

Memorandum

To Billy Meyer

Subject Soil Vapor Extraction Operations and Maintenance Report for Koretizing Cleaners (DC980001),
Wilson, North Carolina

From Matt Allen , Brian Ray

Date August 9, 2016

Project Number 60336953

AECOM Technical Services of North Carolina, Inc. (AECOM) has prepared this Soil Vapor Extraction (SVE) Operations and Maintenance (O&M) report to summarize the activities conducted and results obtained from routine O&M of the SVE system at the former Koretizing Cleaners (Dry-cleaning Solvent Cleanup Act [DSCA] Site ID # 980001) in Wilson, North Carolina (Site).

Site Background

The former Koretizing Cleaners was a dry-cleaning facility located in the Boulevard Plaza Shopping Center from approximately 1988 until 1997. The business moved in 1997 from the Site to a location approximately 380 feet northeast of the Site. The building has been occupied by Enterprise Rental Car (Enterprise) since it was vacated by the dry-cleaners.

After multiple indoor air sampling events by DSCA contractors indicated that vapor intrusion was a concern at the Site, a sub-slab depressurization system (SSDS) was installed (April 2, 2011). The system was composed of a sub-slab depressurization well attached to a radon fan and vented through the western exterior wall of the building. The SSDS was effective in controlling indoor air concentrations of chlorinated volatile organic compounds (CVOCs) to the Division of Waste Management Non-Residential Indoor Air and Crawlspace Screening Levels; however, this system was not designed to remove CVOC mass remaining underneath the former dry-cleaning facility. Results of an SVE pilot test suggested that the CVOCs in the vadose zone could be extracted in a relatively short period of time (compared to operation of the SSDS) with modifications to the existing system. Therefore, in October 2015, AECOM installed an SVE system. Three shallow SVE wells (SVE-04, SVE-05, and SVE-06) were installed and existing well SVE-01 was disconnected from the sub-slab depressurization system, and connected to the new SVE system. Start-up of the system was performed on November 20, 2015.

O&M of SVE System

O&M of the SVE system was performed monthly on January 18, February 27, March 25, April 29, May 20, May 23, and June 30, 2016. During the O&M events, AECOM collected field measurements including, but not limited to, system runtime, vacuum, temperature, and flow readings. During the last O&M event (June 30, 2016), the SVE system operated at a vacuum of 28 inches of water column and a flow rate of 176 standard cubic feet per minute. The average system flow rate, which is a sum of the flow rates from each of the

extraction wells, for the life time of the system, is approximately 154.7 cubic feet per minute. For a summary of SVE system performance data, refer to **Table 1**.

Effluent samples were routinely collected and analyzed for volatile organic compounds (VOCs) by United States Environmental Protection Agency (EPA) Method 8021B modified. Effluent samples are collected from the exhaust piping, after the introduction of dilution air. During the last system sampling in June 2016, the VOC emissions were calculated at 0.0029 (pounds per day) and the VOC emissions based on pounds removed was 0.15 (pounds). The approximate amount of CVOCs removed from the subsurface since system startup is calculated at 2.866 pounds (**Table 2**). Overall, perchloroethylene (PCE) and trichloroethylene (TCE) concentrations in effluent samples have decreased since startup. TCE concentrations were not detected during the last four sampling events and PCE has decreased from 3,700 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) during initial pilot study testing (May 20, 2014 from SVE-01 during pilot testing – Step 1 test – 15 in H2O) to 170 $\mu\text{g}/\text{m}^3$ during the most recent sampling event (June 30, 2016).

The system has been running at approximately 98 percent since the beginning of the project. The down time was the result of waterlogged extraction conduit immediately after system startup and high level in the moisture knock out tank (November 2015).

Summary

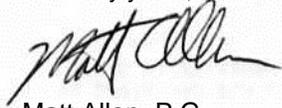
Indoor air sampling was conducted at the facility during two separate sampling events in January 2016 and April 2016 using Radiello® passive diffusion samplers over a seven day period. Tetrachlorethylene was detected at concentrations ranging between 1.2 $\mu\text{g}/\text{m}^3$ to 1.6 $\mu\text{g}/\text{m}^3$. No other CVOCs (TCE, cis-1,2-dichloroethylene [DCE], trans-1,2-DCE, or vinyl chloride) were detected during indoor air sampling. Overall, indoor air concentrations have decreased by an order of magnitude since startup of the SVE system. The SVE system is maintaining CVOCs in indoor air at concentrations below DSCA acceptable target risk levels.

Conclusions

A total CVOC mass of 1.96 pounds was previously estimated to be contained within the vadose zone based on the results of the SVE Pilot Test Report (AECOM, 2014). As of May 20, 2016, 2.866 pounds of CVOC mass have been removed by the system. VOC mass removal rates have decreased over the lifetime of the system and PCE and TCE concentrations have been reduced. Indoor air sampling since system startup indicates that CVOC levels within the facility building have decreased and are at acceptable risk levels. Continued operation of the SVE system is currently recommended.

If you have any questions, please contact Brian Ray at (919) 461-1514 or any of the undersigned.

Sincerely yours,



Matt Allen, P.G.
Project Manager



Brian A. Ray
Program Manager

Attachments

Tables

Table 1
SVE System Performance Data
Koretizing Cleaners, Wilson, North Carolina
DSCA Site ID #980001

Combined Effluent								
Date	Sample Time	Runtime Hours	Pressure ¹ (inches Hg)	Temperature (°F)	SVE Flow ² (inches WC)	Air Flow (cfm)	Air Flow (m ³ /min)	Lifetime Average (cfm)
1/18/2016	13:00	1,326	-0.5	50	3.20	154.8	4.38	154.8
2/27/2016	13:10	NR	0.0	65	2.84	148.0	4.19	151.4
3/25/2016	10:15	2,931	0.0	75	2.83	149.1	4.22	150.6
4/29/2016	14:30	3,818	0.0	70	2.65	143.6	4.07	148.9
5/20/2016	10:00	4,275	0.0	100	4.20	180.8	5.12	155.3
5/23/2016	10:00	NR	2.0	65	NR	130.0	3.68	151.0
6/30/2016	15:10	5,288	2.0	130	4.00	176.4	5.00	154.7

Notes

NR = Not recorded

ppm = parts per million

fpm = feet per minute

cfm = cubic feet per minute

m³/min = cubic meter per minute

°F = degrees fahrenheit

¹Vacuum gauges with a range from 0 to -100 inches of WC were installed on May 23, 2016 replacing previous vacuum gauges that were not appropriate for conditions observed.

²Combined effluent flow is measured and recorded by a datalogger every 5 minutes. The datalogger did not record system parameters from March 15, 2016 to May 10, 2016, due to reaching maximum data capacity. The flow rate on March 25, 2016 was estimated based on datalogger information collected March 15, 2016 @ 5:35 am. The flow rate on April 29, 2016 was estimated based on datalogger information collected May 10, 2016 @ 3:25 am .

Table 2
Air Laboratory Analytical Data
Koretizing Cleaners, Wilson, North Carolina
DSCA Site ID #980001

Combined Effluent Sample Concentrations ($\mu\text{g}/\text{m}^3$)					
Date	TCE ($\mu\text{g}/\text{m}^3$)	PCE ($\mu\text{g}/\text{m}^3$)	Combined Flow Rate (m^3/min)	VOC Emissions (lb/day)	VOC Emissions (lb)
11/20/2015	51	3,700	4.40	0.0525	--
1/18/2016	40	1,406	4.38	0.0202	2.14
2/27/2016	ND	75	4.19	0.0010	0.42
3/25/2016	ND	143	4.22	0.0019	0.04
4/29/2016	ND	82	4.07	0.0011	0.05
5/20/2016	ND	272	5.12	0.0044	0.06
6/30/2016	11	170	5.00	0.0029	0.15

Total CVOCs	2.866
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Manifold Influent Sample Concentrations					
Sample ID	Date	TCE		PCE	
		ppm-v	$\mu\text{g}/\text{m}^3$	ppm-v	$\mu\text{g}/\text{m}^3$
SV-01	1/18/2016	0.0040	21.5	0.0910	617
SV-03	1/18/2016	0.0060	32.25	0.1400	950
SV-04	1/18/2016	0.0270	145.1	0.4400	2,985
SV-05	1/18/2016	0.0070	37.62	0.2840	1,926
SV-06	1/18/2016	0.0050	26.87	0.2400	1,628
Combined	6/30/2016	0.0020	11	0.0361	245

Notes:

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

1,1-DCA = 1,1-Dichloroethane

1,1-DCE = 1,1-Dichloroethene

cis-1,2-DCE = cis-1,2-Dichloroethene

PCE = Tetrachloroethene

TCE = Trichloroethene

trans-1,2-DCE = trans-1,2-Dichloroethene

C = Cancer; N = Non-cancer

NS = No screening value or calculated value not meaningful

VOCs = Volatile organic compounds

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

ND = Not detected

Only detected chlorinated volatile organic compounds shown.

PCE and TCE concentrations shown for 11/20/16 are based on TO-15 sampling results collected on 5/20/14 from SVE-01 during pilot testing (Step 1 test - 15 in H_2O).

PCE and TCE concentrations shown for 1/18/16 (combined effluent samples) were calculated as the geometric mean of the manifold influent sample concentrations collected from wells SV-01, SV-03, SV-04, SV-05, and SV-06.

Table 5: Analytical Data for Indoor and Outdoor Air **ADT 5**

DSCA ID No.: 98-0001												
Sample ID	Sampling Date (mm/dd/yy)	Sample Location ¹	Sampling Method ²	Sampling Duration ³	Benzene	cis-1,2-Dichloroethylene	Chloroethane	Ethylbenzene	Tetrachloroethylene	trans-1,2-Dichloroethylene	Trichloroethylene	Vinyl chloride
					[µg/m ³]							
IA-1	4/8/10	F	6 L SU	8 hrs	NA	3.63	NA	NA	286	0.0605	6.62	<0.0127
IA-2	4/8/10	F	6 L SU	8 hrs	NA	2.78	NA	NA	228	<0.0307	5.44	<0.0117
IA-3	4/8/10	F	6 L SU	8 hrs	NA	<0.0317	NA	NA	0.37	<0.0317	0.0384	<0.012
IA-1 20100819	8/19/10	F	6 L SU	8 hrs	NA	1.3	NA	NA	88	<0.079	2.5	<0.051
IA-2 20100819	8/19/10	F	6 L SU	8 hrs	NA	1.6	NA	NA	120	<0.079	3	<0.051
IA-ERAC-Front	2/23/11	F	6 L SU	8 hrs	NA	2.4	NA	NA	160	<0.079	4.4	<0.0511
IA-ERAC-Back	2/23/11	F	6 L SU	8 hrs	NA	2	NA	NA	170	<0.079	3.9	<0.0511
Sub Slab Depressurization System Installed and started on April 2, 2011												
IA-ERAC-Front	5/12/11	F	6 L SU	8 hrs	NA	1.3	NA	NA	44	<0.079	1.6	<0.051
IA-ERAC-Back	5/12/11	F	6 L SU	8 hrs	NA	1.3	NA	NA	48	<0.079	1.6	<0.051
BG	5/12/11	F	6 L SU	8 hrs	NA	<0.079	NA	NA	1.1	<0.079	<0.11	<0.051
IA-ERAC-Front	6/17/11	F	6 L SU	8 hrs	NA	0.27	NA	NA	34	<0.079	0.7	<0.051
IA-ERAC-Back	6/17/11	F	6 L SU	8 hrs	NA	0.3	NA	NA	41	<0.079	0.8	<0.051
BG	6/17/11	F	6 L SU	8 hrs	NA	<0.079	NA	NA	0.95	<0.079	<0.11	<0.051
IA-1 Front	9/19/11	F	6 L SU	8 hrs	NA	0.95	NA	NA	68	<0.079	1.9	<0.051
IA-2 Back	9/19/11	F	6 L SU	8 hrs	NA	0.95	NA	NA	75	<0.079	1.9	<0.051
IA-1	6/28/12	F	6 L SU	8 hrs	0.54	0.52	NA	0.52	21	<0.079	0.70	<0.051
IA-2	6/28/12	F	6 L SU	8 hrs	0.35	0.27	NA	0.25	32	<0.079	0.52	<0.051
IA-1	02/19/13	F	6 L SU	8 hrs	NA	3.2	NA	NA	95	<0.079	2.9	<0.051
IA-2	02/19/13	F	6 L SU	8 hrs	NA	3.7	NA	NA	62	<0.079	3.3	<0.051
IA-1	07/26/13	F	6 L SU	8 hrs	NA	0.34	NA	NA	24	<0.079	0.53	<0.051
IA-2	07/26/13	F	6 L SU	8 hrs	NA	0.33	NA	NA	31	<0.079	0.54	<0.051
IA-ERAC-FRONT	02/06/14	F	6 L SU	8 hrs	1.1	<0.79	0.8	<0.87	14	<0.79	<1.1	<0.51
IA-ERAC-BACK	02/06/14	F	6 L SU	8 hrs	2.3	0.99	1.3	1.3	25	<0.79	<1.1	<0.51
AA-01	02/06/14	F	6 L SU	8 hrs	0.89	<0.79	0.9	<0.87	<1.4	<0.79	<1.1	<0.51
Soil Vapor Extraction System Installed and Started on November 20, 2015												
IA-01	01/18/16	F	P	7d	NA	<0.22	NA	NA	1.6	<0.23	<0.10	<0.31
IA-ERAC-Back	04/01/16	F	P	7d	NA	<0.32	NA	NA	1.2	<0.33	<0.14	<0.44
IA-ERAC-Front	04/01/16	F	P	7d	NA	<0.32	NA	NA	1.2	<0.33	<0.14	<0.44
DWM Non-Residential Indoor Air and Crawl Space Screening Level (IASL)					15.7	NS	79	49.1	35	52.6	1.75	27.9

Notes:

¹ Indicate "F" for former or current dry-cleaning facility, "AD" for adjacent space, "R" for residence, "C" for commercial not adjacent space. If sample was

² Indicate "SU" for summa canister, "FC" for flux chambers, "T" for tedlar bags, "P" for passive samplers, "O" for other.

³ Indicate "8h" for 8-hour, "24h" for 24-hour, "G" for grab sample, for other hours indicate the number of hours followed by "h" or "d" for days.

ADT 5 Physical Data for Indoor and Outdoor Air (User Specified Chemicals)

DSCA ID No.: 98-0001

Sample ID	Sampling Date (mm/dd/yy)	Sample Location ²	Sampling Method ³	Sampling Duration ⁴	Acetone	Ethanol	cyclohexane	Dichlorodifluoromethane	Trichlorofluoromethane	Heptane	n-Hexane	Methylene Chloride	2-Propanol	Tetrahydrofuran	Toluene	1,2,4-Trimethylbenzene	2,2,4-Trimethylpentane	m&p-xylene	o-xylene
					[µg/m ³]														
IA-1	4/8/10	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-2	4/8/10	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-3	4/8/10	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-1 20100819	8/19/10	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-2 20100819	8/19/10	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-ERAC- Front	2/23/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-ERAC- Back	2/23/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-ERAC- Front	5/12/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-ERAC- Back	5/12/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BG	5/12/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-ERAC- Front	6/17/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-ERAC- Back	6/17/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BG	6/17/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-1 Front	9/19/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-2 Back	9/19/11	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-1	6/28/12	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-2	6/28/12	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-1	2/19/13	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-2	2/19/13	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-1	7/26/13	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-2	7/26/13	F	6 L SU	8 hrs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-ERAC- FRONT	2/6/14	F	6 L SU	8 hrs	16	620	<0.69	1.4	<1.1	0.94	2.6	0.73	16	0.83	3.5	1.5	1.2	2.3	0.95
IA-ERAC- BACK	2/6/14	F	6 L SU	8 hrs	26	600	0.69	2.4	1.2	2	5.3	<0.69	16	1.7	7.2	2.9	2.5	4.3	1.9
AA-01	2/6/14	F	6 L SU	8 hrs	4	17	<0.69	1.8	<1.1	<0.82	<0.71	0.83	<3.1	<0.59	1.2	<0.98	<0.93	<1.7	<0.87
IA-01	1/18/16	F	P	7d	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-ERAC- Back	4/1/16	F	P	7d	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IA-ERAC- Front	4/1/16	F	P	7d	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
					27200	NS	5260	87.6	613	NS	613	526	NS	1750	4380	6.13	NS	87.6	87.6

Notes:

¹ Indicate "F" for former or current dry-cleaning facility, "AD" for adjacent space, "R" for residence, "C" for commercial not adjacent space, "O" for outdoors.

² Indicate "SU" for standard summa canister, "SIM" for SIM summa canisters, "FC" for flux chambers, "T" for tedlar bags, "P" for passive samplers, "O" for other.

³ Indicate "8h" for 8-hour, "24h" for 24-hour, "G" for grab sample, for other hours indicate the number of hours followed by "h" or "d" for days.

Table 5(2): Additional Data for Indoor and Outdoor Air **ADT 5(2)**

DSCA ID No.: 98-0001

Is dry-cleaning facility at the site: Operating Pick-up Only Abandoned
If facility is operating, solvents used are: Petc Petroleum Green Earth Other

For the active or former dry-cleaning space, describe the type and location of the air handling/HVAC unit (for example - a shared unit supplying two adjacent spaces; unit located on the roof):

Unit located on western side of building at groundlevel.

For any other indoor spaces tested, describe the type and location of the air handling/HVAC unit (for example - a shared unit supplying two adjacent spaces; unit located on the roof):

NA

For any indoor air spaces tested, describe the current use of the space (for example - an ABC liquor store adjacent to the dry-cleaner, a residence approximately 200 feet from the dry-cleaner, etc.):

Currently operated as an Enterprise Rent-A-Car

Attachment:
Sampling location map that indicates where all the indoor air samples were collected. The map should clearly indicate the names/types of businesses and residence names sampled and in the vicinity of the subject site that may be of concern.

Table 5(3): Additional Data for Indoor and Outdoor Air **ADT 5(3)**

DSCA ID No.: 98-0001

Sample ID	Name and Address for Sampling Location	Property Owner Name, Address, and Phone Number	Tenant Name, Address, and Phones Number
IA-1	Enterprise Rent-A-Car 1313 Ward Blvd., Wilson, NC	Boulevard Investors LLC 600 Old Country Rd Ste 435, Garden City, NY	Enterprise Rent-A-Car 1313 Ward Blvd., Wilson, NC
IA-2			
IA-3			
IA-1 20100819			
IA-2 20100819			
IA-ERAC-Front			
IA-ERAC-Back			
IA-ERAC-Front			
IA-ERAC-Back			
BG			
IA-ERAC-Front			
IA-ERAC-Back			
BG			
IA-1 Front			
IA-2 Back			
IA-1			
IA-2			
IA-1			
IA-2			
IA-ERAC-FRONT	Enterprise Rent-A-Car 1313 Ward Blvd., Wilson, NC	Boulevard Investors LLC 600 Old Country Rd Ste 435, Garden City, NY	Enterprise Rent-A-Car 1313 Ward Blvd., Wilson, NC
IA-ERAC-BACK			
AA-01			
IA-01	Enterprise Rent-A-Car 1313 Ward Blvd., Wilson, NC	Boulevard Investors LLC 600 Old Country Rd Ste 435, Garden City, NY	Enterprise Rent-A-Car 1313 Ward Blvd., Wilson, NC
IA-ERAC-Back			
IA-ERAC-Front			

4/20/2016

Mr. Matthew Allen
AECOM Environment
1600 Perimeter Park Drive
Suite 400
Morrisville NC 27560

Project Name: Koretizing
Project #:
Workorder #: 1604129

Dear Mr. Matthew Allen

The following report includes the data for the above referenced project for sample(s) received on 4/7/2016 at Air Toxics Ltd.

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

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

Regards,



Ausha Scott
Project Manager

WORK ORDER #: 1604129

Work Order Summary

CLIENT:	Mr. Matthew Allen AECOM Environment 1600 Perimeter Park Drive Suite 400 Morrisville, NC 27560	BILL TO:	Accounts Payable-Raleigh AECOM Environment 1600 Perimeter Park Drive Suite 400 Morrisville, NC 27560
PHONE:	919.461.1100	P.O. #	56910ACM
FAX:		PROJECT #	Koretizing
DATE RECEIVED:	04/07/2016	CONTACT:	Ausha Scott
DATE COMPLETED:	04/20/2016		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>
01A	IA-ERAC-Back	Passive S.E. RAD130/SKC
02A	IA-ERCA-Front	Passive S.E. RAD130/SKC
03A	Lab Blank	Passive S.E. RAD130/SKC
04A	LCS	Passive S.E. RAD130/SKC
04AA	LCSD	Passive S.E. RAD130/SKC

CERTIFIED BY: 
 Technical Director

DATE: 04/20/16

LABORATORY NARRATIVE
Passive SE by Mod EPA TO-17
AECOM Environment
Workorder# 1604129

Two Radiello 130 (Solvent) samples were received on April 07, 2016. The laboratory analyzed the charcoal sorbent bed of the passive sampler following modified method EPA TO-17. The VOCs were chemically extracted using carbon disulfide and an aliquot of the extract was injected into a GC/MS for identification and quantification of volatile organic compounds (VOCs).

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

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

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

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

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

If validated uptake rates were not available, rates were estimated using the chemical's diffusion coefficient in air and the geometric constant of the sampler. Chemicals that are poorly retained by the sorbent over the sampling duration may exhibit a low bias. All concentrations calculated using estimated rates are qualified with a "C" flag.

To calculate ug/m³ concentrations in the Lab Blank, a sampling duration of 10,095 minutes was applied. The assumed temperature used for the uptake rate is listed on the data page. If the field temperatures were provided, the rate was adjusted in the same manner as the field samples.

Definition of Data Qualifying Flags

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

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

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

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

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

N - The identification is based on presumptive evidence.

C - Estimated concentration due to calculated sampling rate

CN - See case narrative explanation.

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

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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

Client Sample ID: IA-ERAC-Back

Lab ID#: 1604129-01A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.10	0.17	0.73	1.2

Client Sample ID: IA-ERCA-Front

Lab ID#: 1604129-02A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.10	0.17	0.75	1.2



Client Sample ID: IA-ERAC-Back

Lab ID#: 1604129-01A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	10041307sim	Date of Collection:	4/1/16 10:45:00 AM
Dil. Factor:	1.00	Date of Analysis:	4/13/16 12:26 PM
		Date of Extraction:	4/13/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	0.73	1.2
Vinyl Chloride	0.40	0.44	Not Detected C	Not Detected C
cis-1,2-Dichloroethene	0.20	0.32	Not Detected C	Not Detected C
trans-1,2-Dichloroethene	0.20	0.33	Not Detected C	Not Detected C

C = Estimated concentration due to calculated sampling rate.

Temperature = 77.0F , duration time = 10095 minutes.

Container Type: Radiello 130 (Solvent)

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



Client Sample ID: IA-ERCA-Front

Lab ID#: 1604129-02A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	10041309sim	Date of Collection:	4/1/16 10:50:00 AM
Dil. Factor:	1.00	Date of Analysis:	4/13/16 01:12 PM
		Date of Extraction:	4/13/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	0.75	1.2
Vinyl Chloride	0.40	0.44	Not Detected C	Not Detected C
cis-1,2-Dichloroethene	0.20	0.32	Not Detected C	Not Detected C
trans-1,2-Dichloroethene	0.20	0.33	Not Detected C	Not Detected C

C = Estimated concentration due to calculated sampling rate.

Temperature = 77.0F , duration time = 10095 minutes.

Container Type: Radiello 130 (Solvent)

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



Client Sample ID: Lab Blank

Lab ID#: 1604129-03A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	10041305sim	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	4/13/16 10:46 AM
		Date of Extraction:	4/13/16

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.10	0.14	Not Detected	Not Detected
Tetrachloroethene	0.10	0.17	Not Detected	Not Detected
Vinyl Chloride	0.40	0.44	Not Detected C	Not Detected C
cis-1,2-Dichloroethene	0.20	0.32	Not Detected C	Not Detected C
trans-1,2-Dichloroethene	0.20	0.33	Not Detected C	Not Detected C

C = Estimated concentration due to calculated sampling rate.

Temperature = 77.0F , duration time = 10095 minutes.

Container Type: Radiello 130 (Solvent)

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



Air Toxics

Client Sample ID: LCS

Lab ID#: 1604129-04A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	10041303sim	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/13/16 09:59 AM
		Date of Extraction: 4/13/16

Compound	%Recovery	Method Limits
Trichloroethene	93	70-130
Tetrachloroethene	93	70-130
Vinyl Chloride	86	50-140
cis-1,2-Dichloroethene	96	70-130
trans-1,2-Dichloroethene	100	70-130

Container Type: NA - Not Applicable

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



Air Toxics

Client Sample ID: LCSD

Lab ID#: 1604129-04AA

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	10041304sim	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	4/13/16 10:23 AM
		Date of Extraction:	4/13/16

Compound	%Recovery	Method Limits
Trichloroethene	95	70-130
Tetrachloroethene	94	70-130
Vinyl Chloride	92	50-140
cis-1,2-Dichloroethene	100	70-130
trans-1,2-Dichloroethene	87	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130

PASSIVE SAMPLE COLLECTION



Air Toxics

CHAIN-OF-CUSTODY RECORD

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. Eurofins 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 Eurofins 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
 (916) 985-1000 FAX (916) 985-1020

Page _____ of _____

Project Manager Matthew Allen maecan@acem.com

Collected by: (Print and Sign) AC. Richardson

Company AECom Email _____

Address 1600 Perimeter Park Dr City Morrisville State NC Zip 27560

Phone 919-461-1434 Fax _____

Project Info:

Project # _____

Project Name Karetzing

Turn Around Time: Normal Rush

Reporting Units: ppmv ppbv µg/m3 mg/m3

specify _____

Lab I.D.	Field Sample I.D. (Location)	Sampler #	Date of Deployment (mm/dd/yy)	Time of Deployment (hr:min)	Date of Retrieval (mm/dd/yy)	Time of Retrieval (hr:min)	Air Temperature	Indoor Air		Outdoor Air		Workplace Monitoring		Other	
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