister Vacuum before sampling	Canister Vacuum at Lab	Manifold Vacuum (leak check vacuum pulled by peristaltic pump)
Karen's Middle sub slab	TO-15	4/16/2018	27.25" Hg	1.2" Hg	24.5" Hg & holding
Karen's North sub slab	TO-15	4/16/2018	29.5" Hg	1.2" Hg	25" Hg & holding
Karen's North #2 sub slab	TO-15	4/16/2018	29.5" Hg	1.4" Hg	24.5" Hg & holding
Karen's South sub slab	TO-15	4/17/2018	29" Hg	2.6" Hg	26.5" Hg & holding
Taylor North sub slab	TO-15	4/18/2018	29.5" Hg	1" Hg	25" Hg & holding

Taylor North #2 sub slab	TO-15	4/18/2018	29.5" Hg	1" Hg	25" Hg & holding
Taylor Middle sub slab	TO-15	4/18/2018	26.5" Hg	1" Hg	25.5" Hg & holding
Taylor South sub slab	TO-15	4/18/2018	30" Hg	1.2" Hg	25.5" Hg & holding

Hg = mercury

BUILDING SURVEY

Geosphere conducted a building survey and completed the ADEC Building Survey and Indoor Air Sampling Questionnaire found in the VI Guidance. The survey forms are attached as Attachment A. Because both of the buildings house operating businesses with multiple potential background indoor air contaminant sources, it not feasible to remove the potential background indoor air contaminant sources. In addition, because both of the buildings house operating businesses, the sampling was conducted while normal building operations were occurring (e.g. the garage doors on both buildings were opened and closed several times per day). The building survey looked for but did not identify any preferential vapor intrusion pathways based on a visual inspection. Currently several adult males and one adult female work in the Karen's RV building and several adult males and two adult females work in the Taylor Leasing building, during approximately normal working hours (40 hours per week). Because the buildings are commercial-industrial facilities, children are not expected to be present in the buildings for extended periods. In the future there may be other receptors.

ANALYTICAL PROGRAM

Air samples were analyzed for selected CVOCs using TO-15. The CVOCs of interest at the sites include PCE, TCE, DCE and VC. The Eurofins Air Toxics, Inc. laboratory in Folsom, California conducted the CVOC analysis. The 6-liter indoor air samples were analyzed using the TO-15 "Hi-Lo" method, while the subslab samples were analyzed using the TO-15 standard method. The analytical results are presented in Table 4. Radon-222 was analyzed by using alpha scintillation counting in accordance with established EPA protocols (EPA 402-R-95-012). The Radon-222 analysis was conducted by Professor Doug Hammond of the University of Southern California, Department of Earth Sciences. The 12 primary and two duplicate samples were collected. An ADEC Laboratory Data Review Checklist for Air Samples (ADEC, 2015) was completed for the project air samples, as show in Attachment B. The ADEC Laboratory Data Review Checklist indicates that the laboratory data meets quality assurance and quality control standards and that the data is usable for determining subslab and indoor air concentrations for the target analytes. A subslab to indoor air attenuation factor was assessed for detected each analyte, for each building, as shown in Table 5. The attenuation factor was calculated as the average concentration of each analyte in the three indoor air samples, divided by the average concentration of each analyte in the three subslab samples.

Table 4 Indoor & Subslab Soil Gas Results

Karen's RV	CLIENTSAMPID	Karen's North sub slab	Karen's North #2 sub slab	Karen's Middle sub slab	Karen's South sub slab	Karen's North Indoor Air	Karen's South Indoor Air	Karen's Office Indoor Air
	SAMPDATE	4/16/18	4/16/18	4/16/18	4/17/18	4/17/18	4/17/18	4/17/18
	LABSAMPID	1804446A-09A	1804446A-10A	1804446A-08A	1804446A-11A	1804446B-12A	1804446B-13A	1804446B-14A
COMPOUND NAME	ADEC Residential & Commerical Indoor Air Target Level (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)
Trichloroethene	2.0 -- 2.2	1500	1600	37	120	0.93	0.95	0.89
Tetrachloroethene	41 -- 41	ND (7.1)	ND (7.3)	ND (7.2)	7.4	0.97	0.97	3.1
1,1-Dichloroethene	79 -- 79	ND (4.2)	ND (4.3)	ND (4.2)	ND (4.4)	ND (0.17)	ND (0.22)	ND (0.13)
cis-1,2-Dichloroethene	NA -- NA	ND (4.2)	ND (4.3)	ND (4.2)	ND (4.4)	ND (0.35)	ND (0.44)	ND (0.26)
trans-1,2-Dichloroethene	790 -- 790	ND (4.2)	ND (4.3)	ND (4.2)	ND (4.4)	ND (1.7)	ND (2.2)	ND (1.3)
Vinyl Chloride	1.7 -- 28	ND (2.7)	ND (2.7)	ND (2.7)	ND (2.8)	ND (0.11)	ND (0.14)	ND (0.085)
Radon-222	NA -- NA	321	287	262	387	0.36	0.23	0.32

Taylor Leasing	CLIENTSAMPID	Taylor North sub slab	Taylor North #2 sub slab	Taylor Middle sub slab	Taylor South sub slab	Taylor North Indoor Air	Taylor South Indoor Air	Taylor Office Indoor Air
	SAMPDATETIME	4/18/18	4/18/18	4/18/18	4/18/18	4/19/18	4/19/18	4/19/18
	LABSAMPID	1804446A-01A	1804446A-02A	1804446A-03A	1804446A-04A	1804446B-05A	1804446B-06A	1804446B-07A
COMPOUND NAME	ADEC Residential & Commerical Indoor Air Target Level (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)	Result (ug/m^3)
Trichloroethene	2.0 -- 2.2	2100	2100	1300	690	0.74	0.94	0.47
Tetrachloroethene	41 -- 41	570	580	28	1000	12	14	6.6
1,1-Dichloroethene	79 -- 79	ND (5.9)	ND (6.4)	ND (4.2)	ND (4.2)	ND (0.088)	ND (0.067)	ND (0.065)
cis-1,2-Dichloroethene	NA -- NA	ND (5.9)	ND (6.4)	ND (4.2)	ND (4.2)	ND (0.18)	ND (0.13)	ND (0.13)
trans-1,2-Dichloroethene	790 -- 790	ND (5.9)	ND (6.4)	ND (4.2)	ND (4.2)	ND (0.88)	ND (0.67)	ND (0.65)
Vinyl Chloride	1.7 -- 28	ND (3.8)	ND (4.1)	ND (2.7)	ND (2.7)	ND (0.056)	ND (0.043)	ND (0.042)
Radon-222	NA -- NA	198	182	239	265	0.1	0.005	0.23

Radon-222 results in pico-Curies per liter

Radon-222 "best" results selected from original and lab duplicates

Subslab and indoor air analysis were by method TO-15 and Modified TO-15 SIM, respectively

Table 5 Measured Attenuation Factors

Karen's RV

Sample	Trichloroethene	Tetrachloroethene	Radon-222
Karen's RV North sub slab "best" result	1600	ND (7.3)	321.29
Karen's RV Middle sub slab	37	ND (7.2)	261.73
Karen's RV South sub slab	120	7.4	386.92
Karen's RV sub slab average	585.6667	7.4000	323.31
Karen's RV North Indoor Air	0.93	0.97	0.36
Karen's RV South Indoor Air	0.95	0.97	0.23
Karen's RV Office Indoor Air	0.89	3.1	0.32
Karen's RV indoor average	0.9233	1.6800	0.3049
Karen's RV Attenuation Factor (indoor average/subslab average)	0.0016	0.2270	0.0009
Karen's RV (1/Attenuation Factor)	634.3	4.4	1060.6

Taylor Leasing

Sample	Trichloroethene	Tetrachloroethene	Radon-222
Taylor North sub slab "best" result	2100	580	197.74
Taylor Middle sub slab	1300	28	239.29
Taylor South sub slab	690	1000	265.13
Taylor sub slab average	1363.33	536.00	234.05
Taylor North Indoor Air	0.74	12	0.105
Taylor South Indoor Air	0.94	14	0.005
Taylor Office Indoor Air	0.47	6.6	0.228
Taylor indoor average	0.7167	10.8667	0.1125
Taylor Attenuation Factor (indoor average/subslab average)	0.00053	0.0203	0.00048
Taylor 1/Attenuation Factor	1902.3	49.3	2080.3

ANALYTICAL RESULTS AND DISCUSSION

Laboratory results (Table 4) and attenuation factor calculations (Table 5) show the following:

1. Most importantly, the indoor air concentrations for all samples, for all compounds were below the ADEC risk based, indoor target levels for residential and commercial scenarios;
2. TCE was detected in all indoor air samples at concentrations less than 1 ug/m^3 (the residential and commercial indoor air target levels are 2 and 2.2 ug/m^3, respectively);
3. PCE was detected in all indoor air samples at concentrations ranging about 1 to 3 ug/m^3 in the Karen's RV building and 6.6 to 14 ug/m^3 in the Taylor Leasing building (the residential and commercial indoor air target is 41 ug/m^3);
4. 1,1-Dichloroethene, cis-1,2-Dichloroethene, trans-1,2-Dichloroethene and vinyl chloride were not detected in any subslab or indoor air samples. Indoor air sample reporting limits for these compounds were more than an order of magnitude below residential and commercial indoor air target levels. These compounds were not detected in the 2009 subslab soil gas samples;
5. Subslab TCE and PCE concentrations at Karen's RV and Taylor Leasing were the same order of magnitude and had a generally similar distribution as those measured in 2009 (compare Table 1 and Table 4 values). For example: at Karen's RV the middle and south probes had very similar and low TCE concentrations in 2009 and 2018, while the northern probe had the highest concentrations in both 2009 and 2018 (2018 TCE results in the northern probe were about 2.5 times higher than in 2009); at Taylor Leasing the northern probe had the highest TCE concentrations in both 2009 and 2018, the southern probe had the highest PCE concentrations in both 2009 and 2018 and 2018 TCE and PCE concentrations were about 1/2 to ¼ of the 2009 concentrations);
6. Subslab and indoor air PCE concentrations appeared to be higher at Taylor Leasing compared with Karen's RV.
7. Radon-222 concentrations in the subslab soil gas were similar in all samples ranging from about 262 to 387 picocuries per liter at Karens RV and from about 182 to 265 picocuries per liter at Taylor Leasing.
8. Radon-222 concentrations in the indoor air samples were similar in all samples ranging from about 0.23 to 0.36 picocuries per liter at Karens RV and from about 0.005 to 0.23 picocuries per liter at Taylor Leasing.
9. The Radon-222 was analyzed to serve as an indicator of the building attenuation factor at both Karen's RV and Taylor Leasing. Radon-222 is a good tracer because it tends to have relatively uniform soil concentrations compared to most contaminants, it has a known degradation rate (half-life) and typically there are not indoor sources of Radon-222. The Radon-222 attenuation factor for the Karen's RV building was 0.0009 (indicating a reduction of the subslab concentration by a factor of 1060), and the Radon-222 attenuation factor for the Taylor Leasing building was 0.00048 (indicating a reduction of the subslab concentration by a factor of 2080). The lower attenuation factor (indicating greater attenuation) at the Taylor Leasing building may be due to a higher building air exchange rate associated with or caused by opening the garage doors more frequently than at the Karen's RV site (during the period of investigation). The Radon-222 building attenuation factors in the 2018 investigation are higher (indicating less attenuation) than the attenuation factors derived from the Johnson and Ettinger model in 2009 by a factor of about 2 for the

Taylor Leasing Building and by a factor of more than 8 for the Karen's RV building. The 2018 data corroborate the 2009 vapor intrusion report by indicating that vapor intrusion at the Karen's RV and Taylor buildings does not cause unacceptable risk.

10. The TCE attenuation factor for the Karen's RV building was 0.0016 (indicating a reduction of the subslab concentration by a factor of about 634), and the TCE attenuation factor for the Taylor Leasing building was 0.00053 (indicating a reduction of the subslab concentration by a factor of 1902).
11. The PCE attenuation factor for the Karen's RV building was 0.227 (indicating a reduction of the subslab concentration by a factor of about 4.4), and the TCE attenuation factor for the Taylor Leasing building was 0.0203 (indicating a reduction of the subslab concentration by a factor of 49.3).
12. The Radon-222 and the TCE attenuation factors at Taylor Leasing are very similar, while the Radon-222 attenuation factor at Karen's RV was greater than the TCE attenuation factor (by a factor of about 1.67).
13. In contrast, the Radon-222 and the PCE attenuation factors at both Taylor Leasing and Karen's RV are significantly different (and the PCE attenuation factors are different than the TCE attenuation factors), with PCE having a much higher attenuation factor (indicating less attenuation) than Radon-222 or TCE. Given that the Radon-222, TCE and PCE attenuation factors are calculated from subslab soil gas samples and are subject only to dilution in the buildings, the higher PCE attenuation factors suggest the presence of indoor sources of PCE in both buildings and potentially the presence of an indoor source of TCE at Karen's RV.

CLOSURE

We trust that you will find the information presented in this report sufficient for concluding that current conditions at the Karen's RV and Taylor Leasing sites are protective of human health via the vapor intrusion route. This conclusion is documented by the measured 2018 indoor air concentrations, and the indoor air concentrations calculated using the subslab TCE and PCE soil gas concentrations and the J and E model and the Radon-222 attenuation factors. The 2018 data corroborate the 2009 vapor intrusion report. The Karen's RV and Taylor Leasing vapor intrusion investigations were conducted following an ADEC approved work plan and the results demonstrate that vapor intrusion is unlikely to cause indoor air concentrations higher than target levels and hence, no further evaluation of this pathway is warranted. This is consistent with the October 19, 2017 letter sent by the ADEC to the ARRC. If you have questions or require additional information, please contact me at GrandelR@akrr.com or telephone at 907-265-2429.

Sincerely,

Russell Grandel

REFERENCES

Alaska Department of Environmental Conservation (ADEC), 2017a. *Vapor Intrusion Guidance for Contaminated Sites. Division of Spill Prevention and Response Contaminated Sites Program.* November.

ADEC, 2017b. *Oil and Other Hazardous Substances Pollution Control*. Title 18 Alaska Administrative Code, Chapter 75 (18 AAC 75). As amended through October 1.

ADEC, 2015. *Laboratory Data Review Checklist for Air Samples.* Updated February 2015.

Figures, Photographs and Attachments

Figure 1 Sub-slab Soil Gas and Indoor Air Sampling Locations

Site Photographs

Attachment A Building Inventory and Indoor Air Sampling Questionnaire Forms

Attachment B Subslab Laboratory Results

Attachment C Indoor Air Laboratory Results

Attachment D Lab Sample Chain of Custody

Attachment E Laboratory Data Review Checklist for Air Samples

Attachment F Radon-222 Results

Figure 1 Approximate Sub-slab Soil Gas and Indoor Air Sampling Locations

Subslab Soil Gas Sample Locations

Indoor Air Sample Locations

Previous Groundwater Sample Locations

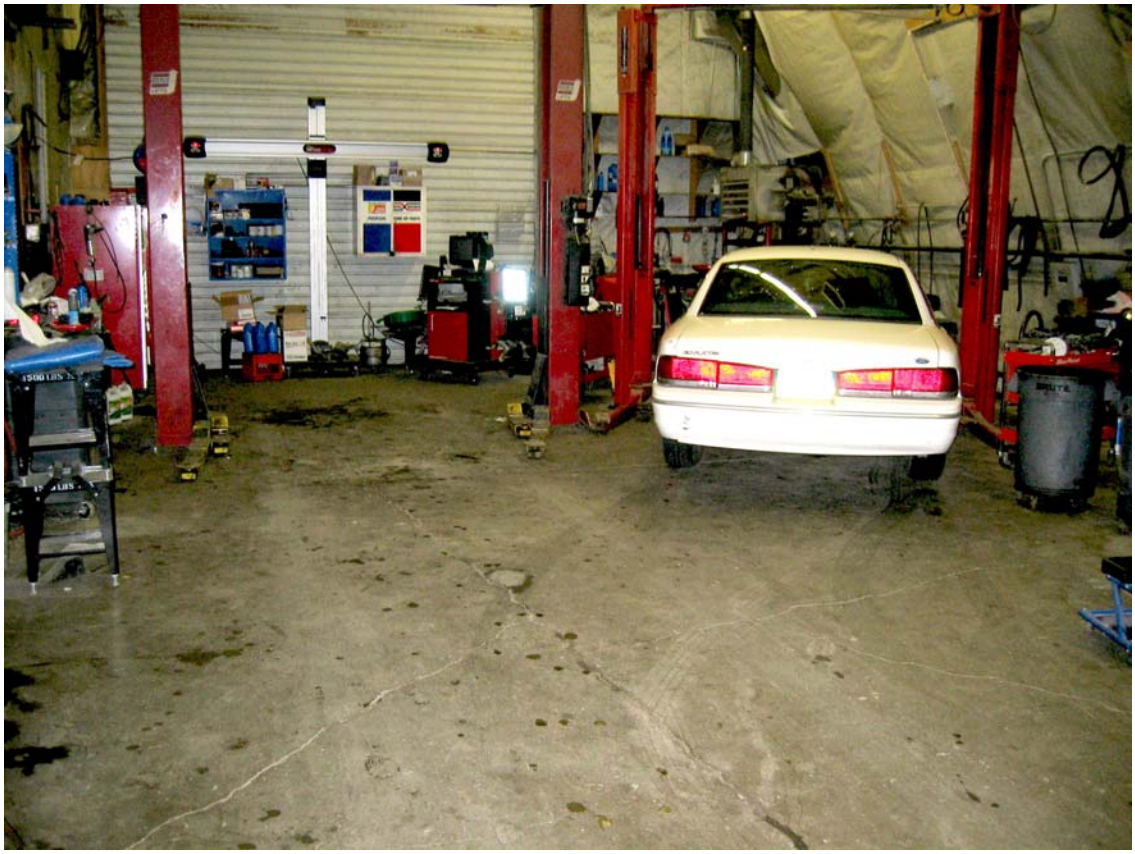
Photograph 1 LP-072 from the northeast looking toward the southwest..


Photograph 2 Interior of LP-072 building. The paint bay is the brightly lit area to the left.

Photograph 3 A sub-slab sampling point cemented into the floor at LP-072.

Photograph 4 Helium tank and regulator used in leak testing.

Photograph 5 LP-125 from the southwest looking toward the northeast.



Photograph 6 Interior of the southern portion of the LP-125 building.

Attachment A

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
BUILDING INVENTORY AND INDOOR AIR SAMPLING QUESTIONNAIRE

Karen's RV

This form should be prepared by a person familiar with indoor air assessments with assistance from a person knowledgeable about the building. Complete this form for each building where interior samples (e.g., indoor air, crawl space, or subslab soil gas samples) will be collected. Section I of this form should be used to assist in choosing an investigative strategy during workplan development. Section II should be used to assist in identification of complicating factors during a presampling building walk-through.

Preparer's Name Lawrence Acomb Date/Time Prepared April 17, 2018

Preparer's Affiliation Geosphere, Inc. Phone No. 907-345-7596

Purpose of Investigation To measure selected chlorinated volatile organic compound (CVOC) concentrations in indoor air and subslab soil gas in the Karen's RV and Taylor Leasing buildings

SECTION I: BUILDING INVENTORY

1. OCCUPANT OR BUILDING PERSONNEL:

Interviewed: Y / N

Last Name First Name Karen of Karen's RV

Address 1850 Viking Dr.

City Anchorage, Alaska 99501

Phone No. 907-336-2055

Number of Occupants/people at this location ~6 to 8 Age of Occupants adult

2. OWNER or LANDLORD: (Check if same as occupant ____.)

Interviewed: Y / N

Last Name First Name

Address 1850 Viking Dr.

City Anchorage, Alaska 99501

Phone No. 907-336-2055

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response.)

Residential	School	Commercial/Multi-use
Industrial	Church	Other RV repair – light industrial work

If the property is residential, what type? (Circle appropriate response.)

Not residential

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouse/Condo
Modular	Log Home	Other_____

If multiple units, how many? Not applicable

If the property is commercial, what type?

Business types(s) RV repair – light industrial work

Does it include residences (i.e., multi-use)? Y / N (No) If yes, how many? None

Other characteristics:

Number of floors one Building age 1980's (?)

Is the building insulated? Y / N (Yes) How airtight? Tight / (Average) / Not Tight

Have occupants noticed chemical odors in the building? Y / N

If yes, please describe: None beyond the chemicals they use in the building.

4. AIRFLOW

Use air current tubes, tracer smoke, or knowledge about the building to evaluate airflow patterns and qualitatively describe:

Airflow between floors Not applicable

Airflow in building near suspected source Not applicable (broad, subslab groundwater plume is the source)

Outdoor air infiltration Air infiltration primarily through garage doors and personnel doors.

Infiltration into air ducts No air ducts are used, gas space heaters with electric fans are suspended from the ceiling.

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply.)

a. Above-grade construction: wood frame | log | concrete | brick | steel frame construction

constructed on pilings with enclosed air space | constructed on pilings with open air space

b. Foundation type: full | crawlspace | slab-on-grade | other_____

c. Floor: concrete | dirt | stone | other _____

d. Basement floor: ~~unsealed~~ ~~sealed~~ ~~sealed with~~ Not applicable

e. Foundation walls: poured | block | stone | other poured footings

f. Foundation walls: unsealed | sealed | sealed with Not applicable

g. The foundation is: wet | damp | dry

h. The basement is: finished | unfinished | partially finished | Not applicable

i. Sump present? Y / N

j. Water in sump? Y / N / not applicable

Basement or lowest level depth below grade slab-on-grade (+6 inches) (feet).

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, and drains).

Perimeter crack; expansion joints; one small, closed crack a few feet long.

---

6. HEATING, VENTING, and AIR CONDITIONING (Circle all that apply.)

Type of heating system(s) used in this building: (Circle all that apply – not just primary.)

Hot air circulation	Heat pump	Hot water baseboard	
Space heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other_____

The primary type of fuel used is:

Natural gas	Fuel oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank is fueled by: natural gas

Heaters/Boiler/furnace is located in: Basement | Outdoors | Main floor | Other_____

Do any of the heating appliances have cold-air intakes? Y / N

Type of air conditioning or ventilation used in this building:

Central air	Window units	Open windows	None
Commercial HVAC	Heat-recovery system	Passive air system	large doors

Are there air distribution ducts present? Y / N

Describe the ventilation system in the building, its condition where visible, and the tightness of duct joints. Indicate the location of air supply and exhaust points on the floor plan.

Not applicable

Is there a radon mitigation system for the building/structure? Y / (N) Date of Installation Not applicable

Is the system active or passive? Active/Passive Not applicable

7. OCCUPANCY

Is ~~basement~~/lowest level occupied? (Full-time) Occasionally Seldom Almost never

Level	**General Use of Each Floor (e.g., family room, bedroom, laundry, workshop, or storage).**
Basement	none
1st Floor	shop floor, restroom & office
2nd Floor	none
3rd Floor	none

8. WATER AND SEWAGE

Water supply: (Public water) Drilled well Driven well Dug well Other_____

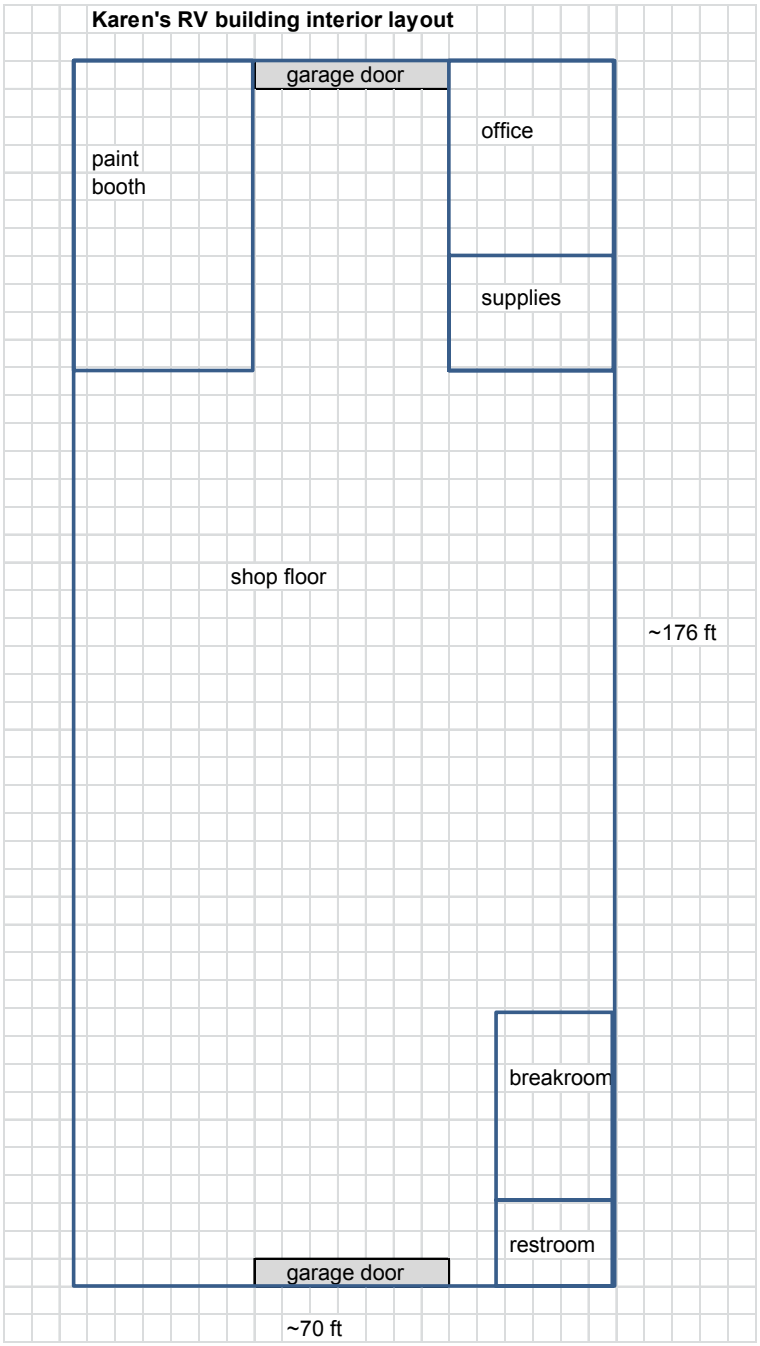
Sewage disposal: (Public sewer) Septic tank Leach field Dry well Other_____

9. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note that.

Basement: Not applicable

First Floor:



10. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (e.g., industries, gas stations, repair shops, landfills, etc.), outdoor air sampling locations and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the location of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

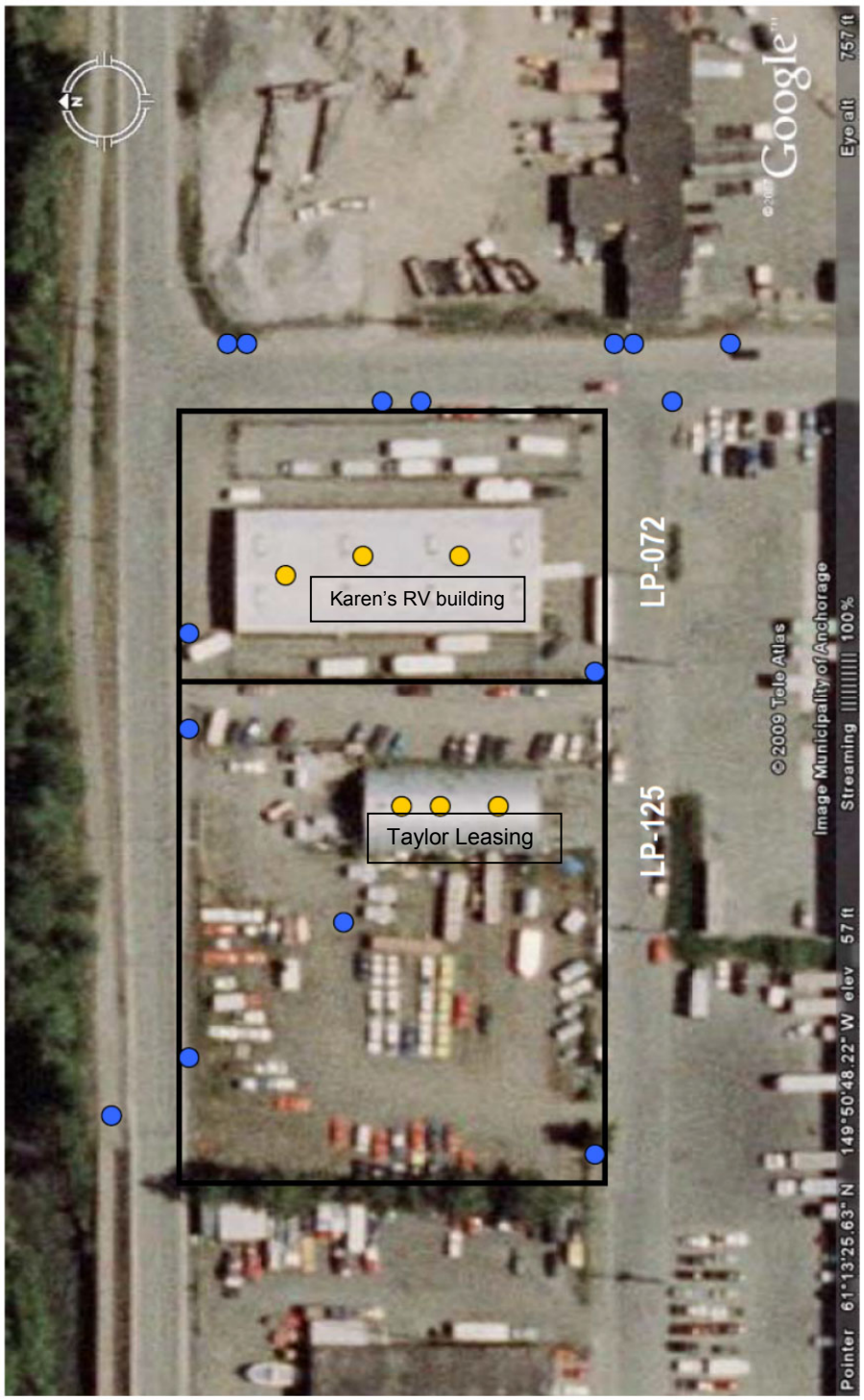


Figure 1 Approximate Sub-slab Soil Gas Sampling Locations

Soil Gas Sample Locations

Previous Groundwater Sample Location

SECTION II: INDOOR AIR SAMPLING QUESTIONNAIRE

This section should be completed during a presampling walk-through. If indoor air sources of COCs are identified and removed, consider ventilating the building prior to sampling. However, ventilation and heating systems should be operating normally for 24 hours prior to sampling.

a) 1. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

Is there an attached garage? Y / N the building is a steel frame warehouse type building, vehicles are parked inside

Does the garage have a separate heating unit? Y / N / NA the building is a steel frame warehouse type building

Are petroleum-powered machines or vehicles stored in the garage/building (e.g., lawnmower, ATV, or car) Y / N /NA

Please specify RVs are parked inside building

Has the building ever had a fire? Y / N When? No fires to my knowledge

Is a kerosene or unvented gas space heater present? Y / N Where?

Is there a workshop or hobby/craft area? Y / N Where and type: the building serves as a work shop

Is there smoking in the building? Y / N How frequently? I did not see anyone smoking inside the building.

Has painting/staining been done in the last six months? Y / N Where and when? In the paint booth

Is there new carpet, drapes or other textiles? Y / N Where and when?

Is there a kitchen exhaust fan? Y / N If yes, where is it vented?

Is there a bathroom exhaust fan? Y / N If yes, where is it vented?

Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

Are cleaning products, cosmetic products, or pesticides used that could interfere with indoor air sampling? Y / N

If yes, please describe Many chemicals including paints, solvents, glues, mastics are used on a daily basis as part of the business.

Do any of the building occupants use solvents at work? Y / N

(For example, is the building used for chemical manufacturing or a laboratory, auto mechanic or auto body shop, painting shop, fuel oil delivery area, or do any of the occupants work as a boiler mechanic, pesticide applicator, or cosmetologist?)

If yes, what types of solvents are used? See the chemical list on the last page of this form.

If yes, are his/her/their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry cleaning regularly (weekly) No

Yes, use dry cleaning infrequently (monthly or less) Unknown

Yes, work at a dry cleaning services No

2. **PRODUCT INVENTORY FORM** (For use during building walk-through.)

Make and model of field instrument used: Vapor concentration readings not taken during walk through.

List specific products found in the residence that have the potential to affect indoor air quality:

Location	Product Description	Site (units)	Condition[1]	Chemical Ingredients	Field Instrument Reading (units)	Photo[2] Y / N
office area	Thetford Awning Cleaner	many	U & UO			
office area	Thetford Bug Bust	many	U & UO			
office area	Thetford Protect & Shine	many	U & UO			
office area	Thetford Blade Streak Remover	many	U & UO			
office area	Thetford Slide-out Rubber Seal Conditioner	many	U & UO	Mineral oil & liquid petrol gas		
office area	Kwik Lube grease gun in a can	many	U & UO	p-chlorobenzotrifloride & aliphatics		
office area	BOC Shield T-9 Corrosion protection	many	U & UO			
office area	Rubber Roof Cleaner	many	U & UO			
supply area	Silca Flex caulk	many	U & UO			
supply area	Parr caulk	many	U & UO			
supply area	Dyco C-10 caulk	many	U & UO			
supply area	Silcasense cleaner	many	U & UO			
Paint booth	One Choice SX320 fast evaporating cleaner	many	U & UO			
Paint booth	U-POL Slow Degreaser	many	U & UO			
Paint booth	Axalta 105 lacquer thinner	many	U & UO			
Paint booth	Antifreeze	many	U & UO			
Paint booth	Standox MSB thinner diluent	many	U & UO			
Paint booth	Industrial Coatings Acetone	many	U & UO	Acetone		
Paint booth	U-POC 20:02 slow degreaser	many	U & UO			
Paint booth	U-POC 20:01 fast degreaser	many	U & UO			
Paint booth	Klean Satin denatured alcohol	many	U & UO			
Shop area	WD-40	many	U & UO			
Shop area	Battery Terminal Cleaner	many	U & UO			
Shop area	Evercoate Rubberized Undercoating	many	U & UO	Toluene, aliphatics, butane, isobutane		
Shop area	3M Server 77 spray adhesive	many	U & UO			
Shop area	Nason ful base 441-21	many	U & UO			
Shop area	3M 10 neoprene adhesive	many	U & UO			
Shop area	American Adhesives	many	U & UO			

[1] Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**.

[2] Photographs of the front and back of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

This form was modified from:

ITRC (Interstate Technology and Regulatory Council). 2007. *Vapor Intrusion Pathway: A Practical Guideline*. VI-1. Washington, D.C.: Interstate Technology and Regulatory Council, Vapor Intrusion Team. Available at: www.itrcweb.org.

Attachment A

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
BUILDING INVENTORY AND INDOOR AIR SAMPLING QUESTIONNAIRE

Taylor Leasing

This form should be prepared by a person familiar with indoor air assessments with assistance from a person knowledgeable about the building. Complete this form for each building where interior samples (e.g., indoor air, crawl space, or subslab soil gas samples) will be collected. Section I of this form should be used to assist in choosing an investigative strategy during workplan development. Section II should be used to assist in identification of complicating factors during a presampling building walk-through.

Preparer's Name Lawrence Acomb Date/Time Prepared April 19, 2018

Preparer's Affiliation Geosphere, Inc. Phone No. 907-345-7596

Purpose of Investigation To measure selected chlorinated volatile organic compound (CVOC) concentrations in indoor air and subslab soil gas in the Karen's RV and Taylor Leasing buildings

SECTION I: BUILDING INVENTORY

1. OCCUPANT OR BUILDING PERSONNEL:

Interviewed: Y / N

Last Name First Name Suzie Taylor of Taylor Leasing

Address 1825 Ship Avenue

City Anchorage, Alaska 99501

Phone No. 907-331-0781

Number of Occupants/people at this location ~4 to 6 Age of Occupants adult

2. OWNER or LANDLORD: (Check if same as occupant ____.)

Interviewed: Y / N

Last Name First Name

Address 1825 Ship Avenue

City Anchorage, Alaska 99501

Phone No. 907-331-0781

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response.)

Residential	School	Commercial/Multi-use
Industrial	Church	Other Taxi Cab repair & trailer construction– light industrial

If the property is residential, what type? (Circle appropriate response.)

Not residential

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouse/Condo
Modular	Log Home	Other_____

If multiple units, how many? Not applicable

If the property is commercial, what type?

Business types(s) Taxi Cab repair & trailer construction– light industrial

Does it include residences (i.e., multi-use)? Y / N (No) If yes, how many? None

Other characteristics:

Number of floors one Building age 1960's (?)

Is the building insulated? Y / N (Yes) How airtight? Tight / (Average) / Not Tight

Have occupants noticed chemical odors in the building? Y / N

If yes, please describe: None beyond the chemicals they use in the building.

4. AIRFLOW

Use air current tubes, tracer smoke, or knowledge about the building to evaluate airflow patterns and qualitatively describe:

Airflow between floors Not applicable

Airflow in building near suspected source Not applicable (broad, subslab groundwater plume is the source)

Outdoor air infiltration Air infiltration primarily through garage doors and personnel doors.

Infiltration into air ducts No air ducts are used, floor mounted waste oil heaters and gas space heaters with electric fans are suspended from the ceiling.

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply.)

a. Above-grade construction: wood frame | log | concrete | brick | wood & steel frame construction

constructed on pilings with enclosed air space | constructed on pilings with open air space

b. Foundation type: full | crawlspace | slab-on-grade | other_____

c. Floor: concrete | dirt | stone | other _____

d. Basement floor: ~~unsealed~~ | ~~sealed~~ | ~~sealed with~~ Not applicable

e. Foundation walls: poured | block | stone | other poured footings

f. Foundation walls: unsealed | sealed | sealed with Not applicable

g. The foundation is: wet | damp | dry

h. The basement is: finished | unfinished | partially finished | Not applicable

i. Sump present? Y / N

j. Water in sump? Y / N / not applicable

Basement or lowest level depth below grade slab-on-grade (+6 inches) (feet).

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, and drains).

Perimeter crack; expansion joints; several open cracks many feet long & slab penetration for floor drain.

---

6. HEATING, VENTING, and AIR CONDITIONING (Circle all that apply.)

Type of heating system(s) used in this building: (Circle all that apply – not just primary.)

Hot air circulation	Heat pump	Hot water baseboard	
Space heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other_____

The primary type of fuel used is:

Natural gas	Fuel oil	Kerosene
Electric	Propane	Solar
Wood	Coal	Waste oil heaters

Domestic hot water tank is fueled by: natural gas

Heaters/Boiler/furnace is located in: Basement | Outdoors | Main floor | Other_____

Do any of the heating appliances have cold-air intakes? Y / N

Type of air conditioning or ventilation used in this building:

Central air	Window units	Open windows	None
Commercial HVAC	Heat-recovery system	Passive air system	large doors

Are there air distribution ducts present? Y / N

Describe the ventilation system in the building, its condition where visible, and the tightness of duct joints. Indicate the location of air supply and exhaust points on the floor plan.

Not applicable

Is there a radon mitigation system for the building/structure? Y / (N) Date of Installation Not applicable

Is the system active or passive? Active/Passive Not applicable

7. OCCUPANCY

Is ~~basement~~/lowest level occupied? (Full-time) Occasionally Seldom Almost never

Level	**General Use of Each Floor (e.g., family room, bedroom, laundry, workshop, or storage).**
Basement	none
1st Floor	shop floor, restroom & office
2nd Floor	storage above office
3rd Floor	none

8. WATER AND SEWAGE

Water supply: (Public water) Drilled well Driven well Dug well Other_____

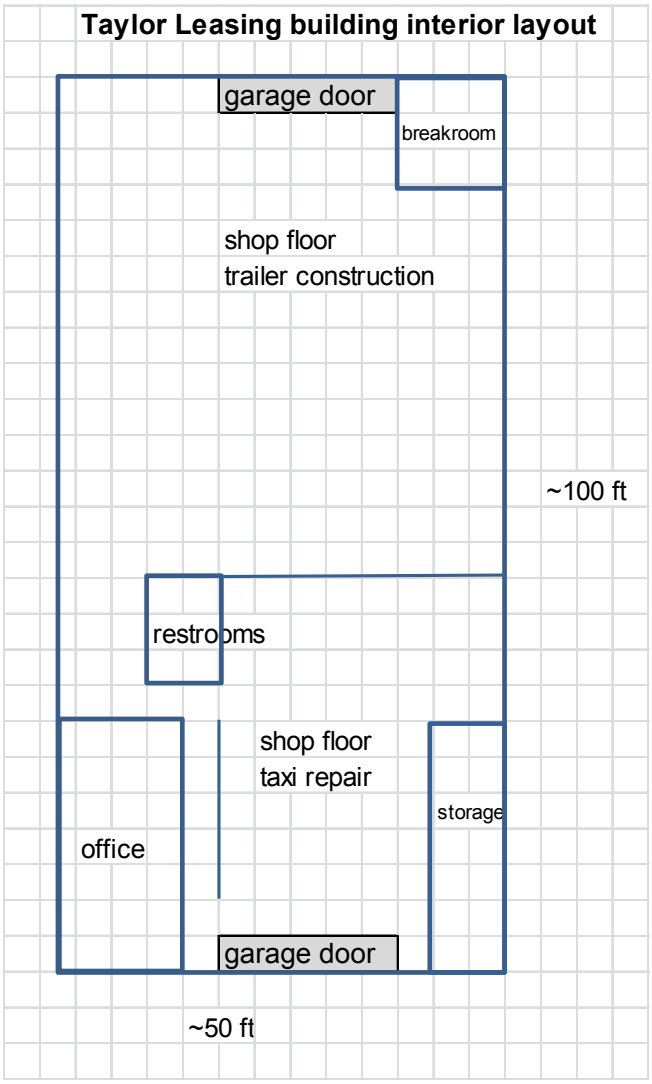
Sewage disposal: (Public sewer) Septic tank Leach field Dry well Other_____

9. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note that.

Basement: Not applicable

First Floor:



10. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (e.g., industries, gas stations, repair shops, landfills, etc.), outdoor air sampling locations and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the location of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

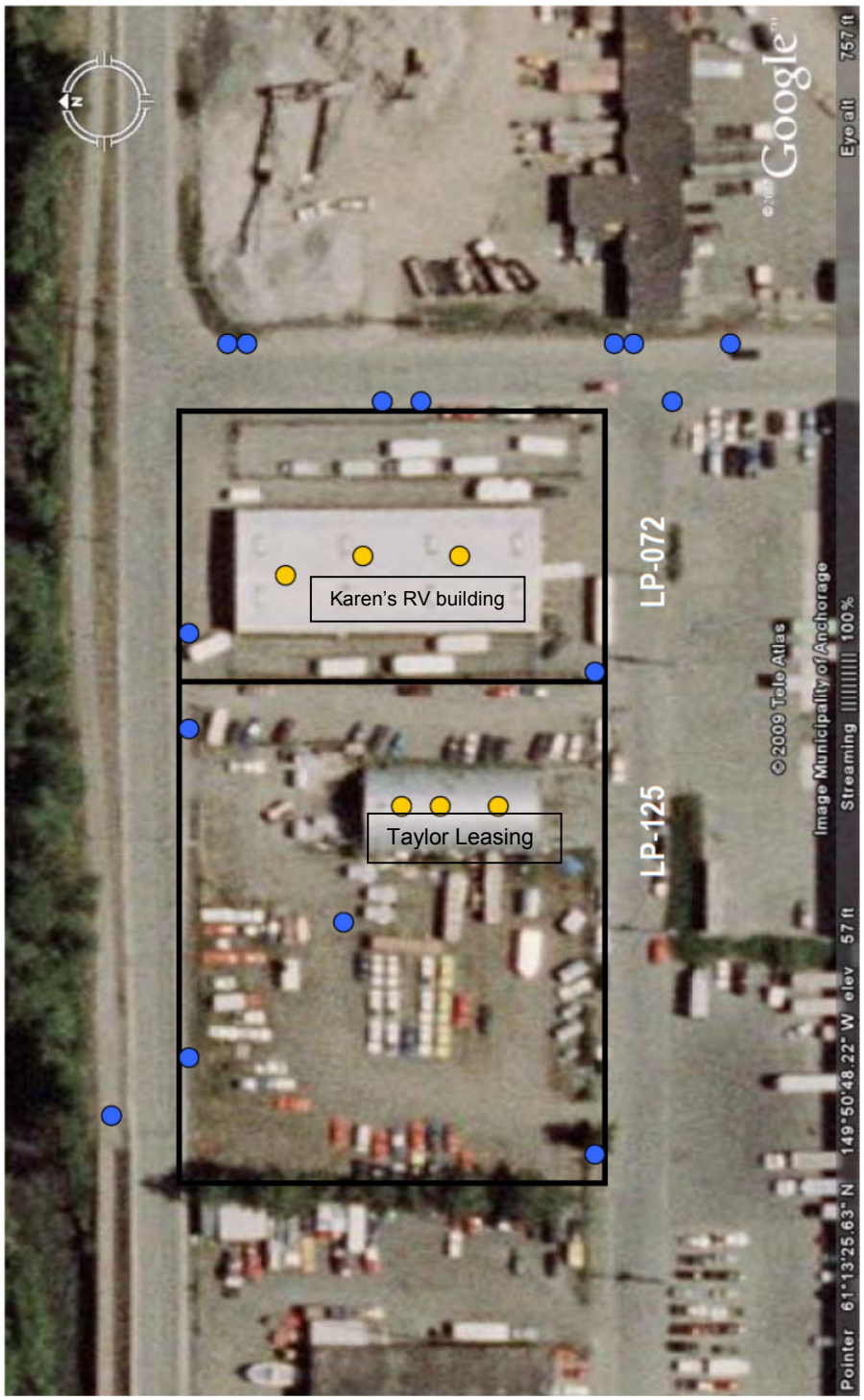


Figure 1 Approximate Sub-slab Soil Gas Sampling Locations

SECTION II: INDOOR AIR SAMPLING QUESTIONNAIRE

This section should be completed during a presampling walk-through. If indoor air sources of COCs are identified and removed, consider ventilating the building prior to sampling. However, ventilation and heating systems should be operating normally for 24 hours prior to sampling.

a) 1. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

Is there an attached garage? Y / N the building is a wood & steel frame building, vehicles are parked inside

Does the garage have a separate heating unit? Y / N / NA the building is a single wood & steel frame building

Are petroleum-powered machines or vehicles stored in the garage/building (e.g., lawnmower, ATV, or car) Y / N /NA

Please specify taxis & ATVs are parked inside building

Has the building ever had a fire? Y / N When? No fires to my knowledge

Is a kerosene or unvented gas space heater present? Y / N Where?

Is there a workshop or hobby/craft area? Y / N Where and type: the building serves as a work shop

Is there smoking in the building? Y / N How frequently? I did not see anyone smoking inside the building.

Has painting/staining been done in the last six months? Y / N Where and when? In the northern portion of the building(?)

Is there new carpet, drapes or other textiles? Y / N Where and when?

Is there a kitchen exhaust fan? Y / N If yes, where is it vented?

Is there a bathroom exhaust fan? Y / N If yes, where is it vented?

Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

Are cleaning products, cosmetic products, or pesticides used that could interfere with indoor air sampling? Y / N

If yes, please describe Many chemicals including paints, solvents, glues, mastics are used on a daily basis as part of the business.

Do any of the building occupants use solvents at work? Y / N

(For example, is the building used for chemical manufacturing or a laboratory, auto mechanic or auto body shop, painting shop, fuel oil delivery area, or do any of the occupants work as a boiler mechanic, pesticide applicator, or cosmetologist?)

If yes, what types of solvents are used? See the chemical list on the last page of this form.

If yes, are his/her/their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry cleaning regularly (weekly) No

Yes, use dry cleaning infrequently (monthly or less) Unknown

Yes, work at a dry cleaning services No

2. **PRODUCT INVENTORY FORM** (For use during building walk-through.)

Make and model of field instrument used: Vapor concentration readings not taken during walk through.

List specific products found in the residence that have the potential to affect indoor air quality:

Location	Product Description	Site (units)	Condition[1]	Chemical Ingredients	Field Instrument Reading (units)	Photo[2] Y / N
Shop area	Car Quest 134A refrigerant	many	U & UO			
Shop area	Valvoline starting fluid	many	U & UO			
Shop area	CRC radiator flush	many	U & UO			
Shop area	Car Quest starting fluid	many	U & UO			
Shop area	Kooler Kleen transmission flush	many	U & UO			
Shop area	Stop Leak radiator sealer	many	U & UO			
Shop area	Castrol ATF	many	U & UO			
Shop area	Petro Canada transmission flush	many	U & UO			
Shop area	Toyota ATF	many	U & UO			
Shop area	BG air intake cleaner	many	U & UO			
Shop area	Car Quest non-flammable brake cleaner chlorinated	many	U & UO	CVOCs		
Shop area	Car Quest non-chlorinated brake cleaner	many	U & UO			
Shop area	Safeway 70% isopropyl alcohol	many	U & UO			
Shop area	Spay Max solvent borne coatings	many	U & UO			
Shop area	Rustoleum clear glass	many	U & UO			
Shop area	Armor All tire foam	many	U & UO			
Shop area	Corrosion X	many	U & UO			
Shop area	Autozone brake fluid	many	U & UO			
Shop area	O'Reilly brake cleaner	many	U & UO			
Shop area	Car Quest antifreeze	many	U & UO			
Shop area	3M 90 spay adhesive	many	U & UO			
Shop area	Evercoate Fiberglass resin	many	U & UO			
Shop area	Car Quest liquid tire buffer & cleaner	many	U & UO			
Shop area	Sprayway glass cleaner	many	U & UO			
Shop area	Autozone windshield washer fluid	many	U & UO			
Shop area	Benzomatic Butane	many	U & UO			
Shop area	Spray Max solvent coatings	many	U & UO	Acetone & dimethylether		
Shop area	CRC Bright Zinc It	many	U & UO			

Shop area	Quad VOC window sealant	many	U & UO			
Shop area	Polyseam seal caulk acrylic with silica	many	U & UO			
Shop area	Waste oil	100+ gallons				
Shop area	WD-40	many	U & UO			
Shop area	Battery Terminal Cleaner	many	U & UO			
Shop area	Evercoate Rubberized Undercoating	many	U & UO	Toluene, aliphatics, butane, isobutane		

[1] Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**.

[2] Photographs of the front and back of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

This form was modified from:

ITRC (Interstate Technology and Regulatory Council). 2007. *Vapor Intrusion Pathway: A Practical Guideline*. VI-1. Washington, D.C.: Interstate Technology and Regulatory Council, Vapor Intrusion Team. Available at: www.itrcweb.org.

Attachment B

Subslab Laboratory Results

5/7/2018

Mr. Lawrence Acomb
Geosphere, Inc.
3120 Legacy Drive

Anchorage AK 99516

Project Name: Karen's & Taylor
Project #: ARRC Karen''s
Workorder #: 1804446A

Dear Mr. Lawrence Acomb

The following report includes the data for the above referenced project for sample(s) received on 4/23/2018 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 to contact 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

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WORK ORDER #: 1804446A

Work Order Summary

CLIENT:	Mr. Lawrence Acomb Geosphere, Inc. 3120 Legacy Drive Anchorage, AK 99516	**BILL TO:**	Mr. Lawrence Acomb Geosphere, Inc. 3120 Legacy Drive Anchorage, AK 99516
PHONE:	907-345-7596	**P.O. #**	
FAX:		**PROJECT #**	ARRC Karen"s Karen's & Taylor
DATE RECEIVED:	04/23/2018	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/03/2018		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	Taylor North sub slab	TO-15	1 "Hg	14.8 psi
02A	Taylor North #2 sub slab	TO-15	1 "Hg	15.1 psi
03A	Taylor Middle sub slab	TO-15	1 "Hg	15.1 psi
04A	Taylor South sub slab	TO-15	1.2 "Hg	15.1 psi
08A	Karen's Middle sub slab	TO-15	1.2 "Hg	15.1 psi
09A	Karen's North sub slab	TO-15	1.2 "Hg	15 psi
10A	Karen's North #2 sub slab	TO-15	1.4 "Hg	15.5 psi
11A	Karen's South sub slab	TO-15	2.6 "Hg	14.8 psi
12A	Lab Blank	TO-15	NA	NA
13A	CCV	TO-15	NA	NA
14A	LCS	TO-15	NA	NA
14AA	LCSD	TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 05/03/18

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

LABORATORY NARRATIVE
EPA Method TO-15
Geosphere, Inc.
Workorder# 1804446A

Eight 1 Liter Summa Canister samples were received on April 23, 2018. 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

The Chain of Custody (COC) information for sample Taylor North sub slab and Taylor North #2 sub slab did not match the information on the canister with regard to canister identification. The client was notified of the discrepancy and the information on the canister was used to process and report the samples.

Analytical Notes

Dilution was performed on samples Taylor North sub slab and Taylor North #2 sub slab due to the presence of high level target species.

Definition of Data Qualifying Flags

Ten 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.

M - Reported value may be biased due to apparent matrix interferences.

CN - See Case Narrative.

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

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

Client Sample ID: Taylor North sub slab

Lab ID#: 1804446A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.5	390	8.0	2100
Tetrachloroethene	1.5	84	10	570

Client Sample ID: Taylor North #2 sub slab

Lab ID#: 1804446A-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.6	400	8.7	2100
Tetrachloroethene	1.6	85	11	580

Client Sample ID: Taylor Middle sub slab

Lab ID#: 1804446A-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.0	240	5.6	1300
Tetrachloroethene	1.0	4.1	7.1	28

Client Sample ID: Taylor South sub slab

Lab ID#: 1804446A-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.0	130	5.7	690
Tetrachloroethene	1.0	150	7.2	1000

Client Sample ID: Karen's Middle sub slab

Lab ID#: 1804446A-08A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.0	6.9	5.7	37

Client Sample ID: Karen's North sub slab

Lab ID#: 1804446A-09A

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

Client Sample ID: Karen's North sub slab

Lab ID#: 1804446A-09A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.0	270	5.6	1500

Client Sample ID: Karen's North #2 sub slab

Lab ID#: 1804446A-10A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.1	290	5.8	1600

Client Sample ID: Karen's South sub slab

Lab ID#: 1804446A-11A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.1	22	5.9	120
Tetrachloroethene	1.1	1.1 J	7.5	7.4 J

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Client Sample ID: Taylor North sub slab

Lab ID#: 1804446A-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042416**	**Date of Collection: 4/18/18 1:49:00 PM**	
Dil. Factor:	**2.96**	**Date of Analysis: 4/24/18 08:41 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.5	Not Detected	3.8	Not Detected
1,1-Dichloroethene	1.5	Not Detected	5.9	Not Detected
cis-1,2-Dichloroethene	1.5	Not Detected	5.9	Not Detected
Trichloroethene	1.5	390	8.0	2100
trans-1,2-Dichloroethene	1.5	Not Detected	5.9	Not Detected
Tetrachloroethene	1.5	84	10	570

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	95	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: Taylor North #2 sub slab

Lab ID#: 1804446A-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042417**	**Date of Collection: 4/18/18 12:52:00 PM**	
Dil. Factor:	**3.23**	**Date of Analysis: 4/24/18 09:07 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.6	Not Detected	4.1	Not Detected
1,1-Dichloroethene	1.6	Not Detected	6.4	Not Detected
cis-1,2-Dichloroethene	1.6	Not Detected	6.4	Not Detected
Trichloroethene	1.6	400	8.7	2100
trans-1,2-Dichloroethene	1.6	Not Detected	6.4	Not Detected
Tetrachloroethene	1.6	85	11	580

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	93	70-130
4-Bromofluorobenzene	104	70-130

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Client Sample ID: Taylor Middle sub slab

Lab ID#: 1804446A-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042418**	**Date of Collection: 4/18/18 3:19:00 PM**	
Dil. Factor:	**2.10**	**Date of Analysis: 4/24/18 09:33 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.0	Not Detected	2.7	Not Detected
1,1-Dichloroethene	1.0	Not Detected	4.2	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Trichloroethene	1.0	240	5.6	1300
trans-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Tetrachloroethene	1.0	4.1	7.1	28

Container Type: 1 Liter Summa Canister

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

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Client Sample ID: Taylor South sub slab

Lab ID#: 1804446A-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042419**	**Date of Collection: 4/18/18 4:28:00 PM**	
Dil. Factor:	**2.11**	**Date of Analysis: 4/24/18 09:59 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.0	Not Detected	2.7	Not Detected
1,1-Dichloroethene	1.0	Not Detected	4.2	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Trichloroethene	1.0	130	5.7	690
trans-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Tetrachloroethene	1.0	150	7.2	1000

Container Type: 1 Liter Summa Canister

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

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Client Sample ID: Karen's Middle sub slab

Lab ID#: 1804446A-08A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042420**	**Date of Collection: 4/16/18 1:00:00 PM**	
Dil. Factor:	**2.11**	**Date of Analysis: 4/24/18 10:26 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.0	Not Detected	2.7	Not Detected
1,1-Dichloroethene	1.0	Not Detected	4.2	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Trichloroethene	1.0	6.9	5.7	37
trans-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Tetrachloroethene	1.0	Not Detected	7.2	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	94	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: Karen's North sub slab

Lab ID#: 1804446A-09A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042421**	**Date of Collection: 4/16/18 2:45:00 PM**	
Dil. Factor:	**2.10**	**Date of Analysis: 4/24/18 10:52 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.0	Not Detected	2.7	Not Detected
1,1-Dichloroethene	1.0	Not Detected	4.2	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Trichloroethene	1.0	270	5.6	1500
trans-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Tetrachloroethene	1.0	Not Detected	7.1	Not Detected

Container Type: 1 Liter Summa Canister

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

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Client Sample ID: Karen's North #2 sub slab

Lab ID#: 1804446A-10A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042422**	**Date of Collection: 4/16/18 3:10:00 PM**	
Dil. Factor:	**2.15**	**Date of Analysis: 4/24/18 11:18 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.1	Not Detected	2.7	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.3	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.3	Not Detected
Trichloroethene	1.1	290	5.8	1600
trans-1,2-Dichloroethene	1.1	Not Detected	4.3	Not Detected
Tetrachloroethene	1.1	Not Detected	7.3	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: Karen's South sub slab

Lab ID#: 1804446A-11A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042423**	**Date of Collection: 4/17/18 3:12:00 PM**	
Dil. Factor:	**2.20**	**Date of Analysis: 4/24/18 11:45 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.1	Not Detected	2.8	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.4	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Trichloroethene	1.1	22	5.9	120
trans-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Tetrachloroethene	1.1	1.1 J	7.5	7.4 J

J = Estimated value.

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	95	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1804446A-12A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042405**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/24/18 12:11 PM**	

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

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	96	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: CCV

Lab ID#: 1804446A-13A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042402**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/24/18 10:06 AM**	

Compound	%Recovery
Vinyl Chloride	96
1,1-Dichloroethene	100
cis-1,2-Dichloroethene	98
Trichloroethene	101
trans-1,2-Dichloroethene	97
Tetrachloroethene	100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: LCS

Lab ID#: 1804446A-14A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042403**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/24/18 10:31 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	95	70-130
1,1-Dichloroethene	94	70-130
cis-1,2-Dichloroethene	91	70-130
Trichloroethene	100	70-130
trans-1,2-Dichloroethene	108	70-130
Tetrachloroethene	98	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	97	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: LCSD

Lab ID#: 1804446A-14AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a042404**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/24/18 10:55 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	97	70-130
1,1-Dichloroethene	96	70-130
cis-1,2-Dichloroethene	91	70-130
Trichloroethene	101	70-130
trans-1,2-Dichloroethene	108	70-130
Tetrachloroethene	101	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	97	70-130
4-Bromofluorobenzene	104	70-130

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Attachment C

Indoor Air Laboratory Results

5/7/2018

Mr. Lawrence Acomb
Geosphere, Inc.
3120 Legacy Drive

Anchorage AK 99516

Project Name: Karen's & Taylor
Project #: ARRC Karen''s
Workorder #: 1804446B

Dear Mr. Lawrence Acomb

The following report includes the data for the above referenced project for sample(s) received on 4/23/2018 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 SIM 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 to contact 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

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WORK ORDER #: 1804446B

Work Order Summary

CLIENT:	Mr. Lawrence Acomb Geosphere, Inc. 3120 Legacy Drive Anchorage, AK 99516	**BILL TO:**	Mr. Lawrence Acomb Geosphere, Inc. 3120 Legacy Drive Anchorage, AK 99516
PHONE:	907-345-7596	**P.O. #**	
FAX:		**PROJECT #**	ARRC Karen"s Karen's & Taylor
DATE RECEIVED:	04/23/2018	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/04/2018		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
05A	Taylor North Indoor Air	Modified TO-15 SIM	11.8 "Hg	5 psi
06A	Taylor South Indoor Air	Modified TO-15 SIM	5.9 "Hg	5.3 psi
07A	Taylor Office Indoor Air	Modified TO-15 SIM	5.7 "Hg	4.9 psi
12A	Karen's North Indoor Air	Modified TO-15 SIM	7.3 "Hg	4.8 psi
13A	Karen's South Indoor Air	Modified TO-15 SIM	5.9 "Hg	5.1 psi
14A	Karen's Office Indoor Air	Modified TO-15 SIM	6.1 "Hg	4.7 psi
15A	Lab Blank	Modified TO-15 SIM	NA	NA
15B	Lab Blank	Modified TO-15 SIM	NA	NA
16A	CCV	Modified TO-15 SIM	NA	NA
16B	CCV	Modified TO-15 SIM	NA	NA
17A	LCS	Modified TO-15 SIM	NA	NA
17AA	LCSD	Modified TO-15 SIM	NA	NA
17B	LCS	Modified TO-15 SIM	NA	NA
17BB	LCSD	Modified TO-15 SIM	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 05/04/18

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

LABORATORY NARRATIVE
Modified TO-15 SIM
Geosphere, Inc.
Workorder# 1804446B

Six 6 Liter Summa Canister (100% SIM Ambient) samples were received on April 23, 2018. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the SIM acquisition 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.

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

Requirement	***TO-15***	***ATL Modifications***
ICAL %RSD acceptance criteria	</=30% RSD with 2 compounds allowed out to < 40% RSD	Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD
Daily Calibration	+- 30% Difference	Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers
Blank and standards	Zero air	Nitrogen
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

The Chain of Custody (COC) information for samples Karen's North Indoor Air, Karen's South Indoor Air and Karen's Office Indoor Air did not match the entries on the sample tags with regard to sample identification. Therefore the information on the sample tag was used to process and report the samples.

Analytical Notes

Dilutions were formed on samples Karen's North Indoor Air, Karen's South Indoor Air and Karen's Office Indoor Air 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

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

Client Sample ID: Taylor North Indoor Air

Lab ID#: 1804446B-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.044	0.14	0.24	0.74
Tetrachloroethene	0.044	1.8	0.30	12

Client Sample ID: Taylor South Indoor Air

Lab ID#: 1804446B-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.034	0.17	0.18	0.94
Tetrachloroethene	0.034	2.1	0.23	14

Client Sample ID: Taylor Office Indoor Air

Lab ID#: 1804446B-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.033	0.088	0.18	0.47
Tetrachloroethene	0.033	0.98	0.22	6.6

Client Sample ID: Karen's North Indoor Air

Lab ID#: 1804446B-12A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.088	0.17	0.47	0.93
Tetrachloroethene	0.088	0.14	0.60	0.97

Client Sample ID: Karen's South Indoor Air

Lab ID#: 1804446B-13A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.11	0.18	0.60	0.95
Tetrachloroethene	0.11	0.14	0.76	0.97

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

Client Sample ID: Karen's Office Indoor Air

Lab ID#: 1804446B-14A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.066	0.16	0.36	0.89
Tetrachloroethene	0.066	0.45	0.45	3.1

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Client Sample ID: Taylor North Indoor Air

Lab ID#: 1804446B-05A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042414sim**	**Date of Collection: 4/19/18 2:45:00 PM**	
Dil. Factor:	**2.21**	**Date of Analysis: 4/24/18 10:07 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.022	Not Detected	0.056	Not Detected
1,1-Dichloroethene	0.022	Not Detected	0.088	Not Detected
cis-1,2-Dichloroethene	0.044	Not Detected	0.18	Not Detected
Trichloroethene	0.044	0.14	0.24	0.74
Tetrachloroethene	0.044	1.8	0.30	12
trans-1,2-Dichloroethene	0.22	Not Detected	0.88	Not Detected

Container Type: 6 Liter Summa Canister (100% SIM Ambient)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	85	70-130

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Client Sample ID: Taylor South Indoor Air

Lab ID#: 1804446B-06A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042415sim**	**Date of Collection: 4/19/18 2:46:00 PM**	
Dil. Factor:	**1.69**	**Date of Analysis: 4/24/18 11:00 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.067	Not Detected
cis-1,2-Dichloroethene	0.034	Not Detected	0.13	Not Detected
Trichloroethene	0.034	0.17	0.18	0.94
Tetrachloroethene	0.034	2.1	0.23	14
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected

Container Type: 6 Liter Summa Canister (100% SIM Ambient)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	87	70-130

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Client Sample ID: Taylor Office Indoor Air

Lab ID#: 1804446B-07A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042416sim**	**Date of Collection: 4/19/18 2:40:00 PM**	
Dil. Factor:	**1.65**	**Date of Analysis: 4/25/18 06:59 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.016	Not Detected	0.042	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.065	Not Detected
cis-1,2-Dichloroethene	0.033	Not Detected	0.13	Not Detected
Trichloroethene	0.033	0.088	0.18	0.47
Tetrachloroethene	0.033	0.98	0.22	6.6
trans-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected

Container Type: 6 Liter Summa Canister (100% SIM Ambient)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	86	70-130

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Client Sample ID: Karen's North Indoor Air

Lab ID#: 1804446B-12A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042507sim**	**Date of Collection: 4/17/18 4:00:00 PM**	
Dil. Factor:	**4.40**	**Date of Analysis: 4/25/18 11:18 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.044	Not Detected	0.11	Not Detected
1,1-Dichloroethene	0.044	Not Detected	0.17	Not Detected
cis-1,2-Dichloroethene	0.088	Not Detected	0.35	Not Detected
Trichloroethene	0.088	0.17	0.47	0.93
Tetrachloroethene	0.088	0.14	0.60	0.97
trans-1,2-Dichloroethene	0.44	Not Detected	1.7	Not Detected

Container Type: 6 Liter Summa Canister (100% SIM Ambient)

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

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Client Sample ID: Karen's South Indoor Air

Lab ID#: 1804446B-13A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042508sim**	**Date of Collection: 4/17/18 4:00:00 PM**	
Dil. Factor:	**5.60**	**Date of Analysis: 4/25/18 11:57 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.056	Not Detected	0.14	Not Detected
1,1-Dichloroethene	0.056	Not Detected	0.22	Not Detected
cis-1,2-Dichloroethene	0.11	Not Detected	0.44	Not Detected
Trichloroethene	0.11	0.18	0.60	0.95
Tetrachloroethene	0.11	0.14	0.76	0.97
trans-1,2-Dichloroethene	0.56	Not Detected	2.2	Not Detected

Container Type: 6 Liter Summa Canister (100% SIM Ambient)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: Karen's Office Indoor Air

Lab ID#: 1804446B-14A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042509sim**	**Date of Collection: 4/17/18 4:02:00 PM**	
Dil. Factor:	**3.32**	**Date of Analysis: 4/25/18 12:36 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.033	Not Detected	0.085	Not Detected
1,1-Dichloroethene	0.033	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.066	Not Detected	0.26	Not Detected
Trichloroethene	0.066	0.16	0.36	0.89
Tetrachloroethene	0.066	0.45	0.45	3.1
trans-1,2-Dichloroethene	0.33	Not Detected	1.3	Not Detected

Container Type: 6 Liter Summa Canister (100% SIM Ambient)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1804446B-15A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042406sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/24/18 10:45 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected
Tetrachloroethene	0.020	Not Detected	0.14	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	110	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1804446B-15B

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042506sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/18 10:35 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected
Tetrachloroethene	0.020	Not Detected	0.14	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	91	70-130

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Client Sample ID: CCV

Lab ID#: 1804446B-16A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042402sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/24/18 08:33 AM**	

Compound	%Recovery
Vinyl Chloride	83
1,1-Dichloroethene	99
cis-1,2-Dichloroethene	100
Trichloroethene	80
Tetrachloroethene	83
trans-1,2-Dichloroethene	94

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	88	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: CCV

Lab ID#: 1804446B-16B

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042502sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/18 08:29 AM**	

Compound	%Recovery
Vinyl Chloride	81
1,1-Dichloroethene	97
cis-1,2-Dichloroethene	98
Trichloroethene	79
Tetrachloroethene	82
trans-1,2-Dichloroethene	92

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	88	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: LCS

Lab ID#: 1804446B-17A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042403sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/24/18 09:03 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	86	70-130
1,1-Dichloroethene	97	70-130
cis-1,2-Dichloroethene	92	70-130
Trichloroethene	95	70-130
Tetrachloroethene	84	70-130
trans-1,2-Dichloroethene	103	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	91	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: LCSD

Lab ID#: 1804446B-17AA

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042404sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/24/18 09:33 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	85	70-130
1,1-Dichloroethene	96	70-130
cis-1,2-Dichloroethene	91	70-130
Trichloroethene	95	70-130
Tetrachloroethene	84	70-130
trans-1,2-Dichloroethene	102	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: LCS

Lab ID#: 1804446B-17B

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042503sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/18 08:59 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	85	70-130
1,1-Dichloroethene	96	70-130
cis-1,2-Dichloroethene	92	70-130
Trichloroethene	94	70-130
Tetrachloroethene	83	70-130
trans-1,2-Dichloroethene	102	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	91	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: LCSD

Lab ID#: 1804446B-17BB

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**21042504sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/25/18 09:30 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	84	70-130
1,1-Dichloroethene	95	70-130
cis-1,2-Dichloroethene	90	70-130
Trichloroethene	94	70-130
Tetrachloroethene	83	70-130
trans-1,2-Dichloroethene	100	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	100	70-130

Attachment D
Lab Sample Chain of Custody

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Sample Transportation Notice
Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX (916) 985-1020

Project Manager Larry Acomb
Collected by: (Print and Sign) Lawrence Acomb
Company Geoshere, Inc. Email gcomb@ak.net
Address 3120 Legacy Dr City Anchorage State AK Zip 99516
Phone 907-345-7556 Fax

Project Info:
P.O. #
Project # ARRC Karen's
Project Name Karen's & Taylor

Turn Around Time:
☑ Normal
☐ Rush
specify

Lab Use Only
Pressurized by:
Date:
Pressurization Gas: N_2 He

Lab I.D.	Field Sample I.D. (Location)	Can #	Date of Collection	Time of Collection	Analyses Requested	Canister Pressure/Vacuum Initial	Final	Receipt	Final (psi)
01A	Taylor North sub slab	1L 2470	4-18-18	1:49 PM	TO-15 standard	29.5	3.0		
02A	Taylor North #2 sub slab	1L 2290	4-18-18	12:52 PM	↓	29.5	3.0		
03A	Taylor middle sub slab	1L 3155	4-18-18	3:19 pm		26.5	3.5		
04A	Taylor South sub slab	1L 3107	4-18-18	4:28 pm		30	3.0		
	Taylor North Indoor Air	N 1721	4-19-18	2:45 pm	TO-15 Hi-Lo Sim/Scan	27.5	12"		
	Taylor South Indoor Air	0 0461	4-19-18	2:46 pm	↓	29.5	7"		
	Taylor Office Indoor Air	N 1657	4-19-18	2:40 pm		30.0	7"		

Relinquished by: (signature)	Date/Time	Received by: (signature)	Date/Time
Lawrence Acomb	4-20-18 1:00 PM	FedEx	4/23/18 0945
Relinquished by: (signature)	Date/Time	Received by: (signature)	Date/Time
Relinquished by: (signature)	Date/Time	Received by: (signature)	Date/Time

Notes:
Initial and final pressures from manifold gages.
Eurofins Quote 1803 2630 8RO

Lab Use Only	Shipper Name	Air Bill #	Temp (°C)	Condition	Custody Seals Intact?	Work Order #
	FedEx		NA	Good	Yes No None	1804446

Form 1293 rev.11

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Sample Transportation Notice
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180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX (916) 985-1020

Project Manager Lawrence Acomb

Collected by: (Print and Sign) Lawrence Acomb Lawrence Acomb

Company Geospec, Inc. Email acomb@ak.net

Address 3120 Legacy Dr. City Anchorage State AK Zip 99516

Phone 907-345-7596 Fax —

Project Info:
P.O. #
Project # ARRC Karen's
Project Name Karen's & Taylor

Turn Around Time:
☑ Normal
☐ Rush
specify

Lab Use Only
Pressurized by:
Date:
Pressurization Gas: N_2 He

Lab I.D.	Field Sample I.D. (Location)	Can #	Date of Collection	Time of Collection	Analyses Requested	Canister Pressure/Vacuum Initial	Final	Receipt	Final (psi)
08A	Karen's Middle sub slab	1L1911	4-16-18	1:00 PM	TO-15 standard	27.25	2.5		
09A	Karen's North sub slab	1L2929	4-16-18	2:45 PM	↓	29.5	3.0		
10A	Karen's North #2 sub slab	1L2339	4-16-18	3:10 PM	↓	29.5	3.0		
11A	Karen's South sub slab	1L2830	4-17-18	3:12 PM	↓	29.0	3.0		
	~~#~~ Karen's North	N0890	4-17-18	4:00 PM	TO-15 Hi-Lo SIM/scan	28"	6.8		
	Karen's South	N0608	4-17-18	4:00 PM	↓	28	6.0		
	Karen's Office	0355	4-17-18	4:02 PM	↓	30.5	7.5		

Relinquished by: (signature) Lawrence Acomb Date/Time 4-20-18 1:00PM
Received by: (signature) FedEx Date/Time 4/23/18 0945
Relinquished by: (signature) Date/Time
Received by: (signature) Date/Time
Relinquished by: (signature) Date/Time
Received by: (signature) Date/Time

Notes:
~~Initial~~ Initial and final pressures from manifold gages.
Eurofins Quote 1803 2630 8RO

Lab Use Only	Shipper Name	Air Bill #	Temp (°C)	Condition	Custody Seals Intact?	Work Order #
	FedEx		NA	Good	Yes No None	804446

Form 1293 rev.11

Attachment E
Subslab Samples

Reset Form

Laboratory Data Review Checklist for Air Samples

Completed by:	Lawrence Acomb		
Title:	Project Manager	Date:	7-10-18
CS Report Name:	Indoor Air and Subslab Soil Gas Assessment Report for Karen's RV and Taylor Leasing	Report Date:	July 9, 2018
Consultant Firm:	Geosphere, Inc.		
Laboratory Name:	Air Toxics	Laboratory Report Number:	1804446A
ADEC File Number:	2100.38.447	ADEC Haz ID:	

1. Laboratory

a. Did a NELAP certified laboratory receive and perform all of the submitted sample analyses?

(•) Yes ( ) No ( ) NA (Please explain.) Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses NELAP approved?

( ) Yes ( ) No (•) NA (Please explain.) Comments:

The samples were not transferred to another lab.

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

(•) Yes ( ) No ( ) NA (Please explain.) Comments:

b. Correct analyses requested?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample condition documented -Samples collected in gas tight, opaque/dark Summa canisters or other ADEC approved container? Canister vacuum/pressure checked, recorded upon receipt and contained no open valves?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

Summa 1 liter & 6 liter canisters used; all had vacuums at lab.

b. If there were any discrepancies, were they documented? For example, incorrect sample containers/ preservation, sample temperature outside of acceptable range, insufficient or missing samples, canister not holding a vacuum etc.?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

The sample collection times for samples "Taylor North subslab" and "Taylor North #2 subslab" were switched on the COC. The correct sample times were transmitted in an email to Air Toxics.

c. Data quality or usability affected? (Please explain.)

( ) Yes (•) No ( ) NA (Please explain) Comments:

No effect on data usability.

4. Case Narrative

a. Present and understandable?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

b. Discrepancies, errors or QC failures identified by the lab?

( ) Yes (•) No ( ) NA (Please explain) Comments:

c. Were all corrective actions documented?

( ) Yes ( ) No (•) NA (Please explain) Comments:

No corrective actions were needed.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

No corrective actions needed -- all data usable.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

c. Are the reported PQLs less than the Target Screening Level or the minimum required detection level for the project?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

d. Data quality or usability affected?

Comments:

All data usable.

6. QC Samples

a. Method Blank

i. One method blank reported per analysis and 20 samples?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

ii. All method blank results less than PQL?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

iii. If above PQL, what samples are affected?

Comments:

NA (all method blank results below PQL).

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

( ) Yes ( ) No (•) NA (Please explain) Comments:

NA (no samples affected, flags not needed).

v. Data quality or usability affected? (Please explain.)

Comments:

All data usable.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. One LCS/LCSD or one LCS and a sample/sample duplicate pair reported per analysis and 20 samples?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.

(•) Yes ( ) No ( ) NA (Please explain) Comments:

iii. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable.

(•) Yes ( ) No ( ) NA (Please explain) Comments:

iv. If %R or RPD is outside of acceptable limits, what samples are affected?

○ Yes ○ No ◉ NA (Please explain) Comments:

No samples affected.

v. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

○ Yes ○ No ◉ NA (Please explain) Comments:

No samples affected.

vi. Data quality or usability affected? (Please explain.)

Comments:

No samples affected; all data usable.

c. Surrogates

i. Are surrogate recoveries reported for field, QC and laboratory samples?

◉ Yes ○ No ○ NA (Please explain) Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.

◉ Yes ○ No ○ NA (Please explain) Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

○ Yes ○ No NA (Please explain) Comments:

All surrogate recoveries within criteria -- flags needed.

iv. Data quality or usability affected? (Please explain.)

Comments:

All surrogate recoveries within criteria; all data usable.

d. Field Duplicate

i. One field duplicate submitted per analysis and 10 type (soil gas, indoor air etc.) samples?

◉ Yes ○ No ○ NA (Please explain) Comments:

ii. Submitted blind to lab?

◉ Yes ○ No ○ NA (Please explain) Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 25%)

$$RPD\ (\%) = \text{Absolute Value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

(•) Yes ( ) No ( ) NA (Please explain) Comments:

iv. Data quality or usability affected? (Please explain.) Comments:

All data usable.

e. Field Blank (If not used explain why).

( ) Yes (•) No ( ) NA (Please explain) Comments:

There was not a need for a field blank; the Summa canisters were certified clean and evacuated.

i. All results less than PQL?

( ) Yes ( ) No (•) NA (Please explain) Comments:

Field blank not needed.

ii. If above PQL, what samples are affected? Comments:

NA

iii. Data quality or usability affected? (Please explain.)

Comments:

All data usable.

7. Other Data Flags/Qualifiers

a. Defined and appropriate?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

Reset Form

Attachment E continued...
Indoor Air Samples

Reset Form

Laboratory Data Review Checklist for Air Samples

Completed by:	Lawrence Acomb		
Title:	Project Manager	Date:	7-10-18
CS Report Name:	Indoor Air and Subslab Soil Gas Assessment Report for Karen's RV and Taylor Leasing	Report Date:	July 9, 2018
Consultant Firm:	Geosphere, Inc.		
Laboratory Name:	Air Toxics	Laboratory Report Number:	1804446B
ADEC File Number:	2100.38.447	ADEC Haz ID:	

1. Laboratory

a. Did a NELAP certified laboratory receive and perform all of the submitted sample analyses?

(•) Yes ( ) No ( ) NA (Please explain.) Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses NELAP approved?

( ) Yes ( ) No (•) NA (Please explain.) Comments:

The samples were not transferred to another lab.

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

(•) Yes ( ) No ( ) NA (Please explain.) Comments:

b. Correct analyses requested?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample condition documented -Samples collected in gas tight, opaque/dark Summa canisters or other ADEC approved container? Canister vacuum/pressure checked, recorded upon receipt and contained no open valves?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

Summa 1 liter & 6 liter canisters used; all had vacuums at lab.

b. If there were any discrepancies, were they documented? For example, incorrect sample containers/ preservation, sample temperature outside of acceptable range, insufficient or missing samples, canister not holding a vacuum etc.?

(●) Yes ( ) No ( ) NA (Please explain) Comments:

Sample labels and COC had a wording difference but the samples were clearly identified by canister number and location (e.g. label said "Karen's North Indoor Air Can# N0890" and COC said "Karen's North Can# N0890").

c. Data quality or usability affected? (Please explain.)

( ) Yes ( ) No (●) NA (Please explain) Comments:

NA -- no effect on data usability.

4. Case Narrative

a. Present and understandable?

(●) Yes ( ) No ( ) NA (Please explain) Comments:

b. Discrepancies, errors or QC failures identified by the lab?

( ) Yes (●) No ( ) NA (Please explain) Comments:

c. Were all corrective actions documented?

( ) Yes ( ) No (●) NA (Please explain) Comments:

No corrective actions were needed.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

No corrective actions needed -- all data usable.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

(●) Yes ( ) No ( ) NA (Please explain) Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

(●) Yes ( ) No ( ) NA (Please explain) Comments:

c. Are the reported PQLs less than the Target Screening Level or the minimum required detection level for the project?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

d. Data quality or usability affected?

Comments: All data usable.

6. QC Samples

a. Method Blank

i. One method blank reported per analysis and 20 samples?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

ii. All method blank results less than PQL?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

iii. If above PQL, what samples are affected?

Comments: NA (all method blank results below PQL).

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

( ) Yes ( ) No (•) NA (Please explain) Comments: NA (no samples affected, flags not needed).

v. Data quality or usability affected? (Please explain.)

Comments: All data usable.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. One LCS/LCSD or one LCS and a sample/sample duplicate pair reported per analysis and 20 samples?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.

(•) Yes ( ) No ( ) NA (Please explain) Comments:

iii. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable.

(•) Yes ( ) No ( ) NA (Please explain) Comments:

iv. If %R or RPD is outside of acceptable limits, what samples are affected?

( ) Yes ( ) No (•) NA (Please explain) Comments:

No samples affected.

v. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No (•) NA (Please explain) Comments:

No samples affected.

vi. Data quality or usability affected? (Please explain.)

Comments:

No samples affected; all data usable.

c. Surrogates

i. Are surrogate recoveries reported for field, QC and laboratory samples?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.

(•) Yes ( ) No ( ) NA (Please explain) Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No NA (Please explain) Comments:

All surrogate recoveries within criteria -- flags needed.

iv. Data quality or usability affected? (Please explain.)

Comments:

All surrogate recoveries within criteria; all data usable.

d. Field Duplicate

i. One field duplicate submitted per analysis and 10 type (soil gas, indoor air etc.) samples?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

ii. Submitted blind to lab?

◉ Yes ○ No ○ NA (Please explain) Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 25%)

$$RPD\ (\%) = \text{Absolute Value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

◉ Yes ○ No ○ NA (Please explain) Comments:

iv. Data quality or usability affected? (Please explain.) Comments:

All data usable.

e. Field Blank (If not used explain why).

○ Yes ◉ No ○ NA (Please explain) Comments:

There was not a need for a field blank; the Summa canisters were certified clean and evacuated.

i. All results less than PQL?

○ Yes ○ No ◉ NA (Please explain) Comments:

Field blank not needed.

ii. If above PQL, what samples are affected? Comments:

NA

iii. Data quality or usability affected? (Please explain.)

Comments:

All data usable.

7. Other Data Flags/Qualifiers

a. Defined and appropriate?

◉ Yes ○ No ○ NA (Please explain) Comments:

Reset Form

Attachment F
Radon-222 Results

Radon Analysis (EPA Method GS: Grab Sample/Scintillation Cell counting)

For Geosphere, Inc

Client Project Number: Karens RV and Taylor Leasing

Sampler: Lawrence Acomb

Sample Dates: 4/16/18-4/18/18

Sample containers: Tedlar bags

Site: Alaska RR Corp, Ship Creek Railyard, Anchorage, AK

Assumed Site Pressur **1.00** atm

Analysts: Doug Hammond

based on an elevation of 50 ft

Phone: 310-490-7896

Time Zone adjustment: add to decay time

email: dhammond@usc.edu

-1 hours

Collect (AKDT)

Run (PDT)

Gas Sample Summary

		Collection		Analysis					Lab Duplicates				
	ID	Date	time	Date	time	Vol run	Conc.	±1 sig	mean	±1ssd	Notes		
			(AKDT)		(PDT)	(cc)	pCi/L	pCi/L	pCi/L	pCi/L			
Received 4/19/18													
1	Karen's North sub slab soil gas	4/16/2018	14:20	4/20/2018	8:33	40	321	16					
2	Karen's North #2 sub slab soil gas	4/16/2018	14:50	4/20/2018	8:35	40	287	14					
3	Karen's Middle sub slab soil gas	4/16/2018	12:50	4/20/2018	8:30	40	262	13					
4	Karen's South sub slab soil gas	4/17/2018	14:56	4/20/2018	8:38	40	387	19	385	3			
	Lab duplicate	4/17/2018	14:56	4/21/2018	8:24	40	382	19					
5	Karen's North Indoor Air	4/17/2018	15:35	4/19/2018	17:54	60	0.36	0.11					
6	Karen's South Indoor Air	4/17/2018	15:30	4/19/2018	17:51	120	0.23	0.07					
7	Karen's Office Indoor Air	4/17/2018	15:40	4/19/2018	17:57	120	0.32	0.07					
Received 4/20/18													
8	Taylor North sub slab soil gas	4/18/2018	12:30	4/21/2018	8:09	40	183	9	193	9			
	Lab duplicate	4/18/2018	12:30	4/21/2018	8:11	40	198	10					
	Lab duplicate	4/18/2018	12:30	4/23/2018	16:49	40	198	10					
9	Taylor North #2 sub slab soil gas	4/18/2018	12:45	4/21/2018	8:15	40	182	9					
10	Taylor Middle sub slab soil gas	4/18/2018	15:06	4/21/2018	8:17	40	239	12					
11	Taylor South sub slab soil gas	4/18/2018	16:21	4/21/2018	8:20	40	240	12	253	18			
	Lab duplicate	4/18/2018	16:21	4/23/2018	16:51	40	265	13					
12	Taylor North Indoor Air	4/18/2018	12:50	4/21/2018	21:19	120	0.10	0.04					
13	Taylor South Indoor Air	4/18/2018	14:14	4/21/2018	21:15	120	0.005	0.05					
14	Taylor Office Indoor Air	4/18/2018	14:08	4/21/2018	21:12	120	0.23	0.05					

Uncertainty given in pCi/liter is based on counting statistics for low activity samples. For high activity samples uncertainty is ±5%.

The Lower Limit of Detection for Rn (95% confidence level as recommended by EPA 402-R-95-012, Oct. 97) is 0.14 pCi/liter.

Results are reported based on standardization with NIST-traceable radon sources.

These results are for application of naturally-occurring radon as a tracer of soil vapor intrusion, but are not intended for evaluation of radon hazards.

Results corrected to in situ pressure as noted above

Note Details: none

Raw Data, Calculation factors, and Analytical Details

		Collection		Analysis														
	Sample ID	Date	Time	Date	Time	Count in	He	Air/He	Vol run	Press	obs	sig	Decay T	Decay	Concentration		count stats	
			(AKDT)		(PDT)	cell/ch	eff	eff	(cc)	factor	dpm	dpm	(hours)	factor	dpm/liter	pCi/liter	pCi/liter ±1 sig	Notes
Received 4/19/18																		
1	Karen's North sub slab soil gas	4/16/2018	14:20	4/20/2018	8:33	59/11	0.930	0.99	40	1.00	13.39	0.30	89.2	1.962	713	321	7	
2	Karen's North #2 sub slab soil gas	4/16/2018	14:50	4/20/2018	8:35	77/32	0.878	0.99	40	1.00	11.35	0.28	88.8	1.955	638	287	7	
3	Karen's Middle sub slab soil gas	4/16/2018	12:50	4/20/2018	8:30	Z13/22	0.762	0.99	40	1.00	8.84	0.25	90.7	1.984	581	262	7	
4	Karen's South sub slab soil gas	4/17/2018	14:56	4/20/2018	8:38	58/31	0.900	0.99	40	1.00	18.78	0.35	64.7	1.630	859	387	7	
	Lab duplicate	4/17/2018	14:56	4/21/2018	8:24	61/33	0.800	0.99	40	1.00	13.78	0.13	88.5	1.951	849	382	4	
5	Karen's North Indoor Air	4/17/2018	15:35	4/19/2018	17:54	72/34	0.915	0.98	60	1.00	0.03	0.01	49.3	1.451	0.81	0.36	0.11	
6	Karen's South Indoor Air	4/17/2018	15:30	4/19/2018	17:51	81/31	0.776	0.96	120	1.00	0.03	0.01	49.4	1.452	0.52	0.23	0.07	
7	Karen's Office Indoor Air	4/17/2018	15:40	4/19/2018	17:57	83/33	0.790	0.96	120	1.00	0.04	0.01	49.3	1.451	0.70	0.32	0.07	
Received 4/20/18																		
8	Taylor North sub slab soil gas	4/18/2018	12:30	4/21/2018	8:09	Z13/22	0.762	0.99	40	1.00	7.41	0.10	66.7	1.654	406	183	2	
	Lab duplicate	4/18/2018	12:30	4/21/2018	8:11	59/11	0.930	0.99	40	1.00	9.77	0.11	66.7	1.655	439	198	2	
	Lab duplicate	4/18/2018	12:30	4/23/2018	16:49	61/33	0.800	0.99	40	1.00	5.49	0.17	123.3	2.538	440	198	6	
9	Taylor North #2 sub slab soil gas	4/18/2018	12:45	4/21/2018	8:15	77/32	0.878	0.99	40	1.00	8.49	0.11	66.5	1.653	404	182	2	
10	Taylor Middle sub slab soil gas	4/18/2018	15:06	4/21/2018	8:17	58/31	0.900	0.99	40	1.00	11.66	0.12	64.2	1.624	531	239	2	
11	Taylor South sub slab soil gas	4/18/2018	16:21	4/21/2018	8:20	SC6/34	0.751	0.99	40	1.00	9.85	0.11	63.0	1.609	533	240	3	
	Lab duplicate	4/18/2018	16:21	4/23/2018	16:51	59/11	0.930	0.99	40	1.00	8.79	0.22	119.5	2.466	589	265	7	
12	Taylor North Indoor Air	4/18/2018	12:50	4/21/2018	21:19	84/11	0.750	0.96	120	1.00	0.01	0.00	79.5	1.823	0.23	0.10	0.04	
13	Taylor South Indoor Air	4/18/2018	14:14	4/21/2018	21:15	81/31	0.776	0.96	120	1.00	0.00	0.01	78.0	1.803	0.01	0.00	0.05	
14	Taylor Office Indoor Air	4/18/2018	14:08	4/21/2018	21:12	82/32	0.679	0.96	120	1.00	0.02	0.01	78.1	1.803	0.51	0.23	0.05	

	Decay correctiions based on Rn decay constant of	0.1813	per day	Radon Conc = {(0.4504)(1000)(obs dpm)(decay factor)(Press factor)}/{(cc used)(He eff)(Air/He)}	
	Conversion from dpm based on	0.4504	pCi/dpm	(in pCi/liter)	
	Blanks are negligible.				
	Definitions:				
	Cell/ch:	Counting cell and channel used		sig dpm	uncertainty (± 1 sig) in dpm based on counting statistics
	He eff:	Cell and counter efficiency using helium matrix		Decay T:	time elapsed from sampling to analysis
	Air/He:	Correction for matrix counting gas density		Decay factor:	Correction factor for decay from collection to analysis
	Sample vol:	Volume analyzed (cc)		dpm/liter:	Radon concentration in disintigrations per minute per liter of sample
	Press factor:	Correction to in situ pressure based on collection altitude		piC/liter:	Radon concentration in picoCuries per liter
	obs dpm:	observed radon activity (disintigrations per minute) when analyzed		count stats:	uncertainty in observed radon based on counting statistics