August 9, 2021

Santa Barbara County Planning Commission
Planning & Development Department
123 East Anapamu Street
Santa Barbara, CA 93013

Subject: Cresco/SLO Cultivation Cannabis Project
Odor and Volatile Organic Compound Sampling Study

To Planning Commissioners:

SCS Engineers (SCS) was retained by Cresco California/SLO Cultivation to conduct a series of odor and Volatile Organic Compound (VOC) sampling at their operational, legal, non-conforming farm located at 3861 Foothill Road, in Carpinteria, California (also known as APN 005-310-024). This sampling study was intended to accomplish three goals:

1. Verify the efficacy of the existing vapor-phase odor neutralizing system.
2. Make recommendations to improve the performance of the odor abatement system and odor control best management practices.
3. Verify that the odor control system and other operations on the Project Site were not producing harmful amounts of VOCs.

Project Site Conditions: At the time of the study, the Project Site included approximately two (2) acres of adult-flowering cannabis cultivation occurring in passively vented greenhouses, one (1) acre of juvenile/nursery cannabis cultivation occurring in passively vented greenhouses, and ancillary harvesting/processing activities. The Project was equipped with one (1) Byers vapor-phase unit and approximately 2,600 linear feet of distribution piping. The Byers system was supplied with a continuous flow of Ecosorb CNB 100.

Odor Sampling Methodology: The sampling study was preceded by analyzing average annual meteorological data associated with the Santa Barbara Air Pollution Control District air monitoring station located in Carpinteria Valley east of the Cresco facility. From this annual meteorological data, three time periods were identified during which meteorological conditions (wind speed and direction) follow consistent different patterns:

1. Early Morning Hours
2. Late Morning Hours
3. Afternoon Hours

Given the probability that the Byers system's performance would be potentially affected by these varying wind patterns, sampling times and procedures were established to capture odor samples throughout each differing time period. The odor samples were taken using a specially designed air displacement sampler consisting of a vacuum pump system and Tedlar sample bags. These samples were then shipped to an independent third-party laboratory (Odor Science and Engineering, Inc. (OS&E) in Bloomfield, Connecticut) for analysis. The OS&E laboratory has an expert odor panel which conducts blind evaluations of the odor samples (the panel is not informed of the potential type or source of the samples). The odor panel provides a character (e.g., sour, skunk, exhaust, garbage), and a concentration for each odor sample. The concentration of odor is quantified as a dilution to threshold ratio (D/T) with higher numbers reflecting stronger odors. For example, the baseline odors present in most communities range from 8-12 D/T. Eight (8) D/T represents eight (8) parts of clean, purified air for each unit of odor sample. The specially trained and qualified odor panelists can often detect a net increase of 3-5 D/T over this baseline condition. Members of the general public can typically detect a net increase of 5-10 D/T. As a result, SCS typically considers a persistent net increase of odor concentration of seven (7) D/T or greater above baseline to be a potential nuisance odor detectable by the public.

Odor Sampling Event 1 Results: On July 1st and 2nd, 2019, SCS collected a set of twenty-one (21) total odor samples at strategically appropriate times and locations in an effort to capture potential maximum odors during calm winds (early morning), transitional winds (late morning), and steady winds (afternoon), with the Project Facilities' roof vents open, and with active cannabis processing occurring. These sample collections included upwind locations to determine an odor baseline for the region without cannabis, samples taken inside the greenhouse to reflect unmitigated odor released from cannabis cultivation or processing, and samples taken outside the greenhouse, downwind to capture odor conditions after the application of the odor neutralizing vapor.

Baseline Conditions: Results from Sampling Event 1 indicated that the upwind/baseline odor present in Carpinteria had a concentration of nine (9) D/T with a character commonly including odor descriptors such as: sour, stale, plastic, and vegetation. Samples of unmitigated cannabis odors within the Project Site's greenhouse ranged from a net increase in odor concentration of 117 D/T to 140 D/T with a character commonly including odor descriptors such as: skunk, mercaptan, and sour.

Samples Mitigated by Byers/Ecosorb System:

Early Morning/Calm Winds: Samples taken outside the Project Site's greenhouse with odor mitigation from the neutralizing vapor had a net increase ranging from 1 D/T to 32 D/T with character descriptors indicative of cannabis (i.e., skunk, sour, and mercaptan) in 5 of the 6 samples. Cannabis odors remained detectable, although the odorous air mass also remained in close proximity to or within the Project and Ocean Breeze parcels. No nuisance level odors were detected in proximity to offsite receptors.

Late Morning/Transitional Winds: Samples taken outside the Project Site's greenhouse with odor mitigation from the neutralizing vapor had a net increase ranging from 1 D/T to 26 D/T with character descriptors indicative of cannabis (i.e., skunk, sour, and mercaptan) only present within 1 of the 6 samples. Increasing wind movement and turbulence appears to provide superior mixing with the only sample point exceeding nuisance levels and having cannabis character was within 50-feet of the greenhouse on an Ocean Breeze parcel.

Afternoon/Steady Winds: Samples taken outside the Project Site's greenhouse with odor mitigation from the neutralizing vapor had a net increase ranging from 0 D/T to 29 D/T with character descriptors indicative of cannabis (i.e., skunk, sour, and mercaptan) only present within 1 of the 6 samples. Increasing wind movement and turbulence appears to provide superior mixing with the only sample point exceeding nuisance levels and having cannabis character was within 20-feet of the greenhouse on an Ocean Breeze parcel.

Initial Conclusions/Recommendations: The Byers/Ecosorb System is achieving the desired effect. Odor samples exceeding nuisance intensities with cannabis character were limited to areas on the Cresco and Ocean Breeze parcels at short distances generally within 50-feet of the cannabis activity. The system seems more challenged to provide efficient mixing during no/low wind states. Consider improving the performance of the site by strategically timing the lowering of the side wall ventilation curtains to coincide with increasing winds speeds and install carbon scrubbers to provide supplemental odor control for processing areas.

Odor Sampling Event 2 Results: Cresco implemented multiple recommendations for improved facility odor control recommended by SCS staff. After these recommended actions were implemented, SCS collected an additional set of twelve (12) total odor samples on September 25, 2019 during calm winds (early morning), steady winds (afternoons), with the Project Facilities' roof vents open, and with active cannabis processing occurring. These sample collections included upwind locations to determine an odor baseline for the region without cannabis, samples taken inside the greenhouse to reflect unmitigated odor released from cannabis cultivation or processing, and samples taken outside the greenhouse, downwind to capture odor conditions after the application of the odor neutralizing vapor.

Baseline Conditions: Results from the Sampling Event 1 indicated that the upwind/baseline odor present in Carpinteria had a concentration of nine (9) D/T with a character commonly including odor descriptors such as: musty, stale, plastic, and vegetation. Samples of unmitigated cannabis odors within the Project Site's greenhouse ranged from a net increase in odor concentration of 521 D/T to 1,941 D/T with a character commonly including odor descriptors such as: skunk, weed/pot, and exhaust.

Samples Mitigated by Byers/Ecosorb System:

Early Morning/Calm Winds: Samples taken outside the Project Site's greenhouse with odor mitigation from the neutralizing vapor had a net increase ranging from 0 D/T to 23 D/T with character descriptors indicative of cannabis (i.e., skunk, weed/pot, and mercaptan) in only 2 of the 5 samples one of which only had borderline 7 D/T concentration. Cannabis odors inside the greenhouse were substantially elevated compared to prior Event 1/Early Morning test results presumably due to delaying drop of wall ventilation; however, the desired effect of reduced odors outside greenhouse has also been achieved and odor levels proximal to offsite receptors are essentially back to baseline.

Afternoon/Steady Winds: Samples taken outside the Project Site's greenhouse with odor mitigation from the neutralizing vapor had a net increase ranging from 1 D/T to 2 D/T with no definitive character descriptors indicative of cannabis (i.e., skunk, pot, mercaptan) found in any of the four downwind samples. Increasing wind movement and turbulence appears to provide superior mixing and the system is functioning very well in achieving the desired odor mitigation.

VOC Testing Summary: During the odor sampling exercise, SCS also captured coincidental VOC samples in real-time utilizing a handheld MiniRae 3000 Photo-Ionization Detector (PID) throughout the greenhouse cultivation spaces, surrounding property, and at targeted locations in proximity to Byer's equipment with the potential to create elevated VOC levels. Additionally, during the July odor sampling event SCS captured a series of seven (7) air samples utilizing SUMMA vacuum canisters. These canisters were sent to an independent laboratory operated by Atmospheric Analysis & Consulting, Inc. for analysis in accordance with EPA Method TO-15 for VOCs.

Table 1- VOC Measurements

	Inside Greenhouse	Byers Output	Inside Greenhouse	Sample Taken Outside Greenhouses				Reg. Thresholds	
Sample ID	**VOC-1**	**VOC-2**	**VOC-3**	**VOC-4**	**VOC-5**	**VOC-6**	**VOC-7**	**NIOSH REL**	**OSHA PEL**
Ethanol	13.7	ND	2.74	ND	7.02	ND	ND		**1,000,000**
2-Methylbutane	0.57	ND	ND	ND	2.22	ND	ND	**120,000**	**1,000,000**
1-Propanol	ND	ND	ND	ND	1.93	ND	ND	**200,000**	**200,000**
2-Methylpentane	ND	ND	ND	ND	1.33	ND	ND	**100,000**	-
3-Methylpentane	ND	ND	ND	ND	0.75	ND	ND	**100,000**	-
Methylcyclopentane	ND	ND	ND	ND	0.69	ND	ND	**400,000**	**500,000**
alpha-Pinene	4.04	95.5	1.6	ND	ND	ND	ND		**100,000**

***All units listed are parts per billion (ppb).**

Final Conclusions/Recommendations: Based upon this Cresco Project Site Case Study, SCS' findings conclude that the odor neutralizing vapor system was:

- Upon initial testing the system was struggling to provide sufficient odor neutralizing effect during early-morning calm wind periods, presumably due to a lack of air turbulence to drive proper mixing between the odorous mass and surrounding vapor. However, due to the lack of air movement there was also insufficient wind speed need to drive the remaining odors to offsite receptors.
- In transitional and steady wind states in both rounds of testing, the system adequately demonstrated an ability to mitigate odors prior to reaching offsite, downwind receptors.
- Implementation of SCS' recommendations for adjustments in greenhouse venting timing/methodology and installation of carbon scrubbers to assist in odor control at processing areas appears to have assisted the performance of the overall system.
- Testing in the second round (September 25th) showed consistent performance of the system and its ability to mitigate odors back to baseline levels before reaching offsite receptors.
- The percentage of odor mitigation beyond 200-feet from the cannabis odor source ranged from 89% to 97% in the first round of testing and improved to 99% in the second round of

testing after Cresco implemented the recommended facility adjustments. Given that offsite receptors are a minimum of 350-feet from the Project facilities, the combination of the Byers/Ecosorb System and the remaining distance allowed for dispersion and dilution make for a consistent and effective odor mitigation solution for this Project Site.

- Based on the multitude of VOC samples taken, most results had such negligible presence of VOCs the lab analytical testing could not reach the detectable levels. In the single sample which did register VOCs, the VOCs detected do not appear to be related to cannabis operations or the Byer's System as no other samples taken much closer to those sources registered those same compounds. Regardless of the source, these detected VOCs were orders of magnitudes below the Permissible Exposure Levels (PELs). Based on this testing, there is no evidence that the Ecosorb vapor, cannabis cultivation, or combination of onsite activities are capable of producing hazardous levels of VOCs.

SCS will continue to work with the cannabis industry to implement environmental solutions, including evolving odor management technology. Our staff are available as a resource should the Commission have additional questions and concerns regarding odor management in the region. We have appended a complimentary slide deck to this memorandum for a graphical illustration of this case study analysis.

Sincerely,

Nathan Eady
Land Use Planner/Project Director

Paul Schafer
Air Quality Specialist/Project Director

Attachments

Attachment 1- Odor Sampling Exhibit Summary
Attachment 2- Laboratory Analytical Data

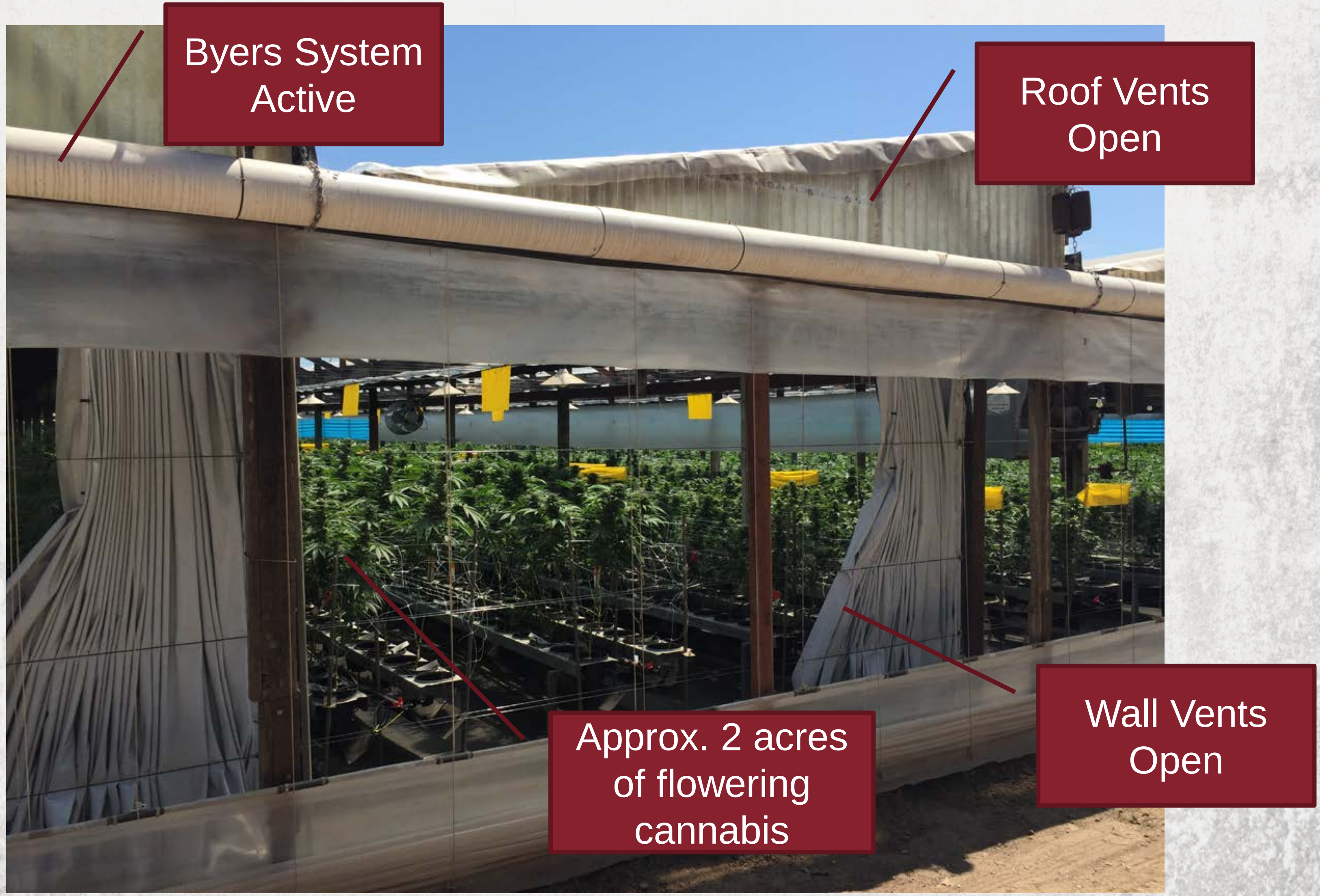
Attachment 1- Odor Sampling Exhibit Summary

CRESCO AIR QUALITY SAMPLING
METHODOLOGY & RESULTS

SCS TRACER ENVIRONMENTAL

September 2019

METHODOLOGY
SAMPLING CONDITIONS ON-SITE



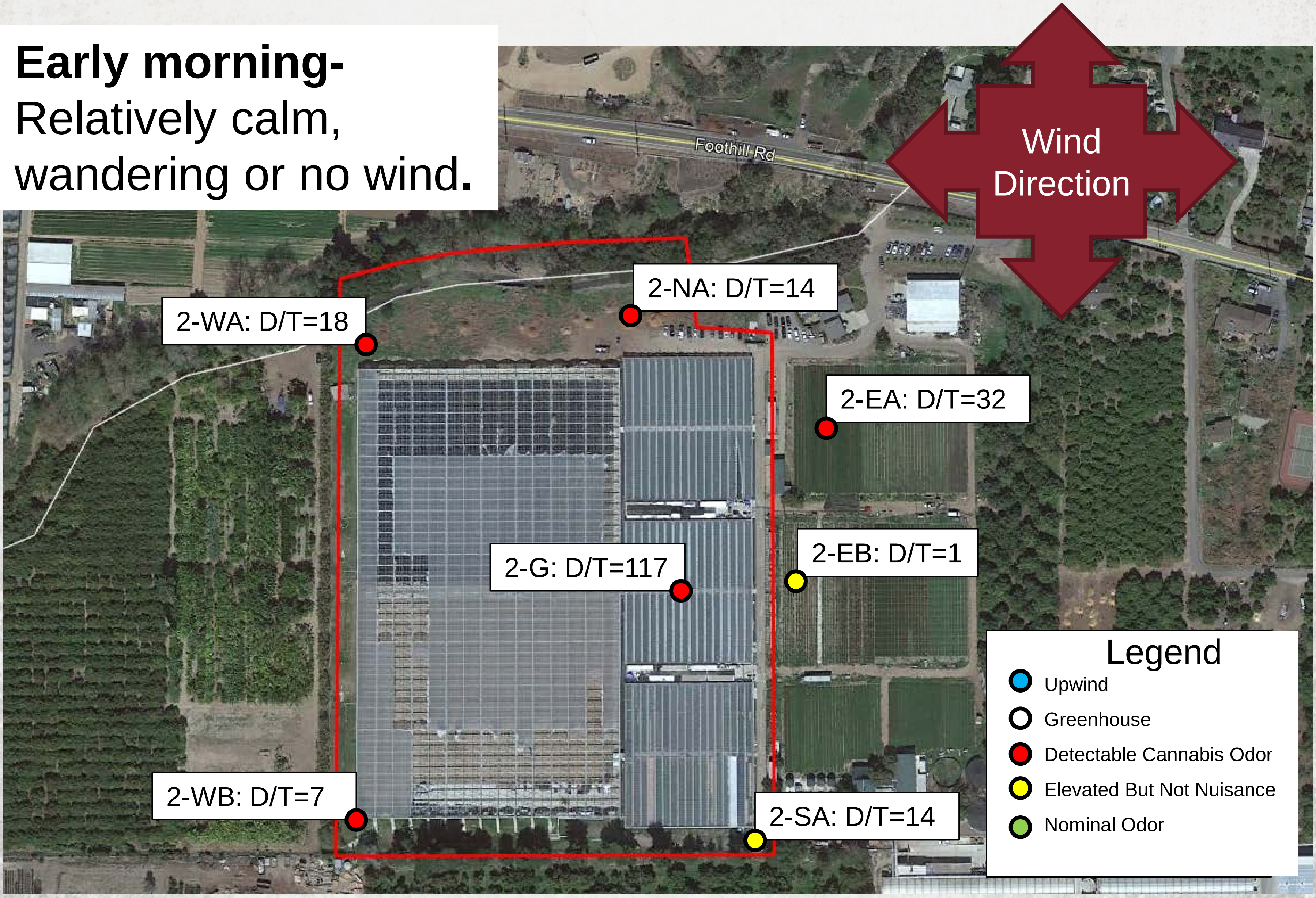
METHODOLOGY
SAMPLING CONDITIONS ON-SITE

PHASE 1 TESTING
JULY 2ND & 5TH, 2019
RESULTS PRIOR TO RECOMMENDATIONS

AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled:
7/2/2019

Early morning-
Relatively calm,
wandering or no wind.



AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled: 7/2/2019

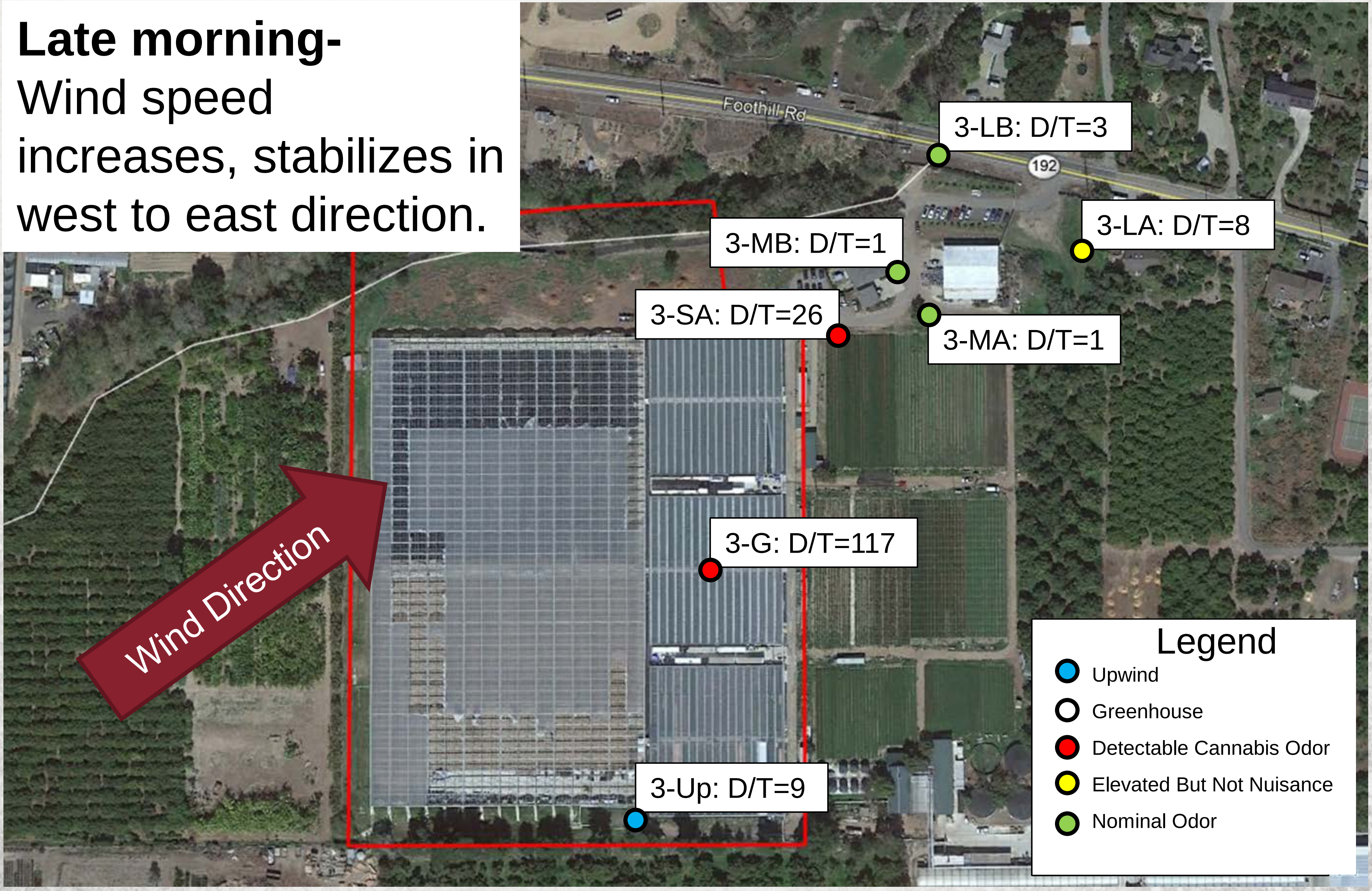
Early morning- Relatively calm, wandering or no wind.

In Greenhouse Net Concentration & Character (Inferred 9 D/T Baseline)	Short-Range (less than 20-50 feet) Net Concentration & Character (Inferred 9 D/T Baseline)		Long-Range (Approx. 400 feet) Net Concentration & Character (Inferred 9 D/T Baseline)
117 Skunk, mercaptan	**1** Sour, mercaptan, skunk, stale, plastic, exhaust	**32** Sour, manure, skunk, mercaptan, rotten cabbage, garbage, oniony, garlic, rubber band, plastic, exhaust	**18** Sour, rotten garbage, skunk, mercaptan, sewage, plastic, exhaust
	14 Sour, rotten grass, mercaptan, skunk, rotten vegetables, manure, burnt rubber, plastic, exhaust	**14** Sour, wet paper, rotten vegetables, green leaves, wet grass, watermelon rind, plastic	**7** Sour, skunk, mercaptan, sulfur, sewage, rubber, vegetation, sour milk, plastic, exhaust

AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled:
7/2/2019

Late morning-
Wind speed increases, stabilizes in west to east direction.



AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled: 7/2/2019

Late morning-
Wind speed increases, stabilizes in west to east direction.

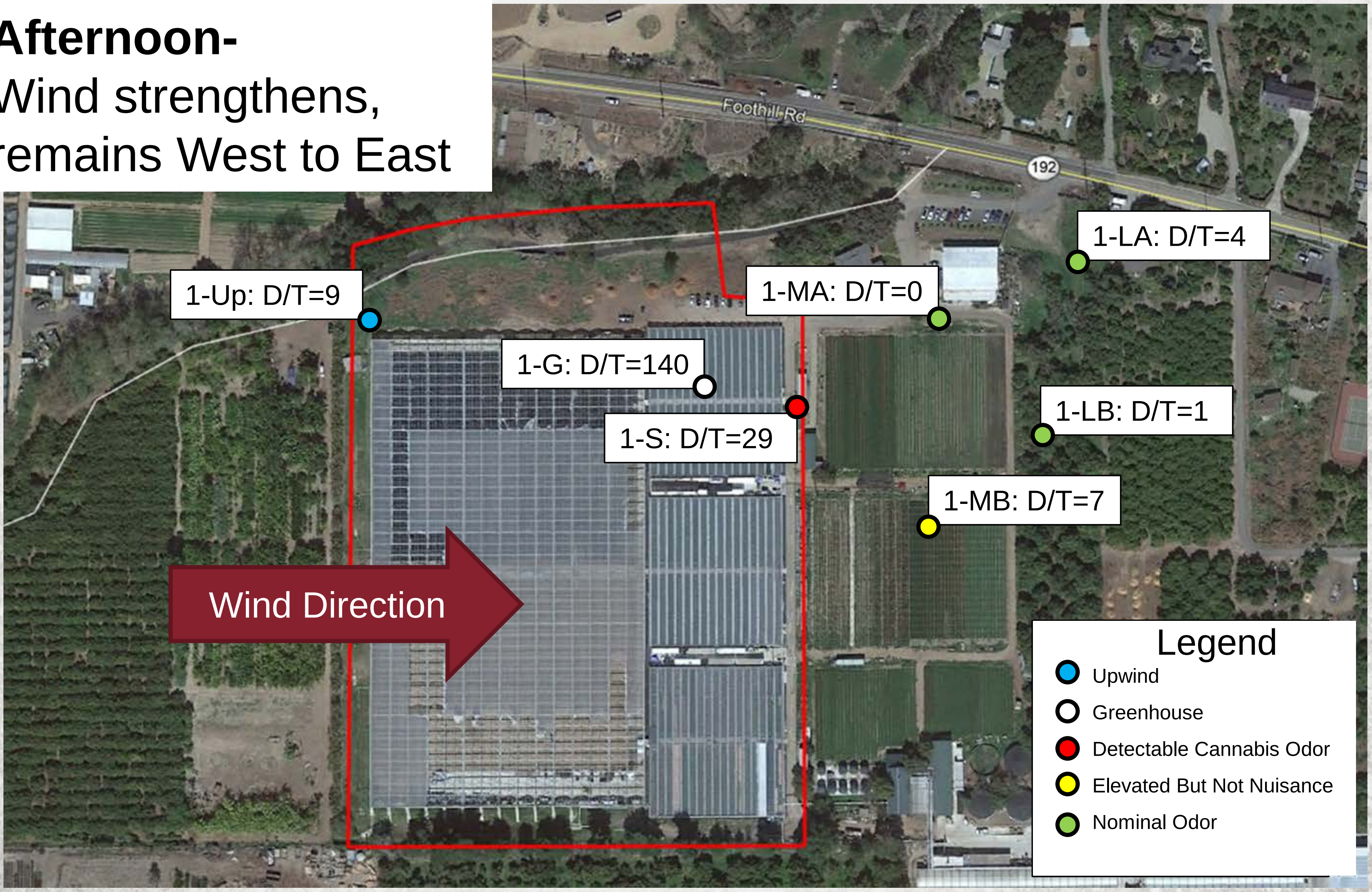
Wind Direction

Baseline/Upwind Concentration & Character	In Greenhouse Net Concentration Increase & Character	Short-Range (50 feet) Net Concentration Increase & Character	Medium-Range (Approx. 200 feet) Net Concentration Increase & Character	Long-Range (Approx. 400-500 feet) Net Concentration Increase & Character
9 Sour, stale, cardboard, vegetation, oily, plastic, exhaust	**117** Sour sewage, mercaptan, skunk, burnt coffee grounds, burnt rubber, plastic	**26** Sour, sewage, mercaptan, skunk, vegetation, milky, plastic	**1** Sour, plastic, mercaptan, rubber, milky, exhaust	**8** Sour, stale, wet cardboard, paper, garbage, vegetation, milk, plastic, exhaust
			1 Sour, plastic, sewage, mercaptan, rubber, milky, exhaust	**3** Sour, plastic, sulfur, burnt match, gasoline, propane, milky, exhaust, vegetation, garbage, plastic, wet cardboard

AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled:
7/1/2019

Afternoon-
Wind strengthens, remains West to East



AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled:
7/1/2019

Afternoon-
Wind strengthens, remains West to East

Wind Direction

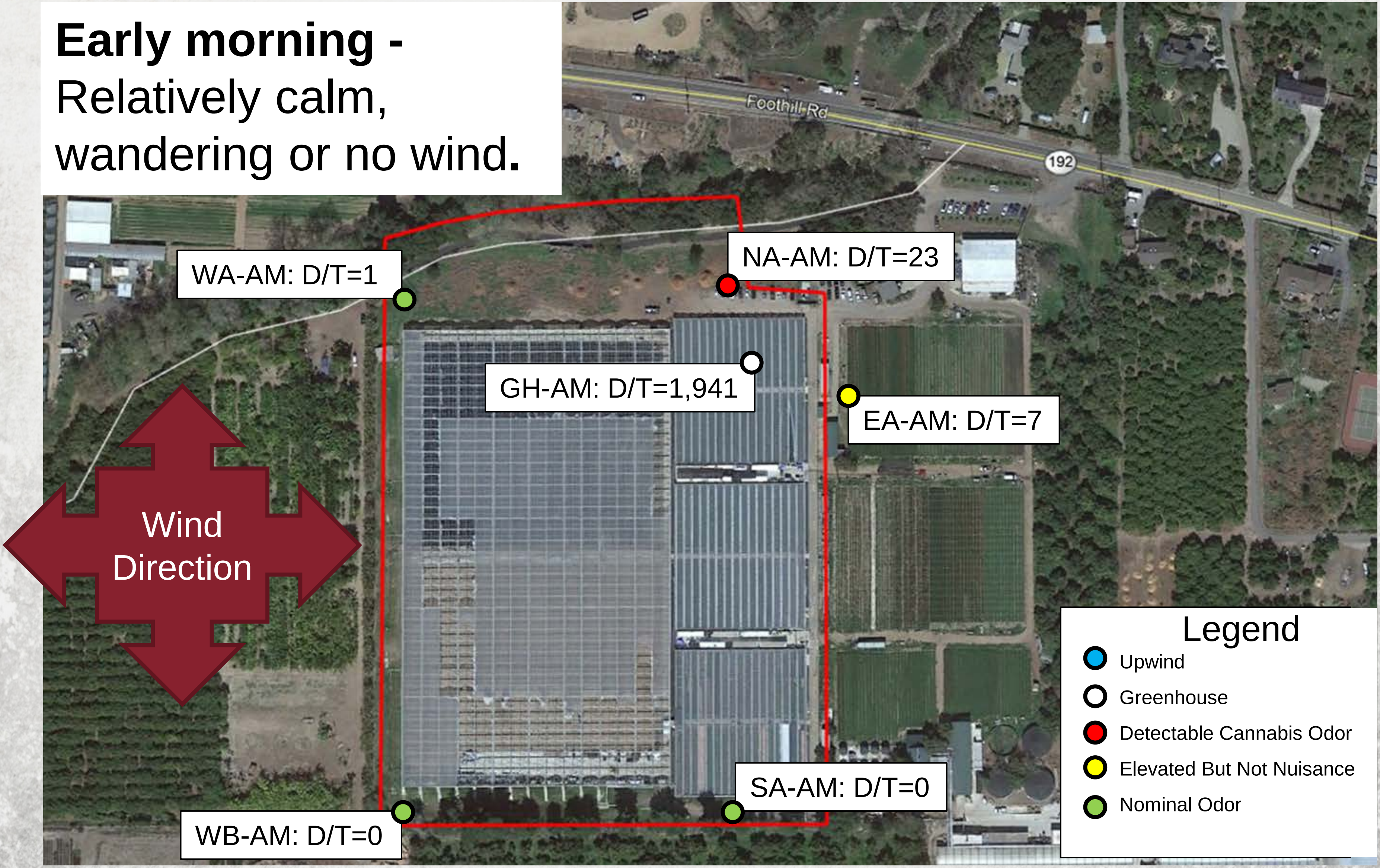
<table>
<tr><th>Baseline/Upwind Concentration and Character</th><th>In Greenhouse Net Concentration & Character</th><th>Short-Range (less than 20 feet) Net Concentration & Character</th><th>Medium-Range (Approx. 200 feet) Net Concentration & Character</th><th>Long-Range (Approx. 500 feet) Net Concentration & Character</th></tr>
<tr><td rowspan="2">9
Sour, stale, plastic, sweet, milky, rubber, vegetation, lemon</td><td rowspan="2">140
Rotten cabbage, mercaptin, oniony, skunky, sour garbage, earthy</td><td rowspan="2">29
Sour, stagnant water, mercaptin, rotten cabbage, skunk, garbage, milk, plastic</td><td>0
Sour, rotten garbage, plastic, burnt, rubber, milky, exhaust</td><td>4
Stale, plastic, vegetation, sweet, milky, rubber, sewage</td></tr>
<tr><td>7
Sour, sewage, plastic, burnt, rubber, sweet, milk, vegetation, exhaust</td><td>1
Sour, stale, plastic, milky, vegetation, rubber, exhaust</td></tr>
</table>

PHASE 2 TESTING
SEPTEMBER 25, 2019
RESULTS AFTER RECOMMENDATIONS IMPLEMENTED

AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled:
9/25/2019

Early morning - Relatively calm, wandering or no wind.



AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled: 9/25/2019

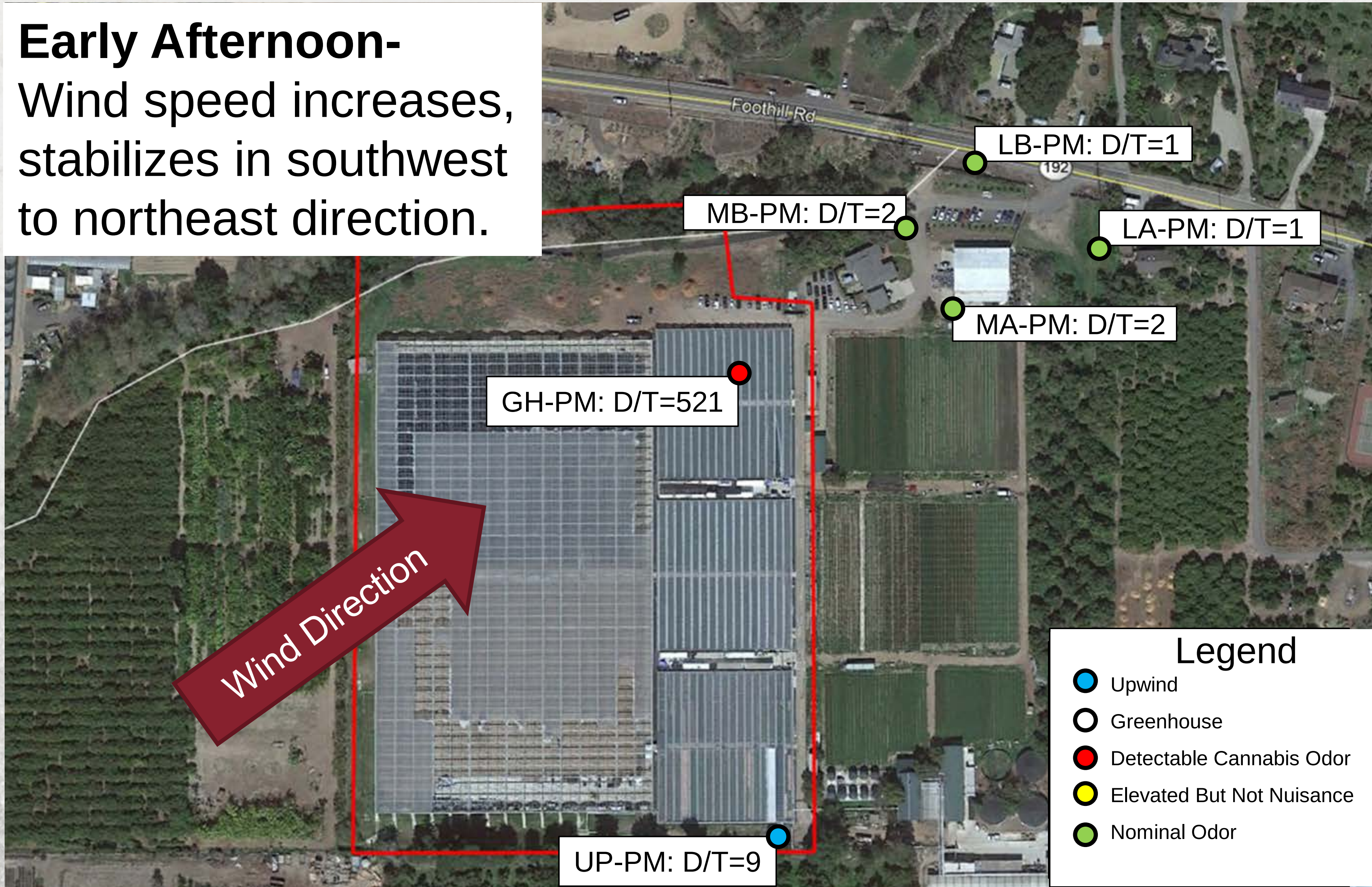
Early morning- Relatively calm, wandering or no wind.

Baseline = 9 (based off afternoon wind)

<table>
<tr><th>In Greenhouse
Net Concentration & Character</th><th>Short-Range
(31 feet and 55 feet)
Net Concentration & Character</th><th>Medium Range
(Approximately 275 feet)
Net Concentration & Character</th><th>Long-Range
(415 feet and 473)
Net Concentration & Character</th></tr>
<tr><td rowspan="2">1,941
skunk, “weed/pot”, sour, exhaust</td><td>23
skunk, burnt, “weed/pot”, manure-like, burnt rubber, mercaptan, oily, stale, plastic</td><td rowspan="2">0
sour, wet/dry cardboard, printing paper, dead grass, stale, vegetation, glue, plastic</td><td>0
sour, wet cardboard, swampy, oily, vegetation, glue, stale, plastic, exhaust</td></tr>
<tr><td>7
burnt skunk/rubber, skunk-like, mercaptan, oily, stale food, wet cardboard, exhaust</td><td>1
sour, stale, cardboard, inner tube, swampy, rubber tires, oily, sour vegetation, plastic</td></tr>
</table>

AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled: 9/25/2019



AIR SAMPLING RESULTS
ODOR CONCENTRATION AND CHARACTER

Sampled:
9/25/2019

Wind Direction

Early Afternoon - Wind speed increases, stabilizes in west to east direction.

Baseline/Upwind Concentration & Character	In Greenhouse Net Concentration Increase & Character	Medium-Range (Approx. 198 feet and 232 feet) Net Concentration Increase & Character	Long-Range (Approx. 325 feet and 465 feet) Net Concentration Increase & Character
9 musty, stale, wet cardboard, plastic, exhaust	**521** skunk, "weed/pot", burnt "weed", exhaust	**2** sour, cardboard, swampy, stale, vegetation, fresh grass, oily, plastic, exhaust	**1** sour, cardboard, vegetation, stale, plastic, exhaust
		2 sour, wet/dry cardboard, wet paper, stale, vegetation, glue, plastic, exhaust	**1** sour, musty, stale, vegetation, glue, plastic, exhaust

AIR SAMPLING RESULTS

VOC SUMMARY

All Units are Parts Per Billion (PPB)

	Inside Greenhouse	Beyers Output	Inside Greenhouse						
Sample ID	**VOC-1**	**VOC-2**	**VOC-3**	**VOC-4**	**VOC-5**	**VOC-6**	**VOC-7**	**NIOSH REL**	**OSHA PEL**
Ethanol	13.7	ND	2.74	ND	7.02	ND	ND	**1,000,000**	
2-Methylbutane	0.57	ND	ND	ND	2.22	ND	ND	**120,000**	**1,000,000**
1-Propanol	ND	ND	ND	ND	1.93	ND	ND	**200,000**	**200,000**
2-Methylpentane	ND	ND	ND	ND	1.33	ND	ND	**100,000**	**-**
3-Methylpentane	ND	ND	ND	ND	0.75	ND	ND	**100,000**	**-**
Methylcyclopentane	ND	ND	ND	ND	0.69	ND	ND	**400,000**	**500,000**
alpha-Pinene	4.04	95.5	1.6	ND	ND	ND	ND	**100,000**	

AIR SAMPLING RESULTS
VOLUME OF VOCS AND HEALTH/ENVIRONMENTAL IMPACTS

All Units are Parts Per Billion (PPB)

Sample ID	Inside Greenhous e	Beyers Output	Inside Greenhouse	VOC-4	VOC-5	VOC-6	VOC-7
alpha-Pinene	4.04	95.5	1.6	ND	ND	ND	ND
beta-Myrcene	27.7	28.8	14.6	1.73	ND	ND	ND
1-Methyl-4-(1-methylethyl)-7-oxabicyclo[2.2.1]heptane	ND	22.6	ND	ND	ND	ND	ND
1-Methyl-(1-methylethyl)-benzene	ND	63.1	0.75	ND	ND	ND	ND
D-Limonene	7.34	189	2.84	0.53	ND	ND	ND
1-Methyl-4-(1-methylethylidene)-cyclohexene	12.9	60.3	5.45	0.49	ND	ND	ND
Total Non-Methane Hydro Carbons (TNMHC)	**196**	**171**	**146**	**29.3**	**65.3**	**10.2**	**10.4**

Formaldehyde- OSHA
Permissible Exposure Level (PEL) of 750 ppb; Action Level of 500 ppb

Attachment 2- Laboratory Analytical Data

O S&E
www.odorscience.com

Odor Science & Engineering, Inc.
105 Filley Street, Bloomfield, CT 06002
(860) 243-9380 Fax: (860) 243-9431

July 10, 2019

Paul Schafer
SCS Tracer Environmental
5963 LaPlace Court
Suite 207
Carlsbad, CA 92008

PSchafer@scsengineers.com

RE: Odor Panel Analysis – July 2nd & 5th, 2019
OS&E Project No. 2116-M-00
SCS Tracer Sampling Site: CARP

Dear Paul:

This letter presents the results of the recent odor panel analyses conducted by Odor Science & Engineering, Inc. (OS&E) for SCS Tracer Environmental. A total of twenty one (21) odor emission samples were collected over a two-day period (July 1st & 2nd, 2019) by on-site SCS personnel. The odor samples were collected into preconditioned Tedlar gas sampling bags provided by OS&E. Each day following sample collection, the sample bags were shipped via UPS Overnight to OS&E's Olfactory Laboratory in Bloomfield, CT for sensory analysis the next day. The first set (7 samples) were collected on Monday, July 1st and arrived for analysis on Tuesday, July 2nd. Due to a shipping error the samples collected on Tuesday, July2nd did not arrive to OS&E until Friday July 3rd (due to the July 4th holiday). **These samples were beyond the normal 30 hour hold time, but were analyzed upon delivery per authorization from SCS**. Each day the samples arrived intact with a chain of custody requesting sensory analysis attached.

Upon arrival the samples were analyzed by dynamic dilution olfactometry using a trained and screened odor panel of 8 members. The odor panelists were chosen from OS&E's pool of panelists from the Greater Hartford area who actively participate in ongoing olfactory research and represent an average to above average sensitivity when compared to a large population. The samples were quantified in terms of dilution-to-threshold (D/T) ratio and odor intensity in accordance with ASTM Methods E-679-04 and E-544-10, respectively. The odor panelists were also asked to describe the odor character of the samples at varying dilution levels. The odor panel methodology is further described in Attachment A.

The results of the odor panel tests are presented in the attached Tables 1and 2.

We appreciate the opportunity to be of continued service to SCS Tracer Environmental. Please feel free to call Martha O'Brien or me if you have any questions concerning these results.

Sincerely,
ODOR SCIENCE & ENGINEERING, INC.

Gary K. Grumley
Associate Scientist

Table 1. Results of dynamic dilution olfactometry analysis – July 2nd, 2019
SCS Tracer Environmental – Sampling Site: CARP
OS&E Project No. 2116-M-00

Date	Time	Sample ID	Odor Conc. D/T[(1)]	Stevens' Law Constants[(2)] a	Stevens' Law Constants[(2)] b	Odor Character[(3)]
7/01/2019	15:00	1-MB	16	--	--	sour, sewage, H_2S, plastic, burnt, rubber, sweet, milk, vegetation, exhaust
7/01/2019	15:16	1-MA	9	--	--	sour, rotten garbage/vegetation, plastic, burnt, rubber, milky, exhaust
7/01/2019	15:12	1-G	149	.48	.65	rotten cabbage/mercaptan, oniony, skunky, sour garbage, earthy
7/01/2019	15:07	1-S	38	.62	.68	sour, stagnant water, mercaptan, rotten greens/cabbage, skunk, garbage, milk, plastic
7/01/2019	15:00	1-U	9	--	--	sour, stale, plastic, sweet, milky, rubber, vegetation, lemon
7/01/2019	15:17	1-LA	13	--	--	stale, plastic, vegetation, sweet, milky, rubber, sewage
7/01/2019	15:00	1-LB	10	--	--	sour, stale plastic, milky, vegetation, rubber, exhaust

1. D/T = dilutions-to-threshold
2. Stevens' Law correlates odor concentration (C) and odor intensity (I): $I = aC^b$. The constants a and b were determined by regression analysis based on the intensity ratings of the odor panel at varying dilution levels. I = 0-8 (based on the n-butanol intensity scale), C = odor concentration (D/T) typical of ambient odor levels.
3. Summary of all odor character descriptors used by the odor panelists at varying dilution levels.

-- Sample D/T too low for dose response calculations

Table 2. Results of dynamic dilution olfactometry analysis – July 5th, 2019
SCS Tracer Environmental – Sampling Site: CARP
OS&E Project No. 2116-M-00

Date	Time	Sample ID	Odor Conc. D/T[(1)]*	Stevens' Law Constants[(2)] a	Stevens' Law Constants[(2)] b	Odor Character[(3)]
7/02/19	10:35	3-M-A	10	--	--	sour, plastic, mercaptan, rubber, milky, exhaust
7/02/19	10:38	3-M-B	10	--	--	sour, plastic, sewage, mercaptan, rubber, milky, exhaust
7/02/19	10:43	3-LB	12	--	--	sour, plastic, sulfur, burnt match, gasoline, propane, milky, exhaust, vegetation, garbage, plastic, wet cardboard, exhaust
7/02/19	07:45	2-E-A	41	.41	.71	sour, manure, skunk, mercaptan, rotten cabbage/garbage, oniony, garlic, rubber band, plastic, exhaust
7/02/19	07:51	2-E-B	10	--	--	sour, mercaptan, skunk, stale, plastic, exhaust
7/02/19	07:56	2-SA	23	.55	.85	sour, wet paper magazine, rotten vegetables, green leaves, wet grass, watermelon rind, plastic
7/02/19	07:58	2-G	126	.53	.89	skunk, mercaptan
7/02/19	07:45	2-WA	27	.48	.79	sour, rotten garbage, skunk, mercaptan, sewage, plastic, exhaust
7/02/19	07:51	2-N-A	23	.37	.82	sour, rotten grass, mercaptan, skunk, rotten vegetables, manure, burnt rubber, plastic, exhaust
7/02/19	07:45	2-W-B	16	--	--	sour, skunk, mercaptan, sulfur, sewage, rubber, vegetation, sour milk, plastic, exhaust
7/02/19	10:43	3-L-A	17	--	--	sour, stale, wet cardboard, paper, garbage, vegetation, milk, plastic, exhaust
7/02/19	10:35	3-UP	9	--	--	sour, stale, cardboard, vegetation, oily, plastic, exhaust
7/02/19	10:43	3-G	126	.45	.77	sour sewage, mercaptan, skunk, burnt coffee grounds, burnt rubber, plastic
7/02/19	10:35	3-S-A	35	.39	.83	sour, sewage, mercaptan, skunk, vegetation, milky, plastic

1. D/T = dilutions-to-threshold
2. Stevens' Law correlates odor concentration (C) and odor intensity (I): $I = aC^b$. The constants a and b were determined by regression analysis based on the intensity ratings of the odor panel at varying dilution levels. I = 0-8 (based on the n-butanol intensity scale), C = odor concentration (D/T) typical of ambient odor levels.
3. Summary of all odor character descriptors used by the odor panelists at varying dilution levels.

-- Sample D/T too low for dose response calculations

***** Samples over the normal 30 hour hold time

O S&E

www.odorscience.com

Odor Science & Engineering, Inc.
~~105 Filley Street, Bloomfield, CT 06002~~ 1350 Blue Hills Ave Bloomfield, CT 06002
(860) 243-9380 Fax: (860) 243-9431

Chain of Custody Record

Project Name	Project Number	ANALYSES	Project No.
CARP ODOR			
Project Location	**Client Project No.**		
CARP			

Contact Person	Sampler (Signature)	P.O. No.
Martha OBrien	[signature]	

Sample Identification No.	Date	Time	Lab Sample No.	Type of Sample	E-679-04	E-544-10					Expected Turnaround Time	Remarks
1-MB	07/01	1500		Air	x	x						
1-MA	"	1516		"	x	x						
1-G	"	1512		"	x	x						
1-S	"	1507		"	x	x						
1-U	"	1500		"	x	x						
1-LA	"	1517		"	x	x						
1-LB	"	1500		"	x	x						

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	07/01	1528	[signature] G. Gurley	7/2/19	11:39
Relinquished by: (Signature)	**Date**	**Time**	**Received by: (Signature)**	**Date**	**Time**
Relinquished by: (Signature)	**Date**	**Time**	**Received by: (Signature)**	**Date**	**Time**

Disposal Method			Comments:
Disposed by: (Signature)	**Date**	**Time**	

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Chain of Custody Record

Project Name: CARP ODOR	Project Number:	Project No.
Project Location: CARP	Client Project No.: CARP ODOR	
Contact Person: Martha O'Brien	Sampler (Signature): [signature]	P.O. No.

Sample Identification No.	Date	Time	Lab Sample No.	Type of Sample	ASTM E-679-04	E-544-10					Expected Turnaround Time	Remarks
3-M-A	07/02	1035		air	x	x						
3-M-B	"	1038		"	x	x						
3-LB	"	1043		"	x	x						
2-E-A	"	0745		"	x	x						
2-E-B	"	0751		"	x	x						
2-SA	"	0756		"	x	x						
2-G	"	0758		"	x	x						
2-WA	"	0745		"	x	x						
2-N-A	"	0751		"	x	x						
2-W-B	"	0745		"	x	x						
3-L-A	"	1043		"	x	x						

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	07/02	1353	[signature] G. G...	7/5/19	10:06

Disposal Method		Comments:
Disposed by: (Signature)	Date	Time

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Chain of Custody Record

Project Name: CARP ODOR	Project Number:	ANALYSES	Project No.
Project Location: CARP	Client Project No.: CARP ODOR		
Contact Person: Martha O'Brien	Sampler (Signature): [signature]	P.O. No.	

Sample Identification No.	Date	Time	Lab Sample No.	Type of Sample	ASTM E-679-04	E-544-10					Expected Turnaround Time	Remarks
·3 – UP	07/02	10:35		air	x	x						
·3 – G	07/02	10:43		air	x	x						
·3 – S – A	07/02	10:35		air	x	x						

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	07/02	1353	[signature]	7/5/19	10:06

Disposal Method:

Disposed by: (Signature) | Date | Time

Comments:

ATTACHMENT A
Odor Science & Engineering, Inc.
Odor Panel Methodology

Measurement of Odor Levels by Dynamic Dilution Olfactometry

Odor concentration is defined as the dilution of an odor sample with odor-free air, at which only a specified percent of an odor panel, typically 50%, will detect the odor. This point represents odor threshold and is expressed in terms of "dilutions-to-threshold" (D/T).

Odor concentration was determined by means of OS&E's forced choice dynamic dilution olfactometer. The members of the panel who have been screened for their olfactory sensitivity and their ability to match odor intensities, have participated in on-going olfactory research at OS&E for a number of years.

In olfactometry, known dilutions of the odor sample were prepared by mixing a stream of odor-free air with a stream of the odor sample. The odor-free air is generated in-situ by passing the air from a compressor pump through a bed of activated charcoal and a potassium permanganate medium for purification. A portion of the odor free air is diverted into two sniff ports for direct presentation to a panelist who compares them with the diluted odor sample.

Another portion of the odor-free air is mixed in a known ratio with the odor from the sample bag and is then introduced into the third sniff port. A panelist is thus presented with three identical sniff ports, two of which provide a stream of odor-free air and the third one a known dilution of the odor sample. Unaware of which is which, the panelist is asked to identify the sniff port which is different from the other two, i.e., which contains the odor. The flow rate at all three nose cups is maintained at 3 liters per minute.

The analysis starts at high odor dilutions. Odor concentration in each subsequent evaluation is increased by a factor of 2. Initially a panelist is unlikely to correctly identify the sniff port which contains an odor. As the concentration increases, the likelihood of error is reduced and at one point the response at every subsequently higher concentration becomes consistently correct. The lowest odor concentration at which this consistency is first noticed, represents the **detection odor threshold** for that panelist.

As the odor concentration is increased further in the subsequent steps, the panelist becomes aware of the odor character, i.e. becomes able to differentiate the analyzed odor from other odors. The lowest odor concentration at which odor differentiation first becomes possible, represent the **recognition odor threshold** for the panelist. Essentially all of OS&E's work is done with recognition odor threshold. By definition the threshold odor is equal to 1 D/T (i.e. the volume of odorous air after dilution divided by the volume before dilution equals one).

The panelists typically arrive at threshold values at different concentrations. To interpret the data statistically, the geometric mean of the individual panelist's thresholds is calculated.

The olfactometer and the odor presentation procedure meet the recommendations of ASTM Standard Practice for Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Concentration Series of Limits (ASTM E679-04). The analysis was carried out in the OS&E Olfactory Laboratory in Bloomfield, Connecticut.

Odor Intensity

Odor intensity is determined using reference sample method with n-butanol as the reference compound (ASTM Method E-544-10). The n-butanol odor intensity scale is based on n-butanol vapor as odorant at eight concentrations. The concentration increases by a factor of two at each intensity step, starting with approximately 15 ppm at step 1.

Odors of widely different types can be compared on that scale just like the intensities of the lights of different colors can be compared to the intensity of standard, e.g. white light. Odor character and hedonic tone are ignored in that comparison. Odor intensities are routinely measured as part of the dynamic dilution olfactometry measurements. The n-butanol vapor samples are presented to the panelists in closed jars containing the standard solutions of n-butanol in distilled water. The vapor pressure above the butanol solutions corresponds to the steps on the n-butanol scale. To observe the odor intensity, a panelist opens the jar and sniffs the air above the liquid. The panelist then closes the jar so that the equilibrium vapor pressure of butanol can be re-established before the next panelist uses the jar. The odor in the jar is compared with unknown odor present at the olfactometer sniff port.

The relationship between odor concentration and intensity can be expressed as a psychophysical power function also known as Steven's law (Dose-Response Function). The function is of the form:

$$I = aC^b$$

where:

I = odor intensity on the butanol scale
C = the odor level in dilution-to-threshold ratio (D/T)
a,b = constants specific for each odor

The major significance of the dose-response function in odor control work is that it determines the rate at which odor intensity decreases as the odor concentration is reduced (either by atmospheric dispersion or by an odor control device).

Odor emissions are used as input to an odor dispersion model, which predicts odor impacts downwind under a variety of meteorological conditions. Whether or not an odor is judged objectionable depends primarily in its intensity. The dose-response constants are used to convert predicted ambient odor concentration to intensity levels. OS&E experience has shown that odors are almost universally considered objectionable when their intensity is 3 or higher on the 8-point n-butanol scale. In general, the lower the intensity, the lower the probability of complaints.

Odor Character Description

Odor character refers to our ability to recognize the similarity of odors. It allows us to distinguish odors of different substances on the basis of experience. We use three types of descriptors, general such as “sweet”, “pungent”, “acrid”, etc. or specific references to its source such as “orange”, “skunk”, “paint”, “sewage”, etc., or to a specific chemical, e.g. “methyl mercaptan”, “butyric acid”, or “cyclohexane”. In the course of the dynamic dilution olfactometry measurements, the odor panelists are asked to describe the character of the odors they detect.

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105 Filley Street, Bloomfield, CT 06002
(860) 243-9380 Fax: (860) 243-9431

October 1, 2019

Paul Schafer
SCS Engineers
5963 LaPlace Court
Suite 207
Carlsbad, CA 92008

PSchafer@scsengineers.com

RE: Odor Panel Analysis – September 26, 2019
OS&E Project No. 2160-M-00
SCS Sampling Site: CARP

Dear Paul:

This letter presents the results of the recent odor panel analyses conducted by Odor Science & Engineering, Inc. (OS&E) for SCS Engineers. A total of twelve (12) odor emission samples were collected on September 25th, 2019 by on-site SCS personnel. The odor samples were collected into Tedlar gas sampling bags provided by OS&E. Following sample collection, the sample bags were shipped via UPS Overnight to OS&E's Olfactory Laboratory in Bloomfield, CT for sensory analysis the next day. The samples arrived intact with a chain of custody requesting sensory analysis attached.

Upon arrival the samples were analyzed by dynamic dilution olfactometry using a trained and screened odor panel of 8 members. The odor panelists were chosen from OS&E's pool of panelists from the Greater Hartford area who actively participate in ongoing olfactory research and represent an average to above average sensitivity when compared to a large population. The samples were quantified in terms of dilution-to-threshold (D/T) ratio and odor intensity in accordance with ASTM Methods E-679-04 and E-544-10, respectively. The odor panelists were also asked to describe the odor character of the samples at varying dilution levels. The odor panel methodology is further described in Attachment A.

The results of the odor panel tests are presented in the attached Table.

We appreciate the opportunity to be of continued service to SCS Engineers. Please feel free to call Martha O'Brien or me if you have any questions concerning these results.

Sincerely,
ODOR SCIENCE & ENGINEERING, INC.

Gary K. Grumley

Gary K. Grumley
Associate Scientist

Table 1. Results of dynamic dilution olfactometry analysis – September 26th, 2019 SCS Engineers – Sampling Site: CARP OS&E Project No. 2160-M-00						
			Odor Conc.	Stevens' Law Constants[2]		Odor Character[3]
Date	Time	Sample ID	D/T[1]	a	b	
9/25/2019	08:29	GH-AM	1,950	.54	.78	skunk, "weed/pot", sour, exhaust
9/25/2019	08:20	WA-AM	10	--	--	sour, stale, cardboard, inner tube, swampy, rubber tires, oily, sour vegetation, plastic
9/25/2019	08:35	NA-AM	32	.42	.80	skunk, burnt, "weed/pot", manure-like, burnt rubber, mercaptan, oily, stale, plastic
9/25/2019	08:36	EA-AM	16	--	--	burnt skunk/rubber, skunk-like, mercaptan, oily, stale food, wet cardboard, exhaust
9/25/2019	08:27	SA-AM	9	--	--	sour, wet/dry cardboard, printing paper, dead grass, stale, vegetation, glue, plastic
9/25/2019	08:20	WB-AM	9	--	--	sour, wet cardboard, swampy, oily, vegetation, glue, stale, plastic, exhaust
9/25/2019	13:17	GH-PM	539	.53	.73	skunk, "weed/pot", burnt "weed", exhaust
9/25/2019	13:10	UP-PM	9	--	--	musty, stale, wet cardboard, plastic, exhaust
9/25/2019	13:14	LB-PM	10	--	--	sour, cardboard, vegetation, stale, plastic, exhaust
9/25/2019	13:21	LA-PM	10	--	--	sour, musty, stale, vegetation, glue, plastic, exhaust
9/25/2019	13:10	MB-PM	11	--	--	sour, cardboard, swampy, stale, vegetation, fresh grass, oily, plastic, exhaust
9/25/2019	13:23	MA-PM	11	--	--	sour, wet/dry cardboard, wet paper, stale, vegetation, glue, plastic, exhaust

1. D/T = dilutions-to-threshold
2. Stevens' Law correlates odor concentration (C) and odor intensity (I): $I = aC^b$. The constants a and b were determined by regression analysis based on the intensity ratings of the odor panel at varying dilution levels. I = 0-8 (based on the n-butanol intensity scale), C = odor concentration (D/T) typical of ambient odor levels.
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Atmospheric Analysis & Consulting, Inc.

CLIENT : SCS Engineers
PROJECT NAME : Carp Odor
AAC PROJECT NO. : 191056
REPORT DATE : 07/10/2019

On July 3, 2019, Atmospheric Analysis & Consulting, Inc. received seven (7) Six-Liter Summa Canisters for Volatile Organic Compounds and TICs analysis by EPA method TO-15. Upon receipt, each sample was assigned a unique Laboratory ID number as follows:

Client ID	Lab ID	Return Pressure (mmHga)
VOC-1	191056-119909	760.0
VOC-2	191056-119910	751.4
VOC-3	191056-119911	751.9
VOC-4	191056-119912	722.6
VOC-5	191056-119913	672.0
VOC-6	191056-119914	682.9
VOC-7	191056-119915	653.5

This analysis is accredited under the laboratory's ISO/IEC 17025:2005 accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation AT-1908. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No problems were encountered during receiving, preparation, and/or analysis of these samples.

The Technical Director or his/her designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 28 pages.

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT	: SCS Engineers		**DATE RECEIVED**	: 07/03/2019
PROJECT NO	: 191056		**DATE REPORTED**	: 07/10/2019
MATRIX	: AIR			
UNITS	: PPB (v/v)			

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	VOC-1			Sample Reporting Limit (SRL) (MRLxDF's)	VOC-2			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	191056-119909				191056-119910				
Date Sampled	07/02/2019				07/02/2019				
Date Analyzed	07/05/2019				07/05/2019				
Can Dilution Factor	1.34				1.35				
	Result	**Qualifier**	**Analysis DF**		**Result**	**Qualifier**	**Analysis DF**		
Chlorodifluoromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Propene	<SRL	U	1.0	1.3	<SRL	U	1.0	1.4	1.0
Dichlorodifluoromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Chloromethane	0.67		1.0	0.7	0.69		1.0	0.7	0.5
Dichlorotetrafluoroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Vinyl Chloride	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Methanol	72.9		1.0	6.7	10.4		1.0	6.8	5.0
1,3-Butadiene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Bromomethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Chloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Dichlorofluoromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Ethanol	13.7		1.0	2.7	<SRL	U	1.0	2.7	2.0
Vinyl Bromide	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Acetone	7.76		1.0	2.7	6.98		1.0	2.7	2.0
Trichlorofluoromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
2-Propanol (IPA)	7.78		1.0	2.7	28.6		1.0	2.7	2.0
Acrylonitrile	<SRL	U	1.0	1.3	<SRL	U	1.0	1.4	1.0
1,1-Dichloroethene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Methylene Chloride (DCM)	<SRL	U	1.0	1.3	<SRL	U	1.0	1.4	1.0
Allyl Chloride	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Carbon Disulfide	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Trichlorotrifluoroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
trans-1,2-Dichloroethene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,1-Dichloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Methyl Tert Butyl Ether (MTBE)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Vinyl Acetate	<SRL	U	1.0	1.3	<SRL	U	1.0	1.4	1.0
2-Butanone (MEK)	<SRL	U	1.0	1.3	<SRL	U	1.0	1.4	1.0
cis-1,2-Dichloroethene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Hexane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Chloroform	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Ethyl Acetate	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Tetrahydrofuran	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2-Dichloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,1,1-Trichloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : **SCS Engineers**
PROJECT NO : **191056**
MATRIX : **AIR**
UNITS : **PPB (v/v)**

DATE RECEIVED : **07/03/2019**
DATE REPORTED : **07/10/2019**

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	VOC-1			Sample Reporting Limit (SRL) (MRLxDF's)	VOC-2			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	191056-119909				191056-119910				
Date Sampled	07/02/2019				07/02/2019				
Date Analyzed	07/05/2019				07/05/2019				
Can Dilution Factor	1.34				1.35				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Benzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Carbon Tetrachloride	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Cyclohexane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2-Dichloropropane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Bromodichloromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,4-Dioxane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Trichloroethene (TCE)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
2,2,4-Trimethylpentane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Heptane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
cis-1,3-Dichloropropene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
4-Methyl-2-pentanone (MiBK)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
trans-1,3-Dichloropropene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,1,2-Trichloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Toluene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
2-Hexanone (MBK)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Dibromochloromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2-Dibromoethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Tetrachloroethene (PCE)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Chlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Ethylbenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
m & p-Xylenes	<SRL	U	1.0	1.3	<SRL	U	1.0	1.4	1.0
Bromoform	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Styrene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,1,2,2-Tetrachloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
o-Xylene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
4-Ethyltoluene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,3,5-Trimethylbenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2,4-Trimethylbenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,3-Dichlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,4-Dichlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2-Dichlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2,4-Trichlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Hexachlorobutadiene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
BFB-Surrogate Std. % Recovery	96%				97%				70-130%

U - Compound was analyzed for, but was not detected at or above the SRL.

Sucha Parmar, Ph.D.
Technical Director

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT	: SCS Engineers	DATE RECEIVED	: 07/03/2019
PROJECT NO	: 191056	DATE REPORTED	: 07/10/2019
MATRIX	: AIR		
UNITS	: PPB (v/v)		

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	VOC-1	
AAC ID	191056-119909	
Date Sampled	07/02/2019	
Date Analyzed	07/05/2019	
Can Dilution Factor	1.34	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Acetaldehyde	1.07	83
Unknown Hydrocarbon	0.73	NA
2-Methylbutane	0.57	83
Pentane	0.59	86
1,3-Pentadiene	0.47	72
.alpha.-Pinene	4.04	94
Camphene	0.44	91
.beta.-Myrcene	27.7	91
.alpha.-Phellandrene	0.60	90
3-Carene	0.56	97
D-Limonene	7.34	95
3,7-Dimethyl-1,3,6-octatriene	3.42	92
1-Methyl-4-(1-methylethylidene)-cyclohexene	12.9	98
BFB-Surrogate Std. % Recovery	96%	

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	VOC-2	
AAC ID	191056-119910	
Date Sampled	07/02/2019	
Date Analyzed	07/05/2019	
Can Dilution Factor	1.35	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
.alpha.-Pinene	95.5	94
.beta.-Myrcene	28.8	90
.alpha.-Phellandrene	3.47	91
1-Methyl-4-(1-methylethyl)-7-oxabicyclo[2.2.1]heptane	22.6	96
1-Methyl-(1-methylethyl)-benzene	63.1	95
D-Limonene	189	94
1-Methyl-4-(1-methylethyl)-1,4-cyclohexadiene	11.3	94
1-Methyl-(1-methylethenyl)-benzene	5.29	95
1-Methyl-4-(1-methylethylidene)-cyclohexene	60.3	98
1,3,3-Trimethylbicyclo[2.2.1]heptan-2-ol	3.78	96
1,7,7-Trimethylbicyclo[2.2.1]heptan-2-one	4.95	98
Isoborneol	1.94	86
BFB-Surrogate Std. % Recovery	97%	

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO : 191056
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/03/2019
DATE REPORTED : 07/10/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	VOC-3			Sample Reporting Limit (SRL) (MRLxDF's)	VOC-4			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	191056-119911				191056-119912				
Date Sampled	07/02/2019				07/02/2019				
Date Analyzed	07/05/2019				07/05/2019				
Can Dilution Factor	1.36				1.40				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Chlorodifluoromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Propene	<SRL	U	1.0	1.4	<SRL	U	1.0	1.4	1.0
Dichlorodifluoromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Chloromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Dichlorotetrafluoroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Vinyl Chloride	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Methanol	<SRL	U	1.0	6.8	<SRL	U	1.0	7.0	5.0
1,3-Butadiene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Bromomethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Chloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Dichlorofluoromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Ethanol	2.74		1.0	2.7	<SRL	U	1.0	2.8	2.0
Vinyl Bromide	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Acetone	7.83		1.0	2.7	3.62		1.0	2.8	2.0
Trichlorofluoromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
2-Propanol (IPA)	5.41		1.0	2.7	<SRL	U	1.0	2.8	2.0
Acrylonitrile	<SRL	U	1.0	1.4	<SRL	U	1.0	1.4	1.0
1,1-Dichloroethene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Methylene Chloride (DCM)	<SRL	U	1.0	1.4	<SRL	U	1.0	1.4	1.0
Allyl Chloride	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Carbon Disulfide	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Trichlorotrifluoroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
trans-1,2-Dichloroethene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,1-Dichloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Methyl Tert Butyl Ether (MTBE)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Vinyl Acetate	<SRL	U	1.0	1.4	<SRL	U	1.0	1.4	1.0
2-Butanone (MEK)	<SRL	U	1.0	1.4	<SRL	U	1.0	1.4	1.0
cis-1,2-Dichloroethene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Hexane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Chloroform	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Ethyl Acetate	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Tetrahydrofuran	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2-Dichloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,1,1-Trichloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO : 191056
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/03/2019
DATE REPORTED : 07/10/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	VOC-3			Sample Reporting Limit (SRL) (MRLxDF's)	VOC-4			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	191056-119911				191056-119912				
Date Sampled	07/02/2019				07/02/2019				
Date Analyzed	07/05/2019				07/05/2019				
Can Dilution Factor	1.36				1.40				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Benzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Carbon Tetrachloride	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Cyclohexane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2-Dichloropropane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Bromodichloromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,4-Dioxane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Trichloroethene (TCE)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
2,2,4-Trimethylpentane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Heptane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
cis-1,3-Dichloropropene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
4-Methyl-2-pentanone (MiBK)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
trans-1,3-Dichloropropene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,1,2-Trichloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Toluene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
2-Hexanone (MBK)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Dibromochloromethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2-Dibromoethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Tetrachloroethene (PCE)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Chlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Ethylbenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
m & p-Xylenes	<SRL	U	1.0	1.4	<SRL	U	1.0	1.4	1.0
Bromoform	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Styrene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,1,2,2-Tetrachloroethane	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
o-Xylene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
4-Ethyltoluene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,3,5-Trimethylbenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2,4-Trimethylbenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,3-Dichlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,4-Dichlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2-Dichlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
1,2,4-Trichlorobenzene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
Hexachlorobutadiene	<SRL	U	1.0	0.7	<SRL	U	1.0	0.7	0.5
BFB-Surrogate Std. % Recovery	100%				90%				70-130%

U - Compound was analyzed for, but was not detected at or above the SRL.

Sucha Parmar, Ph.D.
Technical Director

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT	**: SCS Engineers**	**DATE RECEIVED**	**: 07/03/2019**
PROJECT NO	**: 191056**	**DATE REPORTED**	**: 07/10/2019**
MATRIX	**: AIR**		
UNITS	**: PPB (v/v)**		

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	**VOC-3**	
AAC ID	**191056-119911**	
Date Sampled	**07/02/2019**	
Date Analyzed	**07/05/2019**	
Can Dilution Factor	**1.36**	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Unknown Hydrocarbon #1	1.14	NA
.alpha.-Pinene	1.60	95
Unknown Hydrocarbon #2	1.10	NA
Unknown Hydrocarbon #3	0.99	NA
.beta.-Myrcene	14.6	91
.alpha.-Phellandrene	0.90	68
1-Methyl-(1-methylethyl)-benzene	0.75	94
D-Limonene	2.84	95
3,7-Dimethyl-1,3,6-octatriene	2.08	93
1-Methyl-4-(1-methylethylidene)-cyclohexene	5.45	97
BFB-Surrogate Std. % Recovery	100%	

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	**VOC-4**	
AAC ID	**191056-119912**	
Date Sampled	**07/02/2019**	
Date Analyzed	**07/05/2019**	
Can Dilution Factor	**1.40**	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Acetaldehyde	1.12	83
.beta.-Myrcene	1.73	95
Limonene	0.53	91
1-Methyl-4-(1-methylethylidene)-cyclohexene	0.49	96
BFB-Surrogate Std. % Recovery	90%	

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO : 191056
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/03/2019
DATE REPORTED : 07/10/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	VOC-5			Sample Reporting Limit (SRL) (MRLxDF's)	VOC-6			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	191056-119913				191056-119914				
Date Sampled	07/02/2019				07/02/2019				
Date Analyzed	07/05/2019				07/05/2019				
Can Dilution Factor	1.51				1.51				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Chlorodifluoromethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Propene	<SRL	U	1.0	1.5	<SRL	U	1.0	1.5	1.0
Dichlorodifluoromethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Chloromethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Dichlorotetrafluoroethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Vinyl Chloride	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Methanol	<SRL	U	1.0	7.6	<SRL	U	1.0	7.5	5.0
1,3-Butadiene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Bromomethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Chloroethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Dichlorofluoromethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Ethanol	7.02		1.0	3.0	<SRL	U	1.0	3.0	2.0
Vinyl Bromide	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Acetone	<SRL	U	1.0	3.0	<SRL	U	1.0	3.0	2.0
Trichlorofluoromethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
2-Propanol (IPA)	<SRL	U	1.0	3.0	<SRL	U	1.0	3.0	2.0
Acrylonitrile	<SRL	U	1.0	1.5	<SRL	U	1.0	1.5	1.0
1,1-Dichloroethene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Methylene Chloride (DCM)	<SRL	U	1.0	1.5	<SRL	U	1.0	1.5	1.0
Allyl Chloride	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Carbon Disulfide	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Trichlorotrifluoroethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
trans-1,2-Dichloroethene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,1-Dichloroethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Methyl Tert Butyl Ether (MTBE)	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Vinyl Acetate	<SRL	U	1.0	1.5	<SRL	U	1.0	1.5	1.0
2-Butanone (MEK)	<SRL	U	1.0	1.5	<SRL	U	1.0	1.5	1.0
cis-1,2-Dichloroethene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Hexane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Chloroform	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Ethyl Acetate	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Tetrahydrofuran	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,2-Dichloroethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,1,1-Trichloroethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO : 191056
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/03/2019
DATE REPORTED : 07/10/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	VOC-5			Sample Reporting Limit (SRL) (MRLxDF's)	VOC-6			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	191056-119913				191056-119914				
Date Sampled	07/02/2019				07/02/2019				
Date Analyzed	07/05/2019				07/05/2019				
Can Dilution Factor	1.51				1.51				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Benzene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Carbon Tetrachloride	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Cyclohexane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,2-Dichloropropane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Bromodichloromethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,4-Dioxane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Trichloroethene (TCE)	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
2,2,4-Trimethylpentane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Heptane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
cis-1,3-Dichloropropene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
4-Methyl-2-pentanone (MiBK)	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
trans-1,3-Dichloropropene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,1,2-Trichloroethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Toluene	0.95		1.0	0.8	<SRL	U	1.0	0.8	0.5
2-Hexanone (MBK)	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Dibromochloromethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,2-Dibromoethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Tetrachloroethene (PCE)	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Chlorobenzene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Ethylbenzene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
m & p-Xylenes	<SRL	U	1.0	1.5	<SRL	U	1.0	1.5	1.0
Bromoform	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Styrene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,1,2,2-Tetrachloroethane	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
o-Xylene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
4-Ethyltoluene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,3,5-Trimethylbenzene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,2,4-Trimethylbenzene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,3-Dichlorobenzene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,4-Dichlorobenzene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,2-Dichlorobenzene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
1,2,4-Trichlorobenzene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
Hexachlorobutadiene	<SRL	U	1.0	0.8	<SRL	U	1.0	0.8	0.5
BFB-Surrogate Std. % Recovery	94%				92%				70-130%

U - Compound was analyzed for, but was not detected at or above the SRL.

Sucha Parmar, Ph.D.
Technical Director

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT	: SCS Engineers		DATE RECEIVED	: 07/03/2019
PROJECT NO	: 191056		DATE REPORTED	: 07/10/2019
MATRIX	: AIR			
UNITS	: PPB (v/v)			

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	VOC-5	
AAC ID	191056-119913	
Date Sampled	07/02/2019	
Date Analyzed	07/05/2019	
Can Dilution Factor	1.51	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Acetaldehyde	0.89	83
2-Methylbutane	2.22	91
Pentane	1.66	59
1-Propanol	1.93	59
2-Methylpentane	1.33	91
3-Methylpentane	0.75	74
Methylcyclopentane	0.69	91
2-Methylhexane	0.47	91
3-Methylhexane	0.41	90
BFB-Surrogate Std. % Recovery	94%	

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	VOC-6	
AAC ID	191056-119914	
Date Sampled	07/02/2019	
Date Analyzed	07/05/2019	
Can Dilution Factor	1.51	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Unknown Hydrocarbon #1	0.86	NA
Acetaldehyde	0.83	83
Unknown Hydrocarbon #2	0.68	NA
BFB-Surrogate Std. % Recovery	92%	

Sucha Parmar, Ph.D.
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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO : 191056
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/03/2019
DATE REPORTED : 07/10/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	VOC-7			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	191056-119915				
Date Sampled	07/02/2019				
Date Analyzed	07/08/2019				
Can Dilution Factor	1.56				
	Result	**Qualifier**	**Analysis DF**		
Chlorodifluoromethane	<SRL	U	1.0	0.8	0.5
Propene	<SRL	U	1.0	1.6	1.0
Dichlorodifluoromethane	<SRL	U	1.0	0.8	0.5
Chloromethane	<SRL	U	1.0	0.8	0.5
Dichlorotetrafluoroethane	<SRL	U	1.0	0.8	0.5
Vinyl Chloride	<SRL	U	1.0	0.8	0.5
Methanol	<SRL	U	1.0	7.8	5.0
1,3-Butadiene	<SRL	U	1.0	0.8	0.5
Bromomethane	<SRL	U	1.0	0.8	0.5
Chloroethane	<SRL	U	1.0	0.8	0.5
Dichlorofluoromethane	<SRL	U	1.0	0.8	0.5
Ethanol	<SRL	U	1.0	3.1	2.0
Vinyl Bromide	<SRL	U	1.0	0.8	0.5
Acetone	<SRL	U	1.0	3.1	2.0
Trichlorofluoromethane	<SRL	U	1.0	0.8	0.5
2-Propanol (IPA)	<SRL	U	1.0	3.1	2.0
Acrylonitrile	<SRL	U	1.0	1.6	1.0
1,1-Dichloroethene	<SRL	U	1.0	0.8	0.5
Methylene Chloride (DCM)	<SRL	U	1.0	1.6	1.0
Allyl Chloride	<SRL	U	1.0	0.8	0.5
Carbon Disulfide	<SRL	U	1.0	0.8	0.5
Trichlorotrifluoroethane	<SRL	U	1.0	0.8	0.5
trans-1,2-Dichloroethene	<SRL	U	1.0	0.8	0.5
1,1-Dichloroethane	<SRL	U	1.0	0.8	0.5
Methyl Tert Butyl Ether (MTBE)	<SRL	U	1.0	0.8	0.5
Vinyl Acetate	<SRL	U	1.0	1.6	1.0
2-Butanone (MEK)	<SRL	U	1.0	1.6	1.0
cis-1,2-Dichloroethene	<SRL	U	1.0	0.8	0.5
Hexane	<SRL	U	1.0	0.8	0.5
Chloroform	<SRL	U	1.0	0.8	0.5
Ethyl Acetate	<SRL	U	1.0	0.8	0.5
Tetrahydrofuran	<SRL	U	1.0	0.8	0.5
1,2-Dichloroethane	<SRL	U	1.0	0.8	0.5
1,1,1-Trichloroethane	<SRL	U	1.0	0.8	0.5

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO : 191056
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/03/2019
DATE REPORTED : 07/10/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	VOC-7			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	191056-119915				
Date Sampled	07/02/2019				
Date Analyzed	07/08/2019				
Can Dilution Factor	1.56				
	Result	Qualifier	Analysis DF		
Benzene	<SRL	U	1.0	0.8	0.5
Carbon Tetrachloride	<SRL	U	1.0	0.8	0.5
Cyclohexane	<SRL	U	1.0	0.8	0.5
1,2-Dichloropropane	<SRL	U	1.0	0.8	0.5
Bromodichloromethane	<SRL	U	1.0	0.8	0.5
1,4-Dioxane	<SRL	U	1.0	0.8	0.5
Trichloroethene (TCE)	<SRL	U	1.0	0.8	0.5
2,2,4-Trimethylpentane	<SRL	U	1.0	0.8	0.5
Heptane	<SRL	U	1.0	0.8	0.5
cis-1,3-Dichloropropene	<SRL	U	1.0	0.8	0.5
4-Methyl-2-pentanone (MiBK)	<SRL	U	1.0	0.8	0.5
trans-1,3-Dichloropropene	<SRL	U	1.0	0.8	0.5
1,1,2-Trichloroethane	<SRL	U	1.0	0.8	0.5
Toluene	<SRL	U	1.0	0.8	0.5
2-Hexanone (MBK)	<SRL	U	1.0	0.8	0.5
Dibromochloromethane	<SRL	U	1.0	0.8	0.5
1,2-Dibromoethane	<SRL	U	1.0	0.8	0.5
Tetrachloroethene (PCE)	<SRL	U	1.0	0.8	0.5
Chlorobenzene	<SRL	U	1.0	0.8	0.5
Ethylbenzene	<SRL	U	1.0	0.8	0.5
m & p-Xylenes	<SRL	U	1.0	1.6	1.0
Bromoform	<SRL	U	1.0	0.8	0.5
Styrene	<SRL	U	1.0	0.8	0.5
1,1,2,2-Tetrachloroethane	<SRL	U	1.0	0.8	0.5
o-Xylene	<SRL	U	1.0	0.8	0.5
4-Ethyltoluene	<SRL	U	1.0	0.8	0.5
1,3,5-Trimethylbenzene	<SRL	U	1.0	0.8	0.5
1,2,4-Trimethylbenzene	<SRL	U	1.0	0.8	0.5
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	1.0	0.8	0.5
1,3-Dichlorobenzene	<SRL	U	1.0	0.8	0.5
1,4-Dichlorobenzene	<SRL	U	1.0	0.8	0.5
1,2-Dichlorobenzene	<SRL	U	1.0	0.8	0.5
1,2,4-Trichlorobenzene	<SRL	U	1.0	0.8	0.5
Hexachlorobutadiene	<SRL	U	1.0	0.8	0.5
BFB-Surrogate Std. % Recovery	91%				70-130%

U - Compound was analyzed for, but was not detected at or above the SRL.

Sucha Parmar, Ph.D.
Technical Director

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO : 191056
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/03/2019
DATE REPORTED : 07/10/2019

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	VOC-7	
AAC ID	191056-119915	
Date Sampled	07/02/2019	
Date Analyzed	07/08/2019	
Can Dilution Factor	1.56	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Acetaldehyde	1.51	83
BFB-Surrogate Std. % Recovery	91%	

Sucha Parmar, Ph.D.
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ANALYSIS DATE : 07/05/2019
ANALYST : JJG

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : PS041919-05

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Continuing Calibration Verification of the 06/25/2019 Calibration

Compounds	*Conc*	*Daily Conc*	*%REC**
4-BFB (surrogate standard)	10.00	9.79	98
Chlorodifluoromethane	10.80	11.23	104
Propene	11.00	12.75	116
Dichlorodifluoromethane	10.20	10.63	104
Chloromethane	10.60	11.28	106
Dichlorotetrafluoroethane	11.00	11.55	105
Vinyl Chloride	10.40	10.84	104
Methanol	22.50	24.14	107
1,3-Butadiene	10.90	12.29	113
Bromomethane	10.30	10.69	104
Chloroethane	10.10	12.95	128
Dichlorofluoromethane	10.80	11.45	106
Ethanol	11.00	12.31	112
Vinyl Bromide	10.70	10.99	103
Acetone	10.90	11.95	110
Trichlorofluoromethane	10.10	10.17	101
2-Propanol (IPA)	11.00	11.33	103
Acrylonitrile	11.50	12.52	109
1,1-Dichloroethene	10.70	11.14	104
Methylene Chloride (DCM)	10.60	11.26	106
Allyl Chloride	10.70	11.45	107
Carbon Disulfide	10.50	11.68	111
Trichlorotrifluoroethane	10.60	11.29	107
trans-1,2-Dichloroethene	10.30	11.37	110
1,1-Dichloroethane	10.50	11.26	107
Methyl Tert Butyl Ether (MTBE)	10.80	12.21	113
Vinyl Acetate	10.90	12.01	110
2-Butanone (MEK)	10.90	11.91	109
cis-1,2-Dichloroethene	10.90	12.09	111
Hexane	10.70	11.68	109
Chloroform	10.90	11.30	104
Ethyl Acetate	10.90	11.87	109
Tetrahydrofuran	10.20	11.67	114
1,2-Dichloroethane	10.80	11.82	109
1,1,1-Trichloroethane	10.80	11.42	106

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Atmospheric Analysis & Consulting, Inc.

ANALYSIS DATE : 07/05/2019 **INSTRUMENT ID : GC/MS-02**
ANALYST : JJG **CALIBRATION STD ID : PS041919-05**

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15
Continuing Calibration Verification of the 06/25/2019 Calibration

Compounds	Conc	Daily Conc	%REC*
Benzene	10.90	11.41	105
Carbon Tetrachloride	10.60	10.99	104
Cyclohexane	10.90	12.15	111
1,2-Dichloropropane	10.80	11.43	106
Bromodichloromethane	10.90	11.64	107
1,4-Dioxane	10.90	11.29	104
Trichloroethene (TCE)	10.90	11.85	109
2,2,4-Trimethylpentane	10.70	11.54	108
Heptane	10.80	12.52	116
cis-1,3-Dichloropropene	10.60	11.30	107
4-Methyl-2-pentanone (MiBK)	10.60	11.32	107
trans-1,3-Dichloropropene	10.20	11.09	109
1,1,2-Trichloroethane	10.90	11.24	103
Toluene	11.00	11.32	103
2-Hexanone (MBK)	10.80	11.70	108
Dibromochloromethane	10.30	10.54	102
1,2-Dibromoethane	10.90	11.24	103
Tetrachloroethene (PCE)	10.90	11.26	103
Chlorobenzene	11.00	11.81	107
Ethylbenzene	10.90	11.95	110
m & p-Xylenes	21.00	23.49	112
Bromoform	10.50	11.24	107
Styrene	10.80	11.91	110
1,1,2,2-Tetrachloroethane	10.70	11.77	110
o-Xylene	10.70	12.06	113
4-Ethyltoluene	10.30	11.60	113
1,3,5-Trimethylbenzene	10.40	11.63	112
1,2,4-Trimethylbenzene	10.40	11.68	112
Benzyl Chloride (a-Chlorotoluene)	9.70	10.61	109
1,3-Dichlorobenzene	10.10	10.46	104
1,4-Dichlorobenzene	10.20	11.13	109
1,2-Dichlorobenzene	10.20	10.83	106
1,2,4-Trichlorobenzene	9.70	11.58	119
Hexachlorobutadiene	10.00	11.23	112

* - %REC should be 70-130%

Sucha Parmar, PhD
Technical Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

CLIENT ID	**: Laboratory Control Spike**	**DATE ANALYZED**	**: 07/05/2019**
AAC ID	**: LCS/LCSD**	**DATE REPORTED**	**: 07/05/2019**
MEDIA	**: Air**	**UNITS**	**: ppbv**

TO-15 Laboratory Control Spike Recovery

Compound	Sample Conc.	Spike Added	Spike Res	Dup Spike Res	Spike % Rec *	Spike Dup % Rec *	RPD** %
1,1-Dichloroethene	0.0	10.70	11.14	10.67	104	100	4.3
Methylene Chloride (DCM)	0.0	10.60	11.26	11.06	106	104	1.8
Benzene	0.0	10.90	11.41	11.18	105	103	2.0
Trichloroethene (TCE)	0.0	10.90	11.85	11.35	109	104	4.3
Toluene	0.0	11.00	11.32	11.08	103	101	2.1
Tetrachloroethene (PCE)	0.0	10.90	11.26	10.86	103	100	3.6
Chlorobenzene	0.0	11.00	11.81	11.99	107	109	1.5
Ethylbenzene	0.0	10.90	11.95	11.92	110	109	0.3
m & p-Xylenes	0.0	21.00	23.49	23.58	112	112	0.4
o-Xylene	0.0	10.70	12.06	12.20	113	114	1.2

* Must be 70-130%

** Must be < 25%

Sucha Parmar, PhD
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Method Blank Analysis Report

MATRIX	: AIR	ANALYSIS DATE	: 07/05/2019
UNITS	: ppbv	REPORT DATE	: 07/05/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	Method Blank	RL
AAC ID	MB 070519	
Chlorodifluoromethane	<RL	0.5
Propene	<RL	1.0
Dichlorodifluoromethane	<RL	0.5
Chloromethane	<RL	0.5
Dichlorotetrafluoroethane	<RL	0.5
Vinyl Chloride	<RL	0.5
Methanol	<RL	5.0
1,3-Butadiene	<RL	0.5
Bromomethane	<RL	0.5
Chloroethane	<RL	0.5
Dichlorofluoromethane	<RL	0.5
Ethanol	<RL	2.0
Vinyl Bromide	<RL	0.5
Acetone	<RL	2.0
Trichlorofluoromethane	<RL	0.5
2-Propanol (IPA)	<RL	2.0
Acrylonitrile	<RL	1.0
1,1-Dichloroethene	<RL	0.5
Methylene Chloride (DCM)	<RL	1.0
Allyl Chloride	<RL	0.5
Carbon Disulfide	<RL	0.5
Trichlorotrifluoroethane	<RL	0.5
trans-1,2-Dichloroethene	<RL	0.5
1,1-Dichloroethane	<RL	0.5
Methyl Tert Butyl Ether (MTBE)	<RL	0.5
Vinyl Acetate	<RL	1.0
2-Butanone (MEK)	<RL	1.0
cis-1,2-Dichloroethene	<RL	0.5
Hexane	<RL	0.5
Chloroform	<RL	0.5
Ethyl Acetate	<RL	0.5
Tetrahydrofuran	<RL	0.5
1,2-Dichloroethane	<RL	0.5
1,1,1-Trichloroethane	<RL	0.5
Benzene	<RL	0.5
Carbon Tetrachloride	<RL	0.5
Cyclohexane	<RL	0.5
1,2-Dichloropropane	<RL	0.5
Bromodichloromethane	<RL	0.5
1,4-Dioxane	<RL	0.5
Trichloroethene (TCE)	<RL	0.5
2,2,4-Trimethylpentane	<RL	0.5
Heptane	<RL	0.5

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Method Blank Analysis Report

MATRIX	**: AIR**	**ANALYSIS DATE**	**: 07/05/2019**
UNITS	**: ppbv**	**REPORT DATE**	**: 07/05/2019**

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	Method Blank	RL
AAC ID	MB 070519	
cis-1,3-Dichloropropene	<RL	0.5
4-Methyl-2-pentanone (MiBK)	<RL	0.5
trans-1,3-Dichloropropene	<RL	0.5
1,1,2-Trichloroethane	<RL	0.5
Toluene	<RL	0.5
2-Hexanone (MBK)	<RL	0.5
Dibromochloromethane	<RL	0.5
1,2-Dibromoethane	<RL	0.5
Tetrachloroethene (PCE)	<RL	0.5
Chlorobenzene	<RL	0.5
Ethylbenzene	<RL	0.5
m & p-Xylenes	<RL	1.0
Bromoform	<RL	0.5
Styrene	<RL	0.5
1,1,2,2-Tetrachloroethane	<RL	0.5
o-Xylene	<RL	0.5
4-Ethyltoluene	<RL	0.5
1,3,5-Trimethylbenzene	<RL	0.5
1,2,4-Trimethylbenzene	<RL	0.5
Benzyl Chloride (a-Chlorotoluene)	<RL	0.5
1,3-Dichlorobenzene	<RL	0.5
1,4-Dichlorobenzene	<RL	0.5
1,2-Dichlorobenzene	<RL	0.5
1,2,4-Trichlorobenzene	<RL	0.5
Hexachlorobutadiene	<RL	0.5
System Monitoring Compounds		
BFB-Surrogate Std. % Recovery	93%	--

RL - Reporting Limit

Sucha Parmar, PhD
Technical Director

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Quality Control/Quality Assurance Report

AAC ID	**: 191056-119909**	**DATE ANALYZED**	**: 07/05/2019**
MATRIX	**: Air**	**DATE REPORTED**	**: 07/05/2019**
		UNITS	**: ppbv**

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Chlorodifluoromethane	<SRL	<SRL	0.0
Propene	<SRL	<SRL	0.0
Dichlorodifluoromethane	<SRL	<SRL	0.0
Chloromethane	0.67	0.68	1.5
Dichlorotetrafluoroethane	<SRL	<SRL	0.0
Vinyl Chloride	<SRL	<SRL	0.0
Methanol	72.9	76.3	4.6
1,3-Butadiene	<SRL	<SRL	0.0
Bromomethane	<SRL	<SRL	0.0
Chloroethane	<SRL	<SRL	0.0
Dichlorofluoromethane	<SRL	<SRL	0.0
Ethanol	13.7	13.3	3.0
Vinyl Bromide	<SRL	<SRL	0.0
Acetone	7.76	8.22	5.8
Trichlorofluoromethane	<SRL	<SRL	0.0
2-Propanol (IPA)	7.78	7.95	2.2
Acrylonitrile	<SRL	<SRL	0.0
1,1-Dichloroethene	<SRL	<SRL	0.0
Methylene Chloride (DCM)	<SRL	<SRL	0.0
Allyl Chloride	<SRL	<SRL	0.0
Carbon Disulfide	<SRL	<SRL	0.0
Trichlorotrifluoroethane	<SRL	<SRL	0.0
trans-1,2-Dichloroethene	<SRL	<SRL	0.0
1,1-Dichloroethane	<SRL	<SRL	0.0
Methyl Tert Butyl Ether (MTBE)	<SRL	<SRL	0.0
Vinyl Acetate	<SRL	<SRL	0.0
2-Butanone (MEK)	<SRL	<SRL	0.0
cis-1,2-Dichloroethene	<SRL	<SRL	0.0
Hexane	<SRL	<SRL	0.0
Chloroform	<SRL	<SRL	0.0
Ethyl Acetate	<SRL	<SRL	0.0
Tetrahydrofuran	<SRL	<SRL	0.0
1,2-Dichloroethane	<SRL	<SRL	0.0
1,1,1-Trichloroethane	<SRL	<SRL	0.0
Benzene	<SRL	<SRL	0.0
Carbon Tetrachloride	<SRL	<SRL	0.0

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

AAC ID	**: 191056-119909**	**DATE ANALYZED**	**: 07/05/2019**
MATRIX	**: Air**	**DATE REPORTED**	**: 07/05/2019**
		UNITS	**: ppbv**

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Cyclohexane	<SRL	<SRL	0.0
1,2-Dichloropropane	<SRL	<SRL	0.0
Bromodichloromethane	<SRL	<SRL	0.0
1,4-Dioxane	<SRL	<SRL	0.0
Trichloroethene (TCE)	<SRL	<SRL	0.0
2,2,4-Trimethylpentane	<SRL	<SRL	0.0
Heptane	<SRL	<SRL	0.0
cis-1,3-Dichloropropene	<SRL	<SRL	0.0
4-Methyl-2-pentanone (MiBK)	<SRL	<SRL	0.0
trans-1,3-Dichloropropene	<SRL	<SRL	0.0
1,1,2-Trichloroethane	<SRL	<SRL	0.0
Toluene	<SRL	<SRL	0.0
2-Hexanone (MBK)	<SRL	<SRL	0.0
Dibromochloromethane	<SRL	<SRL	0.0
1,2-Dibromoethane	<SRL	<SRL	0.0
Tetrachloroethene (PCE)	<SRL	<SRL	0.0
Chlorobenzene	<SRL	<SRL	0.0
Ethylbenzene	<SRL	<SRL	0.0
m & p-Xylenes	<SRL	<SRL	0.0
Bromoform	<SRL	<SRL	0.0
Styrene	<SRL	<SRL	0.0
1,1,2,2-Tetrachloroethane	<SRL	<SRL	0.0
o-Xylene	<SRL	<SRL	0.0
4-Ethyltoluene	<SRL	<SRL	0.0
1,3,5-Trimethylbenzene	<SRL	<SRL	0.0
1,2,4-Trimethylbenzene	<SRL	<SRL	0.0
Benzyl Chloride (a-Chlorotoluene)	<SRL	<SRL	0.0
1,3-Dichlorobenzene	<SRL	<SRL	0.0
1,4-Dichlorobenzene	<SRL	<SRL	0.0
1,2-Dichlorobenzene	<SRL	<SRL	0.0
1,2,4-Trichlorobenzene	<SRL	<SRL	0.0
Hexachlorobutadiene	<SRL	<SRL	0.0
System Monitoring Compounds			
BFB-Surrogate Std. % Recovery	96%	96%	0.3

SRL - Sample Reporting Limit

Sucha Parmar, PhD
Technical Director

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ANALYSIS DATE : 07/08/2019
ANALYST : JJG
INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : PS041919-05

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15
Continuing Calibration Verification of the 06/25/2019 Calibration

Compounds	Conc	Daily Conc	%REC*
4-BFB (surrogate standard)	10.00	9.60	96
Chlorodifluoromethane	10.80	11.78	109
Propene	11.00	13.02	118
Dichlorodifluoromethane	10.20	10.92	107
Chloromethane	10.60	11.55	109
Dichlorotetrafluoroethane	11.00	11.71	106
Vinyl Chloride	10.40	10.96	105
Methanol	22.50	26.02	116
1,3-Butadiene	10.90	12.16	112
Bromomethane	10.30	10.83	105
Chloroethane	10.10	10.19	101
Dichlorofluoromethane	10.80	11.23	104
Ethanol	11.00	12.24	111
Vinyl Bromide	10.70	10.91	102
Acetone	10.90	10.92	100
Trichlorofluoromethane	10.10	10.38	103
2-Propanol (IPA)	11.00	11.93	108
Acrylonitrile	11.50	12.59	109
1,1-Dichloroethene	10.70	10.64	99
Methylene Chloride (DCM)	10.60	11.43	108
Allyl Chloride	10.70	11.35	106
Carbon Disulfide	10.50	10.91	104
Trichlorotrifluoroethane	10.60	10.99	104
trans-1,2-Dichloroethene	10.30	11.11	108
1,1-Dichloroethane	10.50	11.32	108
Methyl Tert Butyl Ether (MTBE)	10.80	11.27	104
Vinyl Acetate	10.90	11.84	109
2-Butanone (MEK)	10.90	11.67	107
cis-1,2-Dichloroethene	10.90	11.72	108
Hexane	10.70	11.79	110
Chloroform	10.90	11.34	104
Ethyl Acetate	10.90	11.92	109
Tetrahydrofuran	10.20	11.04	108
1,2-Dichloroethane	10.80	11.99	111
1,1,1-Trichloroethane	10.80	11.34	105

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ANALYSIS DATE : **07/08/2019**
ANALYST : **JJG**
INSTRUMENT ID : **GC/MS-02**
CALIBRATION STD ID : **PS041919-05**

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15
Continuing Calibration Verification of the 06/25/2019 Calibration

Compounds	Conc	Daily Conc	%REC*
Benzene	10.90	11.65	107
Carbon Tetrachloride	10.60	11.29	107
Cyclohexane	10.90	12.02	110
1,2-Dichloropropane	10.80	11.63	108
Bromodichloromethane	10.90	11.84	109
1,4-Dioxane	10.90	11.10	102
Trichloroethene (TCE)	10.90	11.49	105
2,2,4-Trimethylpentane	10.70	11.95	112
Heptane	10.80	12.41	115
cis-1,3-Dichloropropene	10.60	11.33	107
4-Methyl-2-pentanone (MiBK)	10.60	11.73	111
trans-1,3-Dichloropropene	10.20	10.96	107
1,1,2-Trichloroethane	10.90	11.65	107
Toluene	11.00	11.72	107
2-Hexanone (MBK)	10.80	11.99	111
Dibromochloromethane	10.30	10.59	103
1,2-Dibromoethane	10.90	11.08	102
Tetrachloroethene (PCE)	10.90	11.48	105
Chlorobenzene	11.00	12.25	111
Ethylbenzene	10.90	12.29	113
m & p-Xylenes	21.00	23.36	111
Bromoform	10.50	11.22	107
Styrene	10.80	11.68	108
1,1,2,2-Tetrachloroethane	10.70	11.86	111
o-Xylene	10.70	12.19	114
4-Ethyltoluene	10.30	11.59	113
1,3,5-Trimethylbenzene	10.40	11.72	113
1,2,4-Trimethylbenzene	10.40	11.95	115
Benzyl Chloride (a-Chlorotoluene)	9.70	11.26	116
1,3-Dichlorobenzene	10.10	11.25	111
1,4-Dichlorobenzene	10.20	11.02	108
1,2-Dichlorobenzene	10.20	11.08	109
1,2,4-Trichlorobenzene	9.70	11.43	118
Hexachlorobutadiene	10.00	11.22	112

* - %REC should be 70-130%

Sucha Parmar, PhD
Technical Director

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Quality Control/Quality Assurance Report

CLIENT ID	: Laboratory Control Spike	DATE ANALYZED	: 07/08/2019
AAC ID	: LCS/LCSD	DATE REPORTED	: 07/08/2019
MEDIA	: Air	UNITS	: ppbv

TO-15 Laboratory Control Spike Recovery

Compound	Sample Conc.	Spike Added	Spike Res	Dup Spike Res	Spike % Rec *	Spike Dup % Rec *	RPD** %
1,1-Dichloroethene	0.0	10.70	10.64	11.10	99	104	4.2
Methylene Chloride (DCM)	0.0	10.60	11.43	11.43	108	108	0.0
Benzene	0.0	10.90	11.65	11.43	107	105	1.9
Trichloroethene (TCE)	0.0	10.90	11.49	11.92	105	109	3.7
Toluene	0.0	11.00	11.72	12.05	107	110	2.8
Tetrachloroethene (PCE)	0.0	10.90	11.48	11.60	105	106	1.0
Chlorobenzene	0.0	11.00	12.25	12.04	111	109	1.7
Ethylbenzene	0.0	10.90	12.29	12.31	113	113	0.2
m & p-Xylenes	0.0	21.00	23.36	23.41	111	111	0.2
o-Xylene	0.0	10.70	12.19	12.26	114	115	0.6

* Must be 70-130%

** Must be < 25%

Sucha Parmar, PhD
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Atmospheric Analysis & Consulting, Inc.

Method Blank Analysis Report

MATRIX	**: AIR**	**ANALYSIS DATE**	**: 07/08/2019**
UNITS	**: ppbv**	**REPORT DATE**	**: 07/08/2019**

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID / AAC ID	Method Blank / MB 070819	RL
Chlorodifluoromethane	<RL	0.5
Propene	<RL	1.0
Dichlorodifluoromethane	<RL	0.5
Chloromethane	<RL	0.5
Dichlorotetrafluoroethane	<RL	0.5
Vinyl Chloride	<RL	0.5
Methanol	<RL	5.0
1,3-Butadiene	<RL	0.5
Bromomethane	<RL	0.5
Chloroethane	<RL	0.5
Dichlorofluoromethane	<RL	0.5
Ethanol	<RL	2.0
Vinyl Bromide	<RL	0.5
Acetone	<RL	2.0
Trichlorofluoromethane	<RL	0.5
2-Propanol (IPA)	<RL	2.0
Acrylonitrile	<RL	1.0
1,1-Dichloroethene	<RL	0.5
Methylene Chloride (DCM)	<RL	1.0
Allyl Chloride	<RL	0.5
Carbon Disulfide	<RL	0.5
Trichlorotrifluoroethane	<RL	0.5
trans-1,2-Dichloroethene	<RL	0.5
1,1-Dichloroethane	<RL	0.5
Methyl Tert Butyl Ether (MTBE)	<RL	0.5
Vinyl Acetate	<RL	1.0
2-Butanone (MEK)	<RL	1.0
cis-1,2-Dichloroethene	<RL	0.5
Hexane	<RL	0.5
Chloroform	<RL	0.5
Ethyl Acetate	<RL	0.5
Tetrahydrofuran	<RL	0.5
1,2-Dichloroethane	<RL	0.5
1,1,1-Trichloroethane	<RL	0.5
Benzene	<RL	0.5
Carbon Tetrachloride	<RL	0.5
Cyclohexane	<RL	0.5
1,2-Dichloropropane	<RL	0.5
Bromodichloromethane	<RL	0.5
1,4-Dioxane	<RL	0.5
Trichloroethene (TCE)	<RL	0.5
2,2,4-Trimethylpentane	<RL	0.5
Heptane	<RL	0.5

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Method Blank Analysis Report

MATRIX : AIR **ANALYSIS DATE : 07/08/2019**
UNITS : ppbv **REPORT DATE : 07/08/2019**

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID / *AAC ID*	Method Blank / MB 070819	RL
cis-1,3-Dichloropropene	<RL	0.5
4-Methyl-2-pentanone (MiBK)	<RL	0.5
trans-1,3-Dichloropropene	<RL	0.5
1,1,2-Trichloroethane	<RL	0.5
Toluene	<RL	0.5
2-Hexanone (MBK)	<RL	0.5
Dibromochloromethane	<RL	0.5
1,2-Dibromoethane	<RL	0.5
Tetrachloroethene (PCE)	<RL	0.5
Chlorobenzene	<RL	0.5
Ethylbenzene	<RL	0.5
m & p-Xylenes	<RL	1.0
Bromoform	<RL	0.5
Styrene	<RL	0.5
1,1,2,2-Tetrachloroethane	<RL	0.5
o-Xylene	<RL	0.5
4-Ethyltoluene	<RL	0.5
1,3,5-Trimethylbenzene	<RL	0.5
1,2,4-Trimethylbenzene	<RL	0.5
Benzyl Chloride (a-Chlorotoluene)	<RL	0.5
1,3-Dichlorobenzene	<RL	0.5
1,4-Dichlorobenzene	<RL	0.5
1,2-Dichlorobenzene	<RL	0.5
1,2,4-Trichlorobenzene	<RL	0.5
Hexachlorobutadiene	<RL	0.5
System Monitoring Compounds		
BFB-Surrogate Std. % Recovery	94%	--

RL - Reporting Limit

Sucha Parmar, PhD
Technical Director

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Quality Control/Quality Assurance Report

AAC ID	**: 190958-119507**	**DATE ANALYZED**	**: 07/08/2019**
MATRIX	**: Air**	**DATE REPORTED**	**: 07/08/2019**
		UNITS	**: ppbv**

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Chlorodifluoromethane	<SRL	<SRL	0.0
Propene	2160	2160	0.0
Dichlorodifluoromethane	<SRL	<SRL	0.0
Chloromethane	<SRL	<SRL	0.0
Dichlorotetrafluoroethane	<SRL	<SRL	0.0
Vinyl Chloride	<SRL	<SRL	0.0
Methanol	<SRL	<SRL	0.0
1,3-Butadiene	<SRL	<SRL	0.0
Bromomethane	<SRL	<SRL	0.0
Chloroethane	<SRL	<SRL	0.0
Dichlorofluoromethane	<SRL	<SRL	0.0
Ethanol	<SRL	<SRL	0.0
Vinyl Bromide	<SRL	<SRL	0.0
Acetone	<SRL	<SRL	0.0
Trichlorofluoromethane	<SRL	<SRL	0.0
2-Propanol (IPA)	<SRL	<SRL	0.0
Acrylonitrile	<SRL	<SRL	0.0
1,1-Dichloroethene	<SRL	<SRL	0.0
Methylene Chloride (DCM)	<SRL	<SRL	0.0
Allyl Chloride	<SRL	<SRL	0.0
Carbon Disulfide	<SRL	<SRL	0.0
Trichlorotrifluoroethane	<SRL	<SRL	0.0
trans-1,2-Dichloroethene	<SRL	<SRL	0.0
1,1-Dichloroethane	<SRL	<SRL	0.0
Methyl Tert Butyl Ether (MTBE)	<SRL	<SRL	0.0
Vinyl Acetate	<SRL	<SRL	0.0
2-Butanone (MEK)	<SRL	<SRL	0.0
cis-1,2-Dichloroethene	<SRL	<SRL	0.0
Hexane	<SRL	<SRL	0.0
Chloroform	<SRL	<SRL	0.0
Ethyl Acetate	<SRL	<SRL	0.0
Tetrahydrofuran	<SRL	<SRL	0.0
1,2-Dichloroethane	<SRL	<SRL	0.0
1,1,1-Trichloroethane	<SRL	<SRL	0.0
Benzene	<SRL	<SRL	0.0
Carbon Tetrachloride	<SRL	<SRL	0.0

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Quality Control/Quality Assurance Report

AAC ID	**: 190958-119507**	**DATE ANALYZED**	**: 07/08/2019**
MATRIX	**: Air**	**DATE REPORTED**	**: 07/08/2019**
		UNITS	**: ppbv**

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Cyclohexane	<SRL	<SRL	0.0
1,2-Dichloropropane	<SRL	<SRL	0.0
Bromodichloromethane	<SRL	<SRL	0.0
1,4-Dioxane	<SRL	<SRL	0.0
Trichloroethene (TCE)	<SRL	<SRL	0.0
2,2,4-Trimethylpentane	<SRL	<SRL	0.0
Heptane	<SRL	<SRL	0.0
cis-1,3-Dichloropropene	<SRL	<SRL	0.0
4-Methyl-2-pentanone (MiBK)	<SRL	<SRL	0.0
trans-1,3-Dichloropropene	<SRL	<SRL	0.0
1,1,2-Trichloroethane	<SRL	<SRL	0.0
Toluene	<SRL	<SRL	0.0
2-Hexanone (MBK)	<SRL	<SRL	0.0
Dibromochloromethane	<SRL	<SRL	0.0
1,2-Dibromoethane	<SRL	<SRL	0.0
Tetrachloroethene (PCE)	<SRL	<SRL	0.0
Chlorobenzene	<SRL	<SRL	0.0
Ethylbenzene	<SRL	<SRL	0.0
m & p-Xylenes	<SRL	<SRL	0.0
Bromoform	<SRL	<SRL	0.0
Styrene	<SRL	<SRL	0.0
1,1,2,2-Tetrachloroethane	<SRL	<SRL	0.0
o-Xylene	<SRL	<SRL	0.0
4-Ethyltoluene	<SRL	<SRL	0.0
1,3,5-Trimethylbenzene	<SRL	<SRL	0.0
1,2,4-Trimethylbenzene	<SRL	<SRL	0.0
Benzyl Chloride (a-Chlorotoluene)	<SRL	<SRL	0.0
1,3-Dichlorobenzene	<SRL	<SRL	0.0
1,4-Dichlorobenzene	<SRL	<SRL	0.0
1,2-Dichlorobenzene	<SRL	<SRL	0.0
1,2,4-Trichlorobenzene	<SRL	<SRL	0.0
Hexachlorobutadiene	<SRL	<SRL	0.0
System Monitoring Compounds			
BFB-Surrogate Std. % Recovery	93%	96%	3.2

SRL - Sample Reporting Limit

Sucha Parmar, PhD
Technical Director

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ATMOSPHERIC ANALYSIS & CONSULTING, INC.
1534 Eastman Avenue, Suite A
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Phone (805) 650-1642 Fax (805) 650-1644
E-mail: info@aaclab.com

AAC Project No. 191056

Page ___ of ___

CHAIN OF CUSTODY/ ANALYSIS REQUEST FORM

Client Name: SCS

Project Name: CARP ODOR

Project Mgr (Print Name): Paul Schafer

Project Number: CARP ODOR

Sampler's Name (Print Name): Eva Luu

Sampler's Signature: [signature]

AAC Sample No.	Date Sampled	Time Sampled	Sample Type	Client Sample ID/Description	Type/No. of Containers	EPA TO-15 scan VOC's + TICs	EPA PAMS / TO-12 C2-C12 Hydrocarbons TNMHC				
119909	07/02	0851	air	VOC-1 (can ID 836)	Summa / 1	x	x				
119910	"	0914	"	VOC-2 (can ID 845)	Summa / 1	x	x				
119911	"	0922	"	VOC-3 (can ID 835)	Summa / 1	x	x				
119912	"	0927	"	VOC-4 (can ID 828)	Summa / 1	x	x				
119913	"	1040	"	VOC-5 (can ID 832)	Summa / 1	x	x				
119914	"	1045	"	VOC-6 (can ID 826)	Summa / 1	x	x				
119915	"	1035	"	VOC-7 (can ID 849)	Summa / 1	x	x				

Send report: pschafer@scs-engineers.com

Attn: Paul Schafer

Phone#: 619 · 823 · 5333

Fax#:

Send invoice to:

Attn:

P.O. #

Turnaround Time

24-Hr ___ 48-Hr ___

5 Day ___ Normal X

Other (Specify) ___

Special Instructions/remarks:

3-4 day TAT for:
VOC-1
VOC-2

Relinquished by (Signature):	Print Name:	Date/Time	Received by (signature):	Print Name
[signature]	Eva Luu	07/02 1414		
Relinquished by (Signature):	Print Name:	Date/Time	Received by (signature):	Print Name
			Rudy [signature]	7/3/19 1120

UPS

7x cans, no flows