February 1, 2019

Richard Joslin
Wisconsin Department of Natural Resources
625 E County Road Y, Suite 700
Oshkosh, Wisconsin 54901-9731

Subject: **Supplemental Site Investigations Report**
Former Dutch Cleaners
403 S. Main Street, Cedar Grove, Wisconsin
BRRTS# 02-60-271527

Dear Mr. Joslin:

On behalf of the responsible party (RP), Jere Ebbers, EnviroForensics, LLC (EnviroForensics) is providing you with this information supplemental to the site investigative reporting performed at the former Dutch Cleaners property located at 403 S. Main Street, Cedar Grove, Wisconsin (Site). This document summarizes the results of additional vapor intrusion testing performed at the Site building and other off-site properties. It also presents details regarding the installation of a vapor mitigation system (VMS) installed at the Site and data pertaining to commissioning of that system. Lastly, documentation of select groundwater sample analyses with recommendations are presented.

Additional Vapor Intrusion Sampling

EnviroForensics has completed two (2) rounds of vapor intrusion (VI) sampling at four (4) off-site properties as described in our work scope titled: *Letter Report and Work Scope for Further Site Investigation Activities*, dated November 10, 2017. According to the guidelines in WDNR publication RR-800, buildings within 100 feet of the contaminant source area should be assessed for the risk of vapor intrusion. Paired sub-slab and indoor air samples were collected from the following off-site properties both during the heating months and non-heating months:

- 349 S. Main Street, commercial building to the north of the Site across Wisconsin Street;
- 406 S. Main Street, commercial building to the east of the Site;
- 416, 418, and 420 S. Main Street, residential three-family apartment building southeast of the Site; and
- 11 Wisconsin Avenue, residential home adjacent to the west of the Site.

Figure 1 shows the location of these properties in reference to the Site along with the locations of indoor air and sub-slab vapor samples collected. The Wisconsin Department of Natural Resources was copied on the results letters presented to the property owners. **Table 1** contains the results of vapor intrusion sampling for all investigated properties. Analytical laboratory reports corresponding to the vapor

EnviroForensics, LLC
N16W23390 Stone Ridge Drive, Suite G, Waukesha, WI 53188
Phone: 317-972-7870 • Fax 317-972-7875

instrusion sampling results are attached in **Appendix A**. At this time, there were no identified vapor intrustion risks to the off-site properties.

Vapor Mitigation System Installation and O&M Plan

A risk for vapor intrusion was previously identified from sub-slab vapor at the Site Building. Advance diagnostics were performed prior to the design and installation of the VMS at the Site building. The results of this testing were previously submitted in a letter titled: *Project Progress Update and Request for Change Order for Vapor Mitigation System Installation*, dated March 23, 2018.

During the period from April 24-26, 2018, Vapor Protection Services installed the mitigation system under the direction of EnviroForensics staff. The final layout of the VMS and post-installation pressure field extension measurements are shown on **Figure 2**. Further details and photographs of the VMS are provided in the Vapor Mititigation System Operation, Maintenance, and Monitoring document (O&M Plan) in **Appendix B**. Based on the results of pressure field extension testing, one (1) sub-slab extraction point (EP-1) was installed for the sub-slab depressurization system (SSDS), connected with conveyance piping to a RadonAway RP 265 fan, and exhausted above the building roofline. Visible cracks in the slab foundation were sealed to maximize efficacy of the SSDS. A u-tube manometer was installed on the extraction piping in the basement to provide quick and easy visual confirmation that the system is operating under negative pressure.

In addition, a submembrane depressurization system (SMDS) was installed in a crawl space located on the western portion of the building. Crawl space soils were sealed off using 6-mil plastic sheeting and polyurethane calk. A horizontal perforated pipe was installed under the sheeting as a depressurization point. The perforated piping was connected to conveyance piping and routed to a RadonAway RP 380 fan, mounted next to the SSDS fan on the outside of the building, and exhausted above the building roofline. The SMDS fan was hardwired to the same circuit breaker as the SSDS fan, with a dedicated on/off switch next to the fan.

In our progress update of March 23, 2018, we proposed to also vent what we believed to be a small crawl space located on the southern portion of the building. At the time, we visually observed two pipes entering this area from the basement through a concrete block wall and assumed that there was a crawl space behind the block wall. However, upon further inspection, it was discovered that there was no gap between soil and the first floor structure, and that this area was actually concrete slab on grade. Therefore, no venting of this area was performed. Instead, a sub-slab sample (SSV-3) was collected through the slab of this small area as shown on **Figure 1**. The sample did not contain any contaminants of concern as can be seen in **Table 1** results and the laboratory sheets in **Appendix A**.

Vapor Mitigation System Commissioning

Installation and startup of the vapor mitigation systems were completed in April of 2018. Per PUB-RR-800, commissioning of the vapor mitigation systems was performed following installation and startup. The fans and connective piping for both the SSDS and SMDS were visually inspected to ensure smooth

operation and sealed joints. Pressure field extension testing was completed following startup of the SSDS in April. Two (2) additional extension testing events were performed in mid-June and mid-November, 2018 as documented in the O&M Plan contained in **Appendix B**. Indoor air samples were again collected from the building during the June, 2018 commissioning event while the SSDS and SMDS were in operation (see **Table 1** and **Appendix A** for results). The results indicate that the SSDS is capturing sub-slab vapors and indoor air concentrations decreased.

The SMDS was visually inspected for vacuum across the sheeting surface upon system startup. A smoke test was performed to check the integrity of the membrane, with a smoke source placed within the crawl space. The initial smoke testing performed in November indicated leakage at some points where the liner lapped the concrete block walls of the crawl space. Therefore, in December additional sealing was performed and repeat smoke testing indicated that the SMDS was tight. Manometer readings of the SMDS during the commissioning phase indicated adequate negative pressure.

The O&M Plan contained in **Appendix B** was developed for future monitoring and maintenance of the VMS. The O&M Plan was discussed with the current Site owner and occupants, as they will be responsible for the operation and maintenance of the VMS after the case has been closed. A copy of the plan is attached to the VMS extraction piping in the basement at the Site for easy access.

Groundwater Sampling

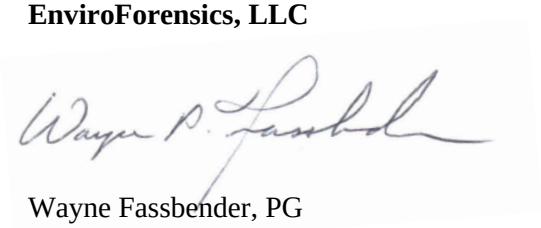
EnviroForensics collected groundwater samples in June, 2018 from two (2) site wells MW-102 and MW-106 to determine the populations of microbes capable of complete degradation of the chlorinated compounds. MW-106 is located in the central part of the groundwater plume and MW-102 is located more towards the trailing edge of the plume to the south. The microbial assay results prepared by Microbial Insights, Inc. are included in **Appendix C**, along with **Figure B.3.b.** from the Site Investigation Report submitted by Fehr Graham dated March, 2015, and showing the extent of the groundwater plume at that time. **Table 2** contains the results of analyses for chlorinated compounds and the laboratory analytical results sheets are contain in **Appenix C**. As can be seen in **Appendix C**, the populations of specific chlorinated compound degrader microbes are very low. However, as seen in **Table 2** and the laboratory analytical results sheets in **Appendix C**, there are significant products of PCE de-chlorination including trichloroethene, cis-1,2-dichloroethene, and vinyl choride indicating that some microbial degradation is occurring. The shape and position of the groundwater plume shown on **Figure B.3.b.** indicates that the plume appears to have migrated to the north from the original source area. In addition, concentrations of PCE and degradation products of PCE has increased at MW-106 since last sampled by Fehr Graham in 2014. This data suggests that groundwater amendments such as an electon donor and specific microbes may be necessary to arrest further migration and for complete degradation of the groundwater plume in a reasonable period of time.

It is recommended that options for remediation be prepared as the next step. Active remedial measures are necessary to reduce source area concentrations in both unsaturated soil and groundwater. The remediation goal should be to eliminate the current vapor intrusion risk to the site building and to reduce concentrations to levels that will no longer result in a migrating groundwater plume and that will naturally

attenuate over a reasonable period of time. We have attached a hydrogeologist certification statement in **Appendix D** as required in NR 712.

If you have any questions or require additional information, please do not hesitate to contact me at (414) 982-3988, or by email at wfassbender@enviroforensics.com.

Sincerely,
EnviroForensics, LLC



Wayne Fassbender, PG
Senior Project Manager

Attachments:
Figure 1: Vapor Intrusion Sample Location Map
Figure 2: Vapor Mitigation System Layout
Figure B.3.b.: Groundwater Isoconcentration, August 13, 2014 (from Fehr Graham SIR)
Table 1: Vapor Instrusion Analytical Results
Table 2: Groundwater Analytical Results for MW-102 and MW-106
Appendix A: Vapor Analytical Laboratory Reports
Appendix B: Vapor Mitigation System O&M Plan
Appendix C: Groundwater Analytical Laboratory Reports
Appendix D: Hydrogeologist Certification

Copy: Jere Ebbers
Tom and Marilyn Berlin

FIGURES

Legend

- Site property boundary
- GAS — Underground gas utility line
- WTR — Underground water utility line
- SAN — Underground sanitary utility line
- STM — Underground storm utility line
- Catch Basin
- Manhole
- Sump
- FDCM — Former dry cleaning machine location
- SSV-1 — Sub-slab sample
- OA-1 — Outdoor air sample
- IA-1 — Indoor air sample

Commercial

Commercial

Residence

Residence

Garage

Garage

SSV-1

IA-1

Commercial
349 S. Main St
(Former Gas Station)

OA

South Main Street

Wisconsin Street

Parking Lot

OA

SSV-1
IA-2
Basement

OA

Crawl Space

FDCM
SSV-2

IA-1

FDCM
SSV-3

Slab on Grade

Residential
11 Wisconsin Ave.

SSV-1
IA-B
IA-1

Residence

Residence

Commercial
406 S. Main St

SSV-1
IA-1

Garage

OA-1

Residential
416, 418, and 420
S. Main St

IA-B
SSV-1
IA-2
IA-1

OA

N

40 0 10 20 30 40

APPROXIMATE SCALE: 1" = 40'

VAPOR INTRUSION SAMPLE LOCATION MAP

Former Dutch Cleaners
403 South Main Street
Cedar Grove, Wisconsin

Date:	1/11/19
Designed:	EB
Drawn:	KH
Checked:	WF
DWG file:	6420-0341

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Figure 1

Project 6420

Wisconsin Street

South Main Street

Bathroom

Crawl Space

Basement

SSV-1
(-1.255)

Stairs

FDCM

SSV-2
(-2.092)

Boiler Room

EP-1

Slab on Grade

FDCM

Legend

- Site property boundary
- GAS — Underground gas utility line
- WTR — Underground water utility line
- SAN — Underground sanitary utility line
- STM — Underground storm utility line
- Catch Basin
- Manhole
- Sump
- FDCM — Former dry cleaning machine location
- SSV-1 — Sub-slab vapor sample
- EP-1 — Extraction point
- Mitigation Fan
- Sub-Slab Depressurization Piping
- Crawl Space Vent Piping
- Open vent/Slotted PVC pipe
- (-0.50) — Pressure influence from SVE system, in inches of water (in H_2O)

N

10 0 5 10

APPROXIAMTE SCALE: 1" = 10'

VAPOR MITIGATION SYSTEM LAYOUT

Former Dutch Cleaners
403 South Main Street
Cedar Grove, Wisconsin

Date:	7/6/18
Designed:	EB
Drawn:	EB
Checked:	WF
DWG file:	6420-0289

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Figure
2

Project
6420

LEGEND

GP-6 — Soil Boring

TW-7 — Existing Geoprobe Boring / Temporary Well

Solid = Abandoned

MW-106 — NR141 Monitoring Well

PZ-114 — NR141 Piezometer

Estimated extent groundwater isoconcentration of PCE (ug/L)

GROUNDWATER CHEMISTRY

PCE Tetrachloroethene (ug/L)
TCE Trichloroethene (ug/L)
cis Cis 1,2-Dichloroethene (ug/L)
BOLD++ Exceeds NR 140 Enforcement Standard
ITALICS+ Exceeds NR140 PAL

GOOD AS NEW SHOP
349 S. Main Street
(Former Gas Station)

Former Tanks ?

Former Dispensers

MW-111
Sidewalk
PCE <10.0
TCE <6.6
cis <5.1

City ROW

Gas

Catch Basin

P.P.

Sidewalk

Storm Sewer

Sanitary Sewer

S. MAIN STREET

M.H.
4' Deep

MW-112
PCE <0.50
TCE <0.33
cis <0.26

Driveway

Sidewalk

P.P.

N

Water

Gas

M.H.
5.2' Deep

8" Sanitary Sewer

WISCONSIN STREET

PCE 5.0 (ES)

PCE 100

PCE 1000

Storm Sewer

M.H.
5.8' Deep

Groundwater Flow
Aug 2014

Grass

Concrete

W Valve

Hydrant

MW-101
PCE *9.4*++
TCE <0.48
cis <0.83

GP-6

Rocks and Shrubs

Water
Sewer Cleanout

Floor Drain
to Sanitary

Basement
Bathroom

DUTCH CLEANERS
403 S. Main Street

Basement
(7' BGS)
Conc Floor

Former
DCM

Boiler Room
(9' BGS)

SUMP
11' BGS

PZ-114
MW-106
PCE <0.50
TCE <0.33
cis <0.26
PCE *3,880*++
TCE *106*++
cis *511*++

TW-9

Former
RR SWITCH

RR SWITCH

MW-113
PCE <0.50
TCE <0.33
cis <0.26

PCE *355*+
TCE <1.7
cis <1.3

TW-10

in Basement

GP-5

MW-104

GP-3

GP-1

MW-102
PZ-103

GP-11

MW-102
PCE *444*++
TCE *54.5*++
cis *12.6*+

PCE <0.50
TCE <0.33
cis <0.26

MW-110

TW-12

PCE *9.6*++
TCE *105*++
cis *13.8*+

PCE *1.3*+
TCE <0.33
cis <0.26

GP-4

GP-2

Residential Property

TW-8

MW-107
PCE *1.6*+
TCE <0.33
cis <0.26

Property Line (estimated)

TW-7

Groundwater Flow
Aug 2014

406 S.
Main Street

W Valves

W Main

MW-108
PCE <0.50
TCE <0.33
cis <0.26

RR Ballast

RR Tracks

MW-109
PCE <0.50
TCE <0.33
cis <0.26

MW-105
PCE <0.50
TCE <0.33
cis <0.26

Cooperative
Property

Apartment
Building

416, 418, 420
S. Main Street

10 0 10 20 Feet
SCALE

Title: Groundwater Isoconcentration August 13, 2014			FEHR GRAHAM ENGINEERING & ENVIRONMENTAL
Site: Former Dutch Cleaners, 403 S. Main St., Cedar Grove, WI 53013	Job # 14-1115 BRRTS# 02-60-271527		
Description:		Appvd:	Date: DATE: 10/11/13 — File: F:Base Map-Dutch-14.1115.skf
Rev:	Date:		Drawn: KAE — Appvd: — Figure: B.3.b

TABLES

TABLE 1
VAPOR INTRUSION ANALYTICAL RESULTS
Former Dutch Cleaners
403 S. Main Street, Cedar Grove, Wisconsin

Sample Address	Sample Identification	Sample Date	Consultant	Applicable Criteria	Mitigation	Tetrachloroethene	Trichlorethene
INDOOR/ OUTDOOR AIR							
Small Commercial Vapor Action Level						**180**	**8.8**
Residential Vapor Action Level						**42**	**2.1**
349 S. Main St.	6420-349 S Main ST-IA-1	04/25/18	EnviroForensics	Commercial	No	<3.19	<1.07
		06/13/18				<3.19	<1.07
	6420-OA	04/25/18				<3.19	<1.07
403 S. Main St.	6420-403 S Main ST-IA-1	09/13/17	EnviroForensics	Commercial	No	**6.92**	<1.07
		06/14/18			Yes	<3.19	<1.07
	6420-403 S Main ST-IA-2	09/13/17			No	**7.26**	<1.07
		06/14/18			Yes	<3.19	<1.07
	6420-403 S Main ST-OA	09/13/17			No	<3.19	<1.07
		06/14/18			Yes	<3.19	<1.07
406 S. Main St.	6420-406 S Main ST-IA-1	01/25/18	EnviroForensics	Commercial	No	<3.19	<1.07
		06/13/18				<3.19	<1.07
	6420-406 S Main ST-OA-1	01/25/18				<3.19	<1.07
418 S. Main St.	6420-418 S Main ST-IA-B	01/26/18	EnviroForensics	Residential	No	<3.19	<1.07
		06/14/18				<3.19	<1.07
	6420-418 S Main ST-IA-1	01/26/18				<3.19	<1.07
	6420-418 S Main ST-IA-2	01/26/18				<3.19	<1.07
	6420-418 S Main ST-OA	01/26/18				<3.19	<1.07
11 Wisconsin Ave	6420-11 Wisconsin Ave-IA-B	04/25/18	EnviroForensics	Residential	No	<3.19	<1.07
		08/07/18			No	**4.1**	<0.237
	6420-11 Wisconsin Ave-IA-1	04/25/18			No	<3.19	<1.07
		08/07/18			No	**2.44**	<0.237
	6420-OA	04/25/18			No	<3.19	<1.07
		08/07/18			No	<0.278	<0.237
SUB-SLAB VAPOR							
Small Commercial Vapor Risk Screening Level						**6,000**	**290**
Residential Vapor Risk Screening Level						**1,400**	**70**
349 S. Main St.	6420-349 S Main ST-SSV-1	04/25/18	EnviroForensics	Commerical	No	**134**	**3.87**
		06/13/18				**15.7**	<1.07
403 S. Main St.	6420-403 S Main ST-SSV-1	09/13/17	EnviroForensics	Commercial	No	**14,100**	**35.3**
		06/14/18			Yes	**60.7**	<1.07
	6420-403 S Main ST-SSV-2	09/13/17			No	**66,300**	**16.4**
		06/14/18			Yes	**25.7**	<1.07
	6420-403 S Main ST-SSV-3	04/25/18			No	<3.19	<1.07
		06/14/18			Yes	**358**	**21.0**
406 S. Main St.	6420-406 S Main ST-SSV-1	01/26/18	EnviroForensics	Commercial	No	**10.2**	<1.07
		06/13/18				**15.2**	<1.07
418 S. Main St.	6420-418 S Main ST-SSV-1	01/26/18	EnviroForensics	Residential	No	**4.88**	<1.07
		06/14/18				**26.0**	<1.07
11 Wisconsin Ave	6420-11 Wisconsin Ave-SSV-1	04/25/18	EnviroForensics	Residential	No	**1,350**	**7.36**
		08/07/18	EnviroForensics	Residential	No	**2.65**	<0.237

Notes:

Results reported in microgragms per cubic meter (µg/m^3)

Samples analyzed according to EPA Method TO-15

Vapor Risk Screeing/Action Levels are calculated in accordance with WDNR Publication RR-800 and subsequent guidance documents

IA = Indoor Air

OA = Outdoor Air

SSV = Sub-slab vapor

Bolded values are above detection limits

Bolded and Orange shaded concentration exceed the applicable small commercial screening level

TABLE 2

GROUNDWATER ANALYTICAL RESULTS for MW-102 and MW-106

Former Dutch Cleaners

403 S. Main Street, Cedar Grove, Wisconsin

Monitoring Well Identification	Sample Date	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl Chloride
Enforcement Standard		**5**	**5**	**70**	**100**	**0.2**
Preventive Action Limit		**0.5**	**0.5**	**7**	**20**	**0.02**
MW-102	6/14/2018	**570**	**53**	**28**	**6.3 J**	<2
MW-106	6/14/2018	**8,000**	**200**	**1,550**	**29.9**	**3.2 J**

Notes:

All concentrations reported in micrograms per liter (µg/L)

Samples analyzed using EPA SW-846 Method 8260

Bolded values exceed method detection limits

Bolded and blue shaded values exceed the Public Health Preventive Action Limit

Bolded and orange shaded values exceed the Public Health Enforcement Standard

J = Analyte concentration detected between the laboratory Method Detection Limit and Reporting Limit

APPENDIX A

Vapor Analytical Laboratory Reports

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Wayne Fassbender
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

September 28, 2017

EnvisionAir Project Number: 2017-576
Client Project Name: 6420

Dear Mr. Fassbender,

Please find the attached analytical report for the samples received September 15, 2017. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2017-576

Sample Summary

Canister Pressure / Vacuum

Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
17-2255	6420-403 S MAIN ST-IA-1	A	9/13/17	9:28	9/13/17	17:30	9/15/17	11:00	-29	-5	-5
17-2256	6420-403 S MAIN ST-IA-2	A	9/13/17	9:30	9/13/17	17:31	9/15/17	11:00	-29	-6	-6
17-2257	6420-403 S MAIN ST-OA-1	A	9/13/17	9:23	9/13/17	17:33	9/15/17	11:00	-29	-7	-7
17-2258	6420-403 S MAIN ST-SSV-1	A	9/13/17	18:27	9/13/17	18:33	9/15/17	11:00	-27	-5	-5
17-2259	6420-403 S MAIN ST-SSV-2	A	9/13/17	18:14	9/13/17	18:21	9/15/17	11:00	-28	-4	-4

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2017-576

Analytical Method: TO-15
Analytical Batch: 092117AIR

Client Sample ID: 6420-403 S MAIN ST-IA-1
Envision Sample Number: 17-2255
Sample Matrix: AIR

Sample Collection START Date/Time: 9/13/17 9:28
Sample Collection END Date/Time: 9/13/17 17:30
Sample Received Date/Time: 9/15/17 11:00

Compounds	Sample Results ug/m^3	Reporting Limit ug/m^3	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**6.92**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	110%		
Analysis Date/Time:	9-21-17/18:36		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2017-576

Analytical Method: TO-15
Analytical Batch: 092117AIR

Client Sample ID: 6420-403 S MAIN ST-IA-2
Envision Sample Number: 17-2256
Sample Matrix: AIR

Sample Collection START Date/Time: 9/13/17 9:30
Sample Collection END Date/Time: 9/13/17 17:31
Sample Received Date/Time: 9/15/17 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**7.26**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	112%		
Analysis Date/Time:	9-21-17/19:15		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2017-576

Analytical Method: TO-15
Analytical Batch: 092117AIR

Client Sample ID: 6420-403 S MAIN ST-OA-1
Envision Sample Number: 17-2257
Sample Matrix: AIR

Sample Collection START Date/Time: 9/13/17 9:23
Sample Collection END Date/Time: 9/13/17 17:33
Sample Received Date/Time: 9/15/17 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	103%		
Analysis Date/Time:	9-21-17/16:01		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2017-576

Analytical Method: TO-15
Analytical Batch: 092517AIR

Client Sample ID: 6420-403 S MAIN ST-SSV-1
Envision Sample Number: 17-2258
Sample Matrix: AIR

Sample Collection START Date/Time: 9/13/17 18:27
Sample Collection END Date/Time: 9/13/17 18:33
Sample Received Date/Time: 9/15/17 11:00

Compounds	Sample Results ug/m^3	Reporting Limit ug/m^3	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**14,100**	1280	1
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	**35.3**	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	113%		
Analysis Date/Time:	9-26-17/03:54		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2017-576

Analytical Method: TO-15
Analytical Batch: 092517AIR

Client Sample ID: 6420-403 S MAIN ST-SSV-2
Envision Sample Number: 17-2259
Sample Matrix: AIR

Sample Collection START Date/Time: 9/13/17 18:14
Sample Collection END Date/Time: 9/13/17 18:21
Sample Received Date/Time: 9/15/17 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**66,300**	5100	2
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	**16.4**	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	105%		
Analysis Date/Time:	9-26-17/04:32		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 092117AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	102%		
Analysis Date/Time:	9-21-17/15:25		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	10.3	10.6	10	103%	106%	2.9%	
trans-1,2-Dichloroethene	9.02	9.38	10	90%	94%	3.9%	
cis-1,2-Dichloroethene	9.34	9.8	10	93%	98%	4.8%	
Trichloroethene	11.3	11.2	10	113%	112%	0.9%	
Tetrachloroethene	11	11.5	10	110%	115%	4.4%	
4-bromofluorobenzene (surrogate)	114%	118%					
Analysis Date/Time:	9-21-17/13:25	9-21-17/14:49					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 092517AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	102%		
Analysis Date/Time:	9-25-17/17:36		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.37	9.64	10	94%	96%	2.8%	
trans-1,2-Dichloroethene	8.65	8.86	10	87%	89%	2.4%	
cis-1,2-Dichloroethene	9.98	10.3	10	100%	103%	3.2%	
Trichloroethene	10.9	10.5	10	109%	105%	3.7%	
Tetrachloroethene	11.4	11.5	10	114%	115%	0.9%	
4-bromofluorobenzene (surrogate)	118%	120%					
Analysis Date/Time:	9-25-17/15:37	9-25-17/16:19					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments
1	Reported value is from a 400x dilution. TJG 9-27-17
2	Reported value is from a 1600x dilution. TJG 9-27-17

EnvisionAir Proj#: 2017-576 Page 1 of 1

CHAIN OF CUSTODY RECORD WAF

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: Env. Forensics	P.O. Number: 2017-1198
Report Address: N16W23390 Stone Ridge Dr Suite G	Project Name or Number: 6420
Report To: Wayne Fassbender	Sampled by: Nate Duda
Phone: 414-982-3988	QA/QC Required: (circle if applicable) Level III (Level IV)
Invoice Address:	Reporting Units needed: (circle) (ug/m³) mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days (Std (5 bus. days))	Media type: 1LC = 1 Liter Canister; 6LC = 6 Liter Canister; TB = Tedlar Bag; TD = Thermal Desorption Tube

REQUESTED PARAMETERS

TO-15 Full List | TO-15 Short List

ENVISIONAIR

www.envision-air.com

Sampling Type:
Soil-Gas: □
Sub-Slab: ~~X~~
Indoor-Air: ~~X~~

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)	TO-15 Full List	TO-15 Short List	Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6420403SMainSt IA-1	6LC	9-13-17	9:28	9-13-17	17:30	X		10348	05717	-29	-5	-5	17-2255
6420403SMainSt IA-2	6LC	9-13-17	9:30	9-13-17	17:31	X		4688	05306	-29	-6	-6	17-2256
6420403SMainSt OA-1	6LC	9-13-17	9:23	9-13-17	17:33	X		16018	07309	-29	-7	-7	17-2257
6420403SMainSt SSV-1	1LC	9-13-17	18:~~23~~ 27	9-13-17	18:33	X		~~03922~~ ~~04045~~	–	-27	-5	-5	17-2258
6420403SMainSt SSV-2	1LC	9-13-17	18:14	9-13-17	18:21	X		~~03977~~ ~~04645~~	–	-28	-4	-4	17-2259

Comments:
Level IV for 6LC's only. Put purchase order on invoice.

Relinquished by:	Date	Time	Received by:	Date	Time
Nathan Duda	9-13-17	11:00		9/15/17	11:00

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Wayne Fassbender
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

May 11, 2018

EnvisionAir Project Number: 2018-275
Client Project Name: 6420

Dear Mr. Fassbender,

Please find the attached analytical report for the samples received April 30, 2018. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-275

Sample Summary

										Canister Pressure / Vacuum		
Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
18-1184	6420-403 S MAIN ST-SSV-3	A	4/25/18	14:28	4/25/18	14:33	4/30/18	11:00	-29	-2	-2

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-275

Analytical Method: TO-15
Analytical Batch: 050918AIR

Client Sample ID: 6420-403 S MAIN ST-SSV-3
Envision Sample Number: 18-1184
Sample Matrix: AIR

Sample Collection START Date/Time: 4/25/18 14:28
Sample Collection END Date/Time: 4/25/18 14:33
Sample Received Date/Time: 4/30/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	102%		
Analysis Date/Time:	05-10-18/03:19		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 050918AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	88%		
Analysis Date/Time:	05-09-18/10:20		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.08	8.96	10	91%	90%	1.3%	
trans-1,2-Dichloroethene	10	10	10	100%	100%	0.0%	
cis-1,2-Dichloroethene	10.5	10.8	10	105%	108%	2.8%	
Trichloroethene	10	10.1	10	100%	101%	1.0%	
Tetrachloroethene	8.86	9	10	89%	90%	1.6%	
4-bromofluorobenzene (surrogate)	97%	94%					
Analysis Date/Time:	05-09-18/09:05	05-09-18/09:45					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments

EnvisionAir Proj#: 2018-275 Page 1 of 1

CHAIN OF CUSTODY RECORD

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

ENVISIONAIR

Client: Enviroforensics	P.O. Number: 2018-0606
Report Address: N16 W23390 Stoneridge Dr Waukesha, WI 53188	Project Name or Number: 6420
Report To: Wayne Fassbender	Sampled by: Nate Rach
Phone: 414-982-3988	QA/QC Required: (circle if applicable) Level III (circled) Level IV
Invoice Address:	Reporting Units needed: (circle) ug/m³ (circled) mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days Std (5 bus. days) (circled)	Media type: 1LC = 1 Liter Canister; 6LC = 6 Liter Canister; TB = Tedlar Bag; TD = Thermal Desorption Tube

REQUESTED PARAMETERS: TO-15 Full List; TO-15 Short List

Sampling Type:
- Soil-Gas: ☐
- Sub-Slab: ☒
- Indoor-Air: ☐

www.envision-air.com

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)	TO-15 Full List	TO-15 Short List			Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6420-4035 Mainst-SSV-3	1LC	4/25/18	1428	4/25/18	1433		X			2210	0059	-29	-2	-2	18-1184

Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	4-27-18		FedEx		
			[signature] Hunnicutt	4/30/18	1100

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Wes Fassbender
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

July 2, 2018

EnvisionAir Project Number: 2018-358
Client Project Name: 6420

Dear Mr. Fassbender,

Please find the attached analytical report for the samples received June 18, 2018. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-358

Sample Summary

Canister Pressure / Vacuum

Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
18-1408	6420-403 S MAIN ST-OA	A	6/13/18	15:13	6/14/18	15:27	6/18/18	16:00	-29	-4	-4
18-1409	6420-403 S MAIN ST-IA-1	A	6/13/18	8:57	6/14/18	10:15	6/18/18	16:00	-28	-4	-4
18-1410	6420-403 S MAIN ST-IA-2	A	6/13/18	9:00	6/14/18	10:17	6/18/18	16:00	-30	-5	-5
18-1411	6420-403 S MAIN ST-SSV-1	A	6/14/18	10:45	6/14/18	10:50	6/18/18	16:00	-28	-3	-3
18-1412	6420-403 S MAIN ST-SSV-2	A	6/14/18	10:36	6/14/18	10:41	6/18/18	16:00	-29	-3	-3
18-1413	6420-403 S MAIN ST-SSV-3	A	6/14/18	10:26	6/14/18	10:31	6/18/18	16:00	-28	-2	-2

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-358

Analytical Method: TO-15
Analytical Batch: 062818AIR

Client Sample ID: 6420-403 S MAIN ST-OA
Sample Collection START Date/Time: 6/13/18 15:13
Sample Collection END Date/Time: 6/14/18 15:27
Envision Sample Number: 18-1408
Sample Received Date/Time: 6/16/18 16:00
Sample Matrix: AIR

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	97%		
Analysis Date/Time:	06-28-18/03:15		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-358

Analytical Method: TO-15
Analytical Batch: 062718AIR

Client Sample ID: 6420-403 S MAIN ST-IA-1
Envision Sample Number: 18-1409
Sample Matrix: AIR

Sample Collection START Date/Time: 6/13/18 8:57
Sample Collection END Date/Time: 6/14/18 10:15
Sample Received Date/Time: 6/16/18 16:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	97%		
Analysis Date/Time:	06-27-18/18:49		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-358

Analytical Method: TO-15
Analytical Batch: 062718AIR

Client Sample ID: 6420-403 S MAIN ST-IA-2
Envision Sample Number: 18-1410
Sample Matrix: AIR

Sample Collection START Date/Time: 6/13/18 9:00
Sample Collection END Date/Time: 6/14/18 10:17
Sample Received Date/Time: 6/16/18 16:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	101%		
Analysis Date/Time:	06-27-18/19:27		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-358

Analytical Method: TO-15
Analytical Batch: 062318AIR

Client Sample ID: 6420-403 S MAIN ST-SSV-1
Envision Sample Number: 18-1411
Sample Matrix: AIR

Sample Collection START Date/Time: 6/14/18 10:45
Sample Collection END Date/Time: 6/14/18 10:50
Sample Received Date/Time: 6/16/18 16:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**60.7**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	90%		
Analysis Date/Time:	06-23-18/03:44		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-358

Analytical Method: TO-15
Analytical Batch: 062318AIR

Client Sample ID: 6420-403 S MAIN ST-SSV-2
Envision Sample Number: 18-1412
Sample Matrix: AIR

Sample Collection START Date/Time: 6/14/18 10:36
Sample Collection END Date/Time: 6/14/18 10:41
Sample Received Date/Time: 6/16/18 16:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**25.7**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	88%		
Analysis Date/Time:	06-23-18/04:23		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-358

Analytical Method: TO-15
Analytical Batch: 062318AIR

Client Sample ID: 6420-403 S MAIN ST-SSV-3
Sample Collection START Date/Time: 6/14/18 10:26
Sample Collection END Date/Time: 6/14/18 10:31
Envision Sample Number: 18-1413
Sample Received Date/Time: 6/16/18 16:00
Sample Matrix: AIR

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**358**	128	1
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	**21.0**	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	88%		
Analysis Date/Time:	06-23-18/05:01		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 062318AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	84%		
Analysis Date/Time:	06-22-18/19:32		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	8.72	8.94	10	87%	89%	2.5%	
trans-1,2-Dichloroethene	10.8	10.9	10	108%	109%	0.9%	
cis-1,2-Dichloroethene	9.42	9.67	10	94%	97%	2.6%	
Trichloroethene	9.51	9.30	10	95%	93%	2.2%	
Tetrachloroethene	10.2	9.46	10	102%	95%	7.5%	
4-bromofluorobenzene (surrogate)	99%	101%					
Analysis Date/Time:	06-22-18/18:15	06-23-18/07:02					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 062718AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	87%		
Analysis Date/Time:	06-27-18/17:31		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.09	9.53	10	91%	95%	4.7%	
trans-1,2-Dichloroethene	9.95	10	10	100%	100%	0.5%	
cis-1,2-Dichloroethene	8.75	9.02	10	88%	90%	3.0%	
Trichloroethene	9.65	9.96	10	97%	100%	3.2%	
Tetrachloroethene	9.48	9.65	10	95%	97%	1.8%	
4-bromofluorobenzene (surrogate)	107%	107%					
Analysis Date/Time:	06-27-18/15:40	06-27-18/16:21					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments
1	Reported value is from a 40x dilution. TJG 07-02-18

EnvisionAir Proj#: 2018-358 Page 1 of 1

CHAIN OF CUSTODY RECORD

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: Enviroforensics	P.O. Number: 2018-0858
Report N16 W23790 Stoneridge Dr Address: Waukesha, WI 53188	Project Name or Number: 6420
Report To: W. Fassbender	Sampled by: Nathan Duda
Phone: 414-982-3988	QA/QC Required: (circle if applicable) ~~Level III~~ Level IV
Invoice Address: Same	Reporting Units needed: (circle) ug/m³ mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days Std (5 bus. days)	Media type: 1LC = 1 Liter Canister, 6LC = 6 Liter Canister, TB = Tedlar Bag, TD = Thermal Desorption Tube

REQUESTED PARAMETERS

TO-15 Full List

TO-15 Short List (Specify in notes)

ENVISIONAIR

Sampling Type:
Soil-Gas: □
Sub-Slab: ☒
Indoor-Air: ☒

www.envision-air.com

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)					Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6420-403S Main St-OA	6LC	6-13-18	15:13	6-14-18	15:27		X			4665	07458	-29	-4	-4	18-1408
6420-403S Main St-IA-1	6LC	6-13-18	08:57	6-14-18	10:15		X			14115	07712	-28	-4	-4	18-1409
6420-403S Main St-IA-2	6LC	6-13-18	09:00	6-14-18	10:17		X			19564	07300	-30	-5	-5	18-1410
6420-403S Main St-SSV-1	1LC	6-14-18	10:45	6-14-18	10:50		X			83924	0011	-28	-3	-3	18-1411
6420-403S Main St-SSV-2	1LC	6-14-18	10:36	6-14-18	10:41		X			84051	0072	-29	-3	-3	18-1412
6420-403S Main St-SSV-3	1LC	6-14-18	10:26	6-14-18	10:31		X			2224	~~0112~~ 0061	-29	-2	-2	18-1413

Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	6-15-18	1030	FedEx		
			~~Alan Munnich~~	6/18/18	1600

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Wayne Fassbender
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

May 11, 2018

EnvisionAir Project Number: 2018-277
Client Project Name: 6420

Dear Mr. Fassbender,

Please find the attached analytical report for the samples received April 30, 2018. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-277

Sample Summary

Canister Pressure / Vacuum

Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
18-1188	6420-11 WISCONSIN AVE-IA-B	A	4/25/18	7:17	4/26/18	7:07	4/30/18	11:00	-29	-6	-6
18-1189	6420-11 WISCONSIN AVE-IA-1	A	4/25/18	7:14	4/26/18	7:03	4/30/18	11:00	-29	-7	-7
18-1190	6420-11 WISCONSIN AVE-SSV-1	A	4/26/18	7:23	4/26/18	7:33	4/30/18	11:00	-29	-10	-10

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-277

Analytical Method: TO-15
Analytical Batch: 050218AIR

Client Sample ID: 6420-11 WISCONSIN AVE-IA-B

Envision Sample Number: 18-1188
Sample Matrix: AIR

Sample Collection START Date/Time: 4/25/18 7:17
Sample Collection END Date/Time: 4/26/18 7:07
Sample Received Date/Time: 4/30/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	88%		
Analysis Date/Time:	05-02-18/20:30		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-277

Analytical Method: TO-15
Analytical Batch: 050218AIR

Client Sample ID: 6420-11 WISCONSIN AVE-IA-1

Envision Sample Number: 18-1189
Sample Matrix: AIR

Sample Collection START Date/Time: 4/25/18 7:14
Sample Collection END Date/Time: 4/26/18 7:03
Sample Received Date/Time: 4/30/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	89%		
Analysis Date/Time:	05-02-18/21:09		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-277

Analytical Method: TO-15
Analytical Batch: 050918AIR

Client Sample ID: 6420-11 WISCONSIN AVE-SSV-1

Envision Sample Number: 18-1190
Sample Matrix: AIR

Sample Collection START Date/Time: 4/26/18 7:23
Sample Collection END Date/Time: 4/26/18 7:33
Sample Received Date/Time: 4/30/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**1,350**	31.9	1
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	**7.36**	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	96%		
Analysis Date/Time:	05-10-18/04:36		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 050918AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	88%		
Analysis Date/Time:	05-09-18/10:20		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.08	8.96	10	91%	90%	1.3%	
trans-1,2-Dichloroethene	10	10	10	100%	100%	0.0%	
cis-1,2-Dichloroethene	10.5	10.8	10	105%	108%	2.8%	
Trichloroethene	10	10.1	10	100%	101%	1.0%	
Tetrachloroethene	8.86	9	10	89%	90%	1.6%	
4-bromofluorobenzene (surrogate)	97%	94%					
Analysis Date/Time:	05-09-18/09:05	05-09-18/09:45					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 050218AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	90%		
Analysis Date/Time:	05-02-18/10:18		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.2	9.15	10	92%	92%	0.5%	
trans-1,2-Dichloroethene	9.77	9.8	10	98%	98%	0.3%	
cis-1,2-Dichloroethene	9.64	9.73	10	96%	97%	0.9%	
Trichloroethene	9.79	9.91	10	98%	99%	1.2%	
Tetrachloroethene	10.9	11.2	10	109%	112%	2.7%	
4-bromofluorobenzene (surrogate)	88%	91%					
Analysis Date/Time:	05-02-18/09:02	05-02-18/09:43					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments
1	Reported value is from a 10x dilution. TJG 05-10-18

EnvisionAir Proj#: 2018-277 Page 1 of 1

CHAIN OF CUSTODY RECORD

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: Enviroforensics	P.O. Number: 2018-0606
Report Address: N16 W23390 Stoneridge Dr. Suite G, Waukesha WI	Project Name or Number:
Report To: Wayne Fassbender	Sampled by: Nick Dudek
Phone: 414-982-3988	QA/QC Required: (circle if applicable) Level III Level IV
Invoice Address:	Reporting Units needed: (circle) ug/m³ mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days Std (5 bus. days)	Media type: 1LC = 1 Liter Canister, 6LC = 6 Liter Canister, TB = Tedlar Bag, TD = Thermal Desorption Tube

REQUESTED PARAMETERS

TO-15 Full List

TO-15 Short List

ENVISIONAIR

Sampling Type:
Soil-Gas: ☐
Sub-Slab: ☒
Indoor-Air: ☒

www.envision-air.com

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)					Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6420-11 Wisconsin Ave-IA-6	6LC	04/25/18	717	04/26/18	707		X			11091	07624	-29	-6	-6	18-1188
6420-11 Wisconsin Ave-IA-1	6LC	04/25/18	714	04/26/18	703		X			91569	08007	-29	-7	-7	18-1189
6420-11 Wisconsin Ave-SSV-1	1LC	04/26/18	723	04/26/18	733		X			83821	0110	-29	-10	-10	18-1190

Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	4-27-18		FedEx		
				4/30/18	1100

Synergy Environmental Lab, INC

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

KYLE VANDER HEIDEN
ENVIROFORENSICS
N16 W 23390 STONERIDGE DR
WAUKESHA WI 53188

Report Date *17-Aug-18*

Project Name FORMER DUTCH CLEANERS **Invoice #** E35063
Project # 6420

Lab Code 5035063A
Sample ID 6420-11 WI. AVE -SSV-1
Sample Matrix Air
Sample Date 8/7/2018

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Air Samples										
cis-1,2-Dichloroethene	< 0.197	ug/m3	0.197	0.626	1	TO-15		8/14/2018	CJR	1
trans-1,2-Dichloroethene	< 0.231	ug/m3	0.231	0.734	1	TO-15		8/14/2018	CJR	1
Tetrachloroethene	2.65	ug/m3	0.278	0.884	1	TO-15		8/14/2018	CJR	1
Trichloroethene (TCE)	< 0.237	ug/m3	0.237	0.754	1	TO-15		8/14/2018	CJR	1
Vinyl Chloride	< 0.148	ug/m3	0.148	0.472	1	TO-15		8/14/2018	CJR	1

Lab Code 5035063B
Sample ID 6420-11 WI. AVE -IA-1
Sample Matrix Air
Sample Date 8/7/2018

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Air Samples										
cis-1,2-Dichloroethene	< 0.197	ug/m3	0.197	0.626	1	TO-15		8/10/2018	CJR	1
trans-1,2-Dichloroethene	< 0.231	ug/m3	0.231	0.734	1	TO-15		8/10/2018	CJR	1
Tetrachloroethene	2.44	ug/m3	0.278	0.884	1	TO-15		8/10/2018	CJR	1
Trichloroethene (TCE)	< 0.237	ug/m3	0.237	0.754	1	TO-15		8/10/2018	CJR	1
Vinyl Chloride	< 0.148	ug/m3	0.148	0.472	1	TO-15		8/10/2018	CJR	1

Project Name FORMER DUTCH CLEANERS **Invoice #** E35063
Project # 6420

Lab Code 5035063C
Sample ID 6420-11 WI. AVE -IA-B
Sample Matrix Air
Sample Date 8/7/2018

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Air Samples										
cis-1,2-Dichloroethene	< 0.197	ug/m3	0.197	0.626	1	TO-15		8/10/2018	CJR	1
trans-1,2-Dichloroethene	< 0.231	ug/m3	0.231	0.734	1	TO-15		8/10/2018	CJR	1
Tetrachloroethene	4.1	ug/m3	0.278	0.884	1	TO-15		8/10/2018	CJR	1
Trichloroethene (TCE)	< 0.237	ug/m3	0.237	0.754	1	TO-15		8/10/2018	CJR	1
Vinyl Chloride	< 0.148	ug/m3	0.148	0.472	1	TO-15		8/10/2018	CJR	1

Lab Code 5035063D
Sample ID 6420-OA
Sample Matrix Air
Sample Date 8/7/2018

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
Air Samples										
cis-1,2-Dichloroethene	< 0.197	ug/m3	0.197	0.626	1	TO-15		8/10/2018	CJR	1
trans-1,2-Dichloroethene	< 0.231	ug/m3	0.231	0.734	1	TO-15		8/10/2018	CJR	1
Tetrachloroethene	< 0.278	ug/m3	0.278	0.884	1	TO-15		8/10/2018	CJR	1
Trichloroethene (TCE)	< 0.237	ug/m3	0.237	0.754	1	TO-15		8/10/2018	CJR	1
Vinyl Chloride	< 0.148	ug/m3	0.148	0.472	1	TO-15		8/10/2018	CJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	*Comment*
1	Laboratory QC within limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature

CHAIN OF CUSTODY RECORD

PO# 2018-1059

Synergy

Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # № 367 1

Page 1 of 1

Sample Handling Request

___ Rush Analysis Date Required ___
(Rushes accepted only with prior authorization)
x Normal Turn Around

Lab I.D. #	
Account No. :	Quote No.:
Project #: 6420	
Sampler: (signature) [signature]	

Project (Name / Location): Former Dutch Cleaners	
Reports To: K. Vander Heiden	Invoice To: W. Fassbender
Company EnviroForensics, LLC	Company
Address N16 W23390 Stone Ridge Dr, Suite G	Address
City State Zip Waukesha, WI 53188	City State Zip
Phone 262-290-4001	Phone
FAX	FAX

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	LEAD	NITRATE/NITRITE	OIL & GREASE	PAH (EPA 8270)	PCB	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	TOTAL SUSPENDED SOLIDS	VOC DW (EPA 524.2)	VOC (EPA 8260)	8-RCRA METALS	TO-15 (Short list)	Other Analysis	PID/FID
	6420-11 Wisconsin Ave-SSV-1	8/7	0915-0926	–	–	–	1	A	–															x	503553A	
	6420-11 Wisconsin Ave-IA-1	8/7	0905-0905	–	–	–	1	A	–															x	B	
	6420-11 Wisconsin Ave-IA-B	8/7	0910-0910	–	–	–	1	A	–															x	C	
	6420-OA	8/7	0915-0900	–	–	–	1	A	–															x	D	

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

	Initial Pressure	Final Pressure	Canister SN	Gauge #
6420-11 Wisconsin Ave-SSV-1	-26	-1	5636	NA
6420-11 Wisconsin Ave-IA-1	-29	-2	5627	5988
6420-11 Wisconsin Ave-IA-B	-29	-1	5625	5994
6420-OA	-29	-3	5640	5455

Sample Integrity - To be completed by receiving lab.

Method of Shipment: Cold Cross

Temp. of Temp. Blank ___ °C On Ice: ✓

Cooler seal intact upon receipt: ✓ Yes ___ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
[signature]	1200	8/8/18			

Received in Laboratory By: [signature] - SEC Time: 8:00 AM Date: 8-10-18

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Wayne Fassbender
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

May 11, 2018

EnvisionAir Project Number: 2018-276
Client Project Name: 6420

Dear Mr. Fassbender,

Please find the attached analytical report for the samples received April 30, 2018. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-276

Sample Summary

Canister Pressure / Vacuum

Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
18-1185	6420-349 S MAIN ST-IA-1	A	4/25/18	7:31	4/25/18	15:27	4/30/18	11:00	-29	-7	-7
18-1186	6420-OA	A	4/25/18	8:00	4/25/18	15:25	4/30/18	11:00	-28	-8	-8
18-1187	6420-349 S MAIN ST-SSV-1	A	4/25/18	15:34	4/25/18	15:38	4/30/18	11:00	-29	-2	-2

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-276

Analytical Method: TO-15
Analytical Batch: 050218AIR

Client Sample ID: 6420-349 MAIN ST-IA-1
Envision Sample Number: 18-1185
Sample Matrix: AIR

Sample Collection START Date/Time: 4/25/18 7:31
Sample Collection END Date/Time: 4/25/18 15:27
Sample Received Date/Time: 4/30/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	100%		
Analysis Date/Time:	05-02-18/19:52		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-276

Analytical Method: TO-15
Analytical Batch: 050218AIR

Client Sample ID: 6420-OA
Envision Sample Number: 18-1186
Sample Matrix: AIR

Sample Collection START Date/Time: 4/25/18 8:00
Sample Collection END Date/Time: 4/25/18 15:25
Sample Received Date/Time: 4/30/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	82%		
Analysis Date/Time:	05-02-18/15:55		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-276

Analytical Method: TO-15
Analytical Batch: 050918AIR

Client Sample ID: 6420-349 S MAIN ST-SSV-1
Envision Sample Number: 18-1187
Sample Matrix: AIR

Sample Collection START Date/Time: 4/25/18 15:34
Sample Collection END Date/Time: 4/25/18 15:38
Sample Received Date/Time: 4/30/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**134**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	**3.87**	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	96%		
Analysis Date/Time:	05-10-18/03:58		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 050918AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	88%		
Analysis Date/Time:	05-09-18/10:20		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.08	8.96	10	91%	90%	1.3%	
trans-1,2-Dichloroethene	10	10	10	100%	100%	0.0%	
cis-1,2-Dichloroethene	10.5	10.8	10	105%	108%	2.8%	
Trichloroethene	10	10.1	10	100%	101%	1.0%	
Tetrachloroethene	8.86	9	10	89%	90%	1.6%	
4-bromofluorobenzene (surrogate)	97%	94%					
Analysis Date/Time:	05-09-18/09:05	05-09-18/09:45					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 050218AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	90%		
Analysis Date/Time:	05-02-18/10:18		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.2	9.15	10	92%	92%	0.5%	
trans-1,2-Dichloroethene	9.77	9.8	10	98%	98%	0.3%	
cis-1,2-Dichloroethene	9.64	9.73	10	96%	97%	0.9%	
Trichloroethene	9.79	9.91	10	98%	99%	1.2%	
Tetrachloroethene	10.9	11.2	10	109%	112%	2.7%	
4-bromofluorobenzene (surrogate)	88%	91%					
Analysis Date/Time:	05-02-18/09:02	05-02-18/09:43					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments

EnvisionAir Proj#: 2018-276 Page 1 of 1

CHAIN OF CUSTODY RECORD

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: Enviroforensics	P.O. Number: 2018-0606
Report N16 W23390 Stoneridge Dr Address: Waukesha WI	Project Name or Number: 6420
Report To: Wayne Fassbender	Sampled by: Nate Dady
Phone: 414-982-3988	QA/QC Required: (circle if applicable) (Level III) Level IV
Invoice Address:	Reporting Units needed: (circle) (ug/m³) mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days (Std (5 bus. days))	Media type: 1LC = 1 Liter Canister; 6LC = 6 Liter Canister; TB = Tedlar Bag; TD = Thermal Desorption Tube

REQUESTED PARAMETERS

TO-15 Full List

TO-15 Short List (Specify in notes)

ENVISIONAIR

Sampling Type:
Soil-Gas: ☐
Sub-Slab: ☒
Indoor-Air: ☒

www.envision-air.com

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)					Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6420-349 Main St-IA-1	6LC	4-25-18	7:31	4-25-18	1527		X			4688	07~~52~~254	-29	-7	-7	18-1185
6420-OA	6LC	4-25-18	8:00	4-25-18	1525		X			16100	03059	-28	-8	-8	18-1186
6420-349 S Main St-SSV-1	1LC	4-25-18	15:34	4-25-18	1538		X			83759	0049	-29	-2	-2	18-1187

Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	4-27-18		FedEx		
			Kevin Hunnicutt	4/30/18	1106

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Wes Fassbender
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

July 2, 2018

EnvisionAir Project Number: 2018-357
Client Project Name: 6420

Dear Mr. Fassbender,

Please find the attached analytical report for the samples received June 18, 2018. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-357

Sample Summary

Canister Pressure / Vacuum

Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
18-1406	6420-349 S MAIN ST-IA-1	A	6/13/18	8:29	6/13/18	15:37	6/18/18	16:00	-27	-9	-9
18-1407	6420-349 S MAIN ST-SSV-1	A	6/13/18	15:40	6/13/18	15:45	6/18/18	16:00	-27	-3	-3

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-357

Analytical Method: TO-15
Analytical Batch: 062718AIR

Client Sample ID: 6420-349 S MAIN ST-IA-1
Envision Sample Number: 18-1406
Sample Matrix: AIR

Sample Collection START Date/Time: 6/13/18 8:29
Sample Collection END Date/Time: 6/13/18 15:37
Sample Received Date/Time: 6/18/18 16:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	101%		
Analysis Date/Time:	6-27-18/18:10		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-357

Analytical Method: TO-15
Analytical Batch: 062218AIR

Client Sample ID: 6420-349 S MAIN ST-SSV-1
Envision Sample Number: 18-1407
Sample Matrix: AIR

Sample Collection START Date/Time: 6/13/18 15:40
Sample Collection END Date/Time: 6/13/18 15:45
Sample Received Date/Time: 6/18/18 16:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**15.7**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	89%		
Analysis Date/Time:	6-23-18/03:06		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 062218AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	84%		
Analysis Date/Time:	6-22-18/19:32		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.48	8.72	10	95%	87%	8.4%	
trans-1,2-Dichloroethene	9.47	10.8	10	95%	108%	13.1%	
cis-1,2-Dichloroethene	9.71	9.42	10	97%	94%	3.0%	
Trichloroethene	8.99	9.51	10	90%	95%	5.6%	
Tetrachloroethene	8.34	10.2	10	83%	102%	20.1%	1
4-bromofluorobenzene (surrogate)	106%	99%					
Analysis Date/Time:	6-22-18/10:14	6-22-18/18:15					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 062718AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	87%		
Analysis Date/Time:	6-27-18/17:31		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.09	9.53	10	91%	95%	4.7%	
trans-1,2-Dichloroethene	9.95	10	10	100%	100%	0.5%	
cis-1,2-Dichloroethene	8.75	9.02	10	88%	90%	3.0%	
Trichloroethene	9.65	9.96	10	97%	100%	3.2%	
Tetrachloroethene	9.48	9.65	10	95%	97%	1.8%	
4-bromofluorobenzene (surrogate)	107%	107%					
Analysis Date/Time:	6-27-18/15:40	6-27-18/16:21					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments
1	RPD is biased high, but recoveries are within control. TJG 7/2/18

EnvisionAir Proj#: 2018-357 Page 1 of 1

CHAIN OF CUSTODY RECORD

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: Envirotorensics	P.O. Number: 2018-0858
Report Address: N16 W23390 Stoneridge Dr Waukesha WI 53188	Project Name or Number: 6420
Report To: W. Fassbender	Sampled by: Nathan Duda
Phone: 414-982-3988	QA/QC Required: (circle if applicable) **Level III** **Level IV**
Invoice Address: same	Reporting Units needed: (circle) **ug/m³** **mg/m³** **PPBV** **PPMV**
Desired TAT: (Please Circle One) **1 day** **2 days** **3 days** **Std (5 bus. days)**	Media type: 1LC = 1 Liter Canister, 6LC = 6 Liter Canister, TB = Tedlar Bag, TD = Thermal Desorption Tube

REQUESTED PARAMETERS

TO-15 Full List

TO-15 Short List (Specify in notes)

ENVISIONAIR

Sampling Type:
Soil-Gas: ☐
Sub-Slab: ☒
Indoor-Air: ☒

www.envision-air.com

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)					Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6420-349S Main St-IA1	6LC	06/13/18	08:29	06/13/18	15:37		X			20670	05252	-27	-9	-9	18-1406
6420-349S Main St-SSV-1	1LC	06/13/18	15:40	06/13/18	15:45		X			83944	0096	-27	-3	-3	18-1407

Comments:
All CANS LABELLED 11 Wisconsin Ave not used

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	6-15-18	1030	FedEx		
			[signature]	6/18/18	1600

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Wayne Fassbender
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

February 9, 2018

EnvisionAir Project Number: 2018-60
Client Project Name: 6420

Dear Mr. Fassbender,

Please find the attached analytical report for the samples received January 31, 2018. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-60

Sample Summary

Canister Pressure / Vacuum

Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
18-231	6420-406 S MAIN ST-IA-1	A	1/25/18	8:51	1/25/18	16:50	1/31/18	11:30	-29	-6	-6
18-232	6420-406 S MAIN ST-OA	A	1/25/18	8:38	1/25/18	16:38	1/31/18	11:30	-29	-7	-7
18-233	6420-418 S MAIN ST-IA-1	A	1/25/18	16:09	1/26/18	16:11	1/31/18	11:30	-29	-5	-5
18-234	6420-418 S MAIN ST-IA-2	A	1/25/18	16:11	1/26/18	16:13	1/31/18	11:30	-29	-7	-7
18-235	6420-418 S MAIN ST-IA-B	A	1/25/18	16:13	1/26/18	16:01	1/31/18	11:30	-29	-2	-2
18-236	6420-418 S MAIN ST-OA	A	1/25/18	15:33	1/26/18	15:40	1/31/18	11:30	-25	-2	-2
18-237	6420-406 S MAIN ST-SSV-1	A	1/26/18	15:19	1/26/18	15:24	1/31/18	11:30	-28	-2	-2
18-238	6420-418 S MAIN ST-SSV-1	A	1/26/18	16:35	1/26/18	16:40	1/31/18	11:30	-27	-5	-5

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-60

Analytical Method: TO-15
Analytical Batch: 020418AIR

Client Sample ID: 6420-406 S MAIN ST-IA-1
Envision Sample Number: 18-231
Sample Matrix: AIR

Sample Collection START Date/Time: 1/25/18 8:51
Sample Collection END Date/Time: 1/25/18 16:50
Sample Received Date/Time: 1/31/18 11:30

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	114%		
Analysis Date/Time:	2-5-18/09:30		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-60

Analytical Method: TO-15
Analytical Batch: 020418AIR

Client Sample ID: 6420-406 S MAIN ST-OA
Sample Collection START Date/Time: 1/25/18 8:38
Sample Collection END Date/Time: 1/25/18 16:38
Envision Sample Number: 18-232
Sample Received Date/Time: 1/31/18 11:30
Sample Matrix: AIR

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	111%		
Analysis Date/Time:	2-5-18/03:14		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-60

Analytical Method: TO-15
Analytical Batch: 020418AIR

Client Sample ID: 6420-418 S MAIN ST-IA-1
Envision Sample Number: 18-233
Sample Matrix: AIR

Sample Collection START Date/Time: 1/25/18 16:09
Sample Collection END Date/Time: 1/26/18 16:11
Sample Received Date/Time: 1/31/18 11:30

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	113%		
Analysis Date/Time:	2-5-18/10:08		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-60

Analytical Method: TO-15
Analytical Batch: 020418AIR

Client Sample ID: 6420-418 S MAIN ST-IA-2
Sample Collection START Date/Time: 1/25/18 16:11
Sample Collection END Date/Time: 1/26/18 16:13
Envision Sample Number: 18-234
Sample Received Date/Time: 1/31/18 11:30
Sample Matrix: AIR

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	118%		
Analysis Date/Time:	2-5-18/10:46		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-60

Analytical Method: TO-15
Analytical Batch: 020418AIR

Client Sample ID: 6420-418 S MAIN ST-IA-B
Envision Sample Number: 18-235
Sample Matrix: AIR

Sample Collection START Date/Time: 1/25/18 16:13
Sample Collection END Date/Time: 1/26/18 16:01
Sample Received Date/Time: 1/31/18 11:30

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	112%		
Analysis Date/Time:	2-5-18/11:25		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-60

Analytical Method: TO-15
Analytical Batch: 020418AIR

Client Sample ID: 6420-418 S MAIN ST-OA
Envision Sample Number: 18-236
Sample Matrix: AIR

Sample Collection START Date/Time: 1/25/18 15:33
Sample Collection END Date/Time: 1/26/18 15:40
Sample Received Date/Time: 1/31/18 11:30

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	112%		
Analysis Date/Time:	2-5-18/04:26		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-60

Analytical Method: TO-15
Analytical Batch: 020618AIR

Client Sample ID: 6420-406 S MAIN ST-SSV-1
Envision Sample Number: 18-237
Sample Matrix: AIR

Sample Collection START Date/Time: 1/26/18 15:19
Sample Collection END Date/Time: 1/26/18 15:24
Sample Received Date/Time: 1/31/18 11:30

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**10.2**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	116%		
Analysis Date/Time:	2-7-18/06:23		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WAYNE FASSBENDER

EnvisionAir Project Number: 2018-60

Analytical Method: TO-15
Analytical Batch: 020618AIR

Client Sample ID: 6420-418 S MAIN ST-SSV-1
Envision Sample Number: 18-238
Sample Matrix: AIR

Sample Collection START Date/Time: 1/26/18 16:35
Sample Collection END Date/Time: 1/26/18 16:40
Sample Received Date/Time: 1/31/18 11:30

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**4.88**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	108%		
Analysis Date/Time:	2-7-18/07:05		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 020418AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	89%		
Analysis Date/Time:	2-4-18/14:03		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	10.3	10.1	10	103%	101%	2.0%	
trans-1,2-Dichloroethene	9.27	9.62	10	93%	96%	3.7%	
cis-1,2-Dichloroethene	9.95	10.1	10	100%	101%	1.5%	
Trichloroethene	9.61	10.8	10	96%	108%	11.7%	
Tetrachloroethene	10.3	11.3	10	103%	113%	9.3%	
4-bromofluorobenzene (surrogate)	89%	95%					
Analysis Date/Time:	2-4-18/12:47	2-4-18/13:28					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 020618AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	92%		
Analysis Date/Time:	2-4-18/17:14		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	10	11.4	10	100%	114%	13.1%	
trans-1,2-Dichloroethene	9.07	9.09	10	91%	91%	0.2%	
cis-1,2-Dichloroethene	9.74	9.57	10	97%	96%	1.8%	
Trichloroethene	10.1	10.7	10	101%	107%	5.8%	
Tetrachloroethene	10.3	10.9	10	103%	109%	5.7%	
4-bromofluorobenzene (surrogate)	113%	115%					
Analysis Date/Time:	2-4-18/15:59	2-4-18/16:39					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments

EnvisionAir Proj#: 2018-60 Page 1 of 1

CHAIN OF CUSTODY RECORD WAF

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: Enviroforensics	P.O. Number: 2018-0084
Report Address: N16 W23390 Stoneridge Dr Waukesha, WI 53188	Project Name or Number: 6420
Report To: Wayne Fassbender	Sampled by: Nate Ruda
Phone: 414-982-3988	QA/QC Required: (circle if applicable) (Level III) Level IV
Invoice Address: Same	Reporting Units needed: (circle) (ug/m³) mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days (Std (5 bus. days)	Media type: 1LC = 1 Liter Canister, 6LC = 6 Liter Canister, TB = Tedlar Bag, TD = Thermal Desorption Tube

REQUESTED PARAMETERS

TO-15 Full List | TO-15 Short List

ENVISIONAIR

Sampling Type:
Soil-Gas: □
Sub-Slab: ☒
Indoor-Air: ☒

www.envision-air.com

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)					Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6420-406SMainSt-IA-1	6LC	01/25/18	8:51	01/25/18	16:50		X			82011	05716	-27	-6	-6	18-231
6420-406SMainSt-OA	6LC	01/25/18	8:38	01/25/18	16:38		X			16026	04653	-28	-7	-7	18-232
6420-418SMainSt-IA-1	6LC	01/25/18	16:09	01/26/18	16:11		X			14886	07620	-29	-5	-5	18-233
6420-418SMainSt-IA-2	6LC	01/25/18	16:11	01/26/18	16:13		X			4656	08008	-29	-7	-7	18-234
6420-418SMainSt-IA-B	6LC	01/25/18	16:13	01/26/18	16:01		X			16101	07257	-29	-2	-2	18-235
6420-418SMainSt-OA	6LC	01/25/18	15:33	01/26/18	15:40		X			17877	03062	-25	-2	-2	18-236
6420-406SMainSt-SSV-1	1LC	01/26/18	15:19	01/26/18	15:24		X			83943	0052	-28	-2	-2	18-237
6420-418SMainSt-SSV-1	1LC	01/26/18	16:35	01/26/18	16:40		X			83948	0053	-27	-5	-5	18-238

Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
			FedEx		
			Sean Hunnicutt	1/31/18	1130

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Wes Fassbender
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

July 2, 2018

EnvisionAir Project Number: 2018-359
Client Project Name: 6420

Dear Mr. Fassbender,

Please find the attached analytical report for the samples received June 18, 2018. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-359

Sample Summary

										Canister Pressure / Vacuum		
Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
18-1414	6420-406 S MAIN ST-IA-1	A	6/13/18	8:25	6/13/18	15:25	6/18/18	16:00	-29	-9	-9
18-1415	6420-406 S MAIN ST-SSV-1	A	6/13/18	15:30	6/13/18	15:36	6/18/18	16:00	-17	-2	-2

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-359

Analytical Method: TO-15
Analytical Batch: 062718AIR

Client Sample ID: 6420-406 S MAIN ST-IA-1
Envision Sample Number: 18-1414
Sample Matrix: AIR

Sample Collection START Date/Time: 6/13/18 8:25
Sample Collection END Date/Time: 6/13/18 15:25
Sample Received Date/Time: 6/18/18 16:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	107%		
Analysis Date/Time:	06-27-18/20:07		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-359

Analytical Method: TO-15
Analytical Batch: 063018AIR

Client Sample ID: 6420-406 S MAIN ST-SSV-1
Sample Collection START Date/Time: 6/13/18 15:30
Sample Collection END Date/Time: 6/13/18 15:36
Envision Sample Number: 18-1415
Sample Received Date/Time: 6/18/18 16:00
Sample Matrix: AIR

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**15.2**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	92%		
Analysis Date/Time:	06-30-18/09:36		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 063018AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	90%		
Analysis Date/Time:	06-29-18/12:51		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.32	8.49	10	93%	85%	9.3%	
trans-1,2-Dichloroethene	9.89	9.63	10	99%	96%	2.7%	
cis-1,2-Dichloroethene	8.98	9.13	10	90%	91%	1.7%	
Trichloroethene	8.79	9.08	10	88%	91%	3.2%	
Tetrachloroethene	10.4	9.18	10	104%	92%	12.5%	
4-bromofluorobenzene (surrogate)	109%	96%					
Analysis Date/Time:	06-29-18/10:59	06-29-18/11:41					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 062718AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	87%		
Analysis Date/Time:	06-27-18/17:31		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.09	9.53	10	91%	95%	4.7%	
trans-1,2-Dichloroethene	9.95	10.0	10	100%	100%	0.5%	
cis-1,2-Dichloroethene	8.75	9.02	10	88%	90%	3.0%	
Trichloroethene	9.65	9.96	10	97%	100%	3.2%	
Tetrachloroethene	9.48	9.65	10	95%	97%	1.8%	
4-bromofluorobenzene (surrogate)	107%	107%					
Analysis Date/Time:	06-27-18/15:40	06-27-18/16:21					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments

EnvisionAir Proj#: 2018-359 Page 1 of 1

CHAIN OF CUSTODY RECORD

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: Enviroforensics	P.O. Number: 2018-0858
Report Address: N16 W23390 Stoneridge Dr. Waukesha WI 53188	Project Name or Number: 6420
Report To: W. Fassbender	Sampled by: Nathan Dade
Phone: 414-982-3988	QA/QC Required: (circle if applicable) (Level III) Level IV
Invoice Address: Same	Reporting Units needed: (circle) (ug/m³) mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days (Std (5 bus. days))	Media type: 1LC = 1 Liter Canister, 6LC = 6 Liter Canister, TB = Tedlar Bag, TD = Thermal Desorption Tube

REQUESTED PARAMETERS

TO-15 Full List

TO-15 Short List (Specify in notes)

ENVISIONAIR

Sampling Type:
Soil-Gas: ☐
Sub-Slab: ☒
Indoor-Air: ☒

www.envision-air.com

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)					Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6420-4065 Main St-IA-1	6LC	6-13-18	08:25	6-13-18	15:25		X			11078	05301	-29	-9	-9	18-1414
6420-4065 Main St-SSV-1	1LC	6-13-18	15:30	6-13-18	15:36		X			2215	0077	-17	-2	-2	18-1415

Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	6-15-18	1030	FedEx		
			[signature]	6/18/18	1600

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Wes Fassbender
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

July 2, 2018

EnvisionAir Project Number: 2018-360
Client Project Name: 6420

Dear Mr. Fassbender,

Please find the attached analytical report for the samples received June 18, 2018. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-360

Sample Summary

										Canister Pressure / Vacuum		
Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
18-1416	6420-418 S MAIN ST-IA-B	A	6/13/18	16:34	6/14/18	16:14	6/18/18	16:00	-29	-4	-4
18-1417	6420-418 S MAIN ST-SSV-1	A	6/14/18	16:16	6/14/18	16:21	6/18/18	16:00	-27	-2	-2

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-360

Analytical Method: TO-15
Analytical Batch: 062718AIR

Client Sample ID: 6420-418 S MAIN ST-IA-B
Envision Sample Number: 18-1416
Sample Matrix: AIR

Sample Collection START Date/Time: 6/13/18 16:34
Sample Collection END Date/Time: 6/14/18 16:14
Sample Received Date/Time: 6/18/18 16:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	111%		
Analysis Date/Time:	06-27-18/20:46		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6420

Client Project Manager: WES FASSBENDER

EnvisionAir Project Number: 2018-360

Analytical Method: TO-15
Analytical Batch: 063018AIR

Client Sample ID: 6420-418 S MAIN ST-SSV-1
Envision Sample Number: 18-1417
Sample Matrix: AIR

Sample Collection START Date/Time: 6/14/18 16:16
Sample Collection END Date/Time: 6/14/18 16:21
Sample Received Date/Time: 6/18/18 16:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	**26.0**	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	93%		
Analysis Date/Time:	06-30-18/10:14		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 063018AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	90%		
Analysis Date/Time:	06-29-18/12:51		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.32	8.49	10	93%	85%	9.3%	
trans-1,2-Dichloroethene	9.89	9.63	10	99%	96%	2.7%	
cis-1,2-Dichloroethene	8.98	9.13	10	90%	91%	1.7%	
Trichloroethene	8.79	9.08	10	88%	91%	3.2%	
Tetrachloroethene	10.4	9.18	10	104%	92%	12.5%	
4-bromofluorobenzene (surrogate)	109%	96%					
Analysis Date/Time:	06-29-18/10:59	06-29-18/11:41					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 062718AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	87%		
Analysis Date/Time:	06-27-18/17:31		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	9.09	9.53	10	91%	95%	4.7%	
trans-1,2-Dichloroethene	9.95	10.0	10	100%	100%	0.5%	
cis-1,2-Dichloroethene	8.75	9.02	10	88%	90%	3.0%	
Trichloroethene	9.65	9.96	10	97%	100%	3.2%	
Tetrachloroethene	9.48	9.65	10	95%	97%	1.8%	
4-bromofluorobenzene (surrogate)	107%	107%					
Analysis Date/Time:	06-27-18/15:40	06-27-18/16:21					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments

EnvisionAir Proj#: 2018-360 Page 1 of 1

CHAIN OF CUSTODY RECORD

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: Env.rofornsics	P.O. Number: 2018-0858
Report Address: N16 W23390 Stoneridge Dr. Waukesha, WI 53188	Project Name or Number: 6420
Report To: W. Fassbender	Sampled by: Nathan Duda
Phone: 414-982-3988	QA/QC Required: (circle if applicable) Level III (circled) Level IV
Invoice Address: same	Reporting Units needed: (circle) ug/m³ (circled) mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days Std (5 bus. days) (circled)	Media type: 1LC = 1 Liter Canister; 6LC = 6 Liter Canister; TB = Tedlar Bag; TD = Thermal Desorption Tube

REQUESTED PARAMETERS: TO-15 Full List; TO-15 Short List (Specify in notes)

ENVISIONAIR

Sampling Type:
Soil-Gas: ☐
Sub-Slab: ☒
Indoor-Air: ☒

www.envision-air.com

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)	TO-15 Full List	TO-15 Short List (Specify in notes)			Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6420-418 S Main St-IA8	6LC	6-13-18	16:34	6-14-18	16:14		X			4656	07617	-29	-4	-4	18-1416
6420-418 S Main st-SSV1	1LC	6-14-18	16:16	6-14-18	16:21		X			2218	0023	-27	-2	-2	18-1417

Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	6-15-18	1030	FedEx		
			[signature]	6/18/18	1600

APPENDIX B

Vapor Mitigation System O&M Plan

VAPOR MITIGATION SYSTEM (VMS)
OPERATION, MAINTENANCE & MONITORING PLAN

Former Dutch Cleaners
403 S. Main Street
Cedar Grove, WI 53013

WDNR BRRTS# 02-60-271527

January 31, 2019

Prepared For:

Marilyn and Tom Berlin
W2626 Miley Rd.
Sheboygan Falls, WI 53085
Phone: (920) 467-2756
tberlin@woodenwashtub.net

Responsible Party:

Jere Ebbers
231 S. Main St.
Cedar Grove, WI 53013
Phone: (920) 668-8810
Ebbyjer@yahoo.com

Prepared By:

EnviroForensics, LLC
N16 W23390 Stone Ridge Drive, Suite G
Waukesha, WI 53188
Phone: (262) 290-4001
www.enviroforensics.com

TABLE OF CONTENTS

1.0 BACKGROUND 1

2.0 CONTACTS 1

3.0 SYSTEM DESIGN AND CONSTRUCTION 2

4.0 SYSTEM OPERATION, MAINTENANCE, AND MONITORING 2
4.1 System Operation 2
4.2 System Monitoring 3
4.2.1 System Commissioning 3
4.2.2 Long-Term Monitoring 3
4.3 System Maintenance and Repairs 4
4.4 Inspection and Repair Logs 4
4.5 Notifications 4

5.0 DECOMMISSIONING AND CONTINUING OBLIGATIONS 5

TABLES

Table 1 Vapor Intrusion Analytical Results

APPENDICES

Appendix A Vapor Mitigation System Installation Report
Appendix B Vapor Mitigation System Commissioning Data
Appendix C Inspection and Repair Logs

1.0 BACKGROUND

A Vapor Mitigation System (VMS) system was installed at 403 South Main Street in Cedar Grove, Wisconsin (Site) to mitigate vapor intrusion risk associated with tetrachloroethene (PCE). Dry cleaning operations actively used PCE at this location from 1947 until 2005. The VMS system installation utilizes a combination of a sub-slab depressurization system (SSDS) to mitigate the basement and a sub-membrane depressurization system (SMDS) to mitigate the western crawl space of the building.

Sub-slab vapor samples were collected from beneath the basement, and indoor air samples collected from the basement, and first floor, respectively. The sample results are presented in **table 1.** The September 2017 results indicate indoor-air (IA) detections of PCE in the basement and main floor below non-residential vapor action limits (PALs). Sub-slab vapor (SSV) samples indicated detections of PCE beneath the basement floor above non-residential vapor risk screening levels (VRSLs).

The Wisconsin Department of Natural Resources (WDNR) requires that mitigation systems be monitored and maintained to ensure ongoing effectiveness. Proper operation of the VMS system is necessary to prevent exposure to the chemicals of concern via vapor intrusion. Since the time of installation, the property has been occupied by the Heart to Hands Holistic Health Center which is a commercial yoga, massage, and massage therapy business. The VMS system is designed to depressurize the sub-slab space and western crawl space to prevent vapors from migrating into the building and affecting indoor air quality.

2.0 CONTACTS

Property Owner: Marilyn and Tom Berlin
Address W2626 Miley Rd., Cedar Grove, WI 53085
Telephone #: (920) 467-2756

System Design and Installation: Vapor Protection Services
Address: 825 North Capital Avenue, Indianapolis, Indiana
Contact: Jason Condry
Contact/Telephone #: (866) 888-7911

Consultant: EnviroForensics
Address: N16 W23390 Stone Ridge Dr., Suite G, Waukesha, WI 53188
Contacts: Wayne Fassbender, Senior Project Manager
Telephone #: (414) 982-3988
Email: wfassbender@enviroforensics.com

WDNR Project Manager: Richard Joslin, Hydrogeologist
Address: 625 E County Road Y, Suite 700, Oshkosh, WI 54901
Telephone #: 608-275-3323
Email: Richard.Joslin@Wisconsin.gov

3.0 SYSTEM DESIGN AND CONSTRUCTION

EnviroForensics contracted Vapor Protection Services (VPS) of Indianapolis, Indiana to design and install the VMS system. The system was installed during April 24-26, 2018. Design and construction documentation for the VMS is provided in the July 10, 2018 *Installation Report* prepared by VPS, included as **Appendix A**.

The final system configuration is depicted on Figure 1 of the VPS Installation Report. The system utilized a combination SSDS and SMDS to mitigate vapor intrusion. The SSDS is constructed with one (1) extraction point connected via 4-inch schedule-40 polyvinylchloride piping to one (1) RadonAway model RP 265 fan to supply negative pressure to the basement sub-slab environment. The SMDS utilizes one (1) horizontal extraction point within the western crawl space connected via 4-inch schedule-40 PVC piping to one (1) RadonAway model RP 380 fan. A 6 mil membrane was then secured and sealed above the horizontal extraction point and dirt floor of the crawl space and sealed using polyurethane caulk. Photographs of system components are presented in Attachment 1 of the VPS report (see **Appendix A**).

4.0 SYSTEM OPERATION, MAINTENANCE, AND MONITORING

Operation, maintenance, and monitoring (OM&M) of the VMS system installed in the 203 South Main St. building is required until the WDNR grants case closure for the Site. Further OM&M of the VMS system will then be the responsibility of the current property owner of the Site at that time.

4.1 System Operation

One (1) RadonAway RP-265 fan one (1) RadonAway RP-380 fan are hardwired to a dedicated circuit breaker in the electrical panel on the south wall of the 203 South Main St. building. Operation of the VMS can be confirmed by inspecting the fan or checking the u-tube manometers that are installed in each of the two (2) system extraction pipes (refer to photographs of the u-tube manometers in **Appendix A**). The system is designed and intended to operate continuously.

4.2 System Monitoring

The Wisconsin Department of Natural Resources (WDNR) has issued general guidance for VMS system commissioning and long-term monitoring programs (see August 2018 RR-800; *Addressing Vapor Intrusion at Remediation & Redevelopment Sites in Wisconsin* https://dnr.wi.gov/files/PDF/pubs/rr/RR800.pdf). The recommendations have been adopted and incorporated into this OM&M Plan.

4.2.1 System Commissioning

Commissioning is intended to demonstrate that the VMS is effectively mitigating vapor intrusion in all conditions. Therefore, a minimum of two (2) commissioning events were performed seasonally during the first year of operation, including as least one (1) event during the winter months. System commissioning events included the following activities:

1. Measured sub-slab pressure field extension (PFE). The PFE was measured by connecting a hand-held digital manometer to sub-slab test ports installed in the basement floor, designated SSV-1 and SSV-2;

2. Confirmed vacuum induced by each extraction point by measuring with a manometer and measured air flow at each extraction point;

3. Visually inspected the visible concrete floor penetration seals, integrity of the vapor barrier covering the dirt floor, and all system components including fans, manometers, pressure switches, and piping connections;

4. Collected indoor air samples from each level of the building (i.e., basement and first floor) in certified vacuum canisters. Submitted the samples to a laboratory for analysis of the contaminants of concern (COCs); and

5. Smoke testing of the SMDS membrane and associated repairs.

System commissioning was completed in December of 2018 with the re-sealing of the SMDS membrane and smoke testing to confirm tightness. A checklist and the results of commissioning are provided in **Appendix B**.

4.2.2 Long-Term Monitoring

Long-term monitoring of the VMS begins after commissioning data and observations confirm system effectiveness. Indoor air sampling is not required during long-term monitoring. VMS

monitoring and inspections procedures are required to be conducted annually during the winter months. Post-commissioning inspection procedures are presented in Section 4.4 below.

4.3 System Maintenance and Repairs

The mitigation fans are factory sealed and require no maintenance. In the event that a fan stops operating due to mechanical failure, the fan shall be replaced with an identical model or a fan with the same performance specifications. Replacement of fans should be handled by a mitigation contractor and/or an electrician. Maintenance and repair activities on other components, including piping and floor seals, can be performed by the environmental consultant or building maintenance personnel.

4.4 Inspection and Repair Logs

Inspection and repair logs for the SSDS and the SMDS shall be completed by the person or group responsible for OM&M of the VMS. The completed inspection logs shall include the findings of the visual inspection. The logs shall be kept on file by the environmental consultant and/or the property owner and made available to WDNR upon request. Blank logs with the required and recommended inspection data are provided in **Appendix C**.

4.5 Notifications

The WDNR shall be notified at least 45 days prior to actions that may alter the system effectiveness or before any actions are taken which would terminate or interrupt operation of the VMS for more than one week.

5.0 DECOMMISSIONING AND CONTINUING OBLIGATIONS

The VMS system will be operated until it is no longer needed to prevent vapor intrusion (Wis. Admin. § Code NR 724.13(1)(c)). A Decommissioning Plan will be prepared, if appropriate. In general, decommissioning will be performed according to the following procedure:

- Re-assess the vapor intrusion pathway in the building.
    - Turn the VMS off
    - Collect paired indoor air and sub-slab vapor samples after 2-4 weeks of shut down
    - Repeat paired vapor sampling after 2-6 months
    - Repeat paired vapor sampling after one (1) year following shut down
    - Re-start the VMS
- Submit Post-Closure Modification to WDNR with fees.
- Decommission the VMS following WDNR approval.

If the VMS system is necessary to mitigate vapor movement into the Site building at the time of case closure, there will be a continuing obligation for any owner of the Site to operate and maintain the VMS system post-closure until such time when the VMS system is no longer necessary. Post-closure OM&M reporting shall be done using the Continuing Obligations Inspection and Maintenance Logs in **Appendix C**.

TABLE 1

Vapor Intrusion Analytical Results

TABLE 1
SUMMARY OF SUB-SLAB/INDOOR AIR VAPOR ANALYTICAL RESULTS
Former Dutch Cleaners
403 S. Main Street
Cedar Grove, WI

403 S. Main St.	6420-403 S Main St-IA-1	09/13/17	EnviroForensics	No	**6.92**	<1.07
	6420-403 S Main St-IA-2	09/13/17	EnviroForensics	No	**7.26**	<1.07
	6420-403 S Main St-OA-1	09/13/17	EnviroForensics	No	<3.019	<1.07
SUB-SLAB VAPOR						
Non-Residential Vapor Risk Screening Level					**6,000**	**290**
403 S. Main St.	6420-403 S Main St-SSV-1	09/13/17	EnviroForensics	No	**14,100**	**35.3**
	6420-403 S Main St-SSV-2	09/13/17	EnviroForensics	No	**66,300**	**16.4**

Notes:

Results reported in microgragms per cubic meter (µg/m^3)

Samples analyzed according to EPA Method TO-15

Vapor Risk Screeing/Action Levels are calculated in accordance with WDNR Publication RR-800 and subsequent guidance documents

IA = Indoor Air

OA = Outdoor Air

SSV = Sub-slab vapor

Bolded values are above detection limits

Bolded and Orange shaded concentration exceed the applicable non-residential screening level

APPENDIX A

Vapor Mitigation System Installation Report

VAPOR PROTECTION SERVICES

INSTALLATION REPORT

July 10, 2018

VPS Proposal No. 2018-2041
Vapor Mitigation System (VMS)
Dutch Cleaners
403 S. Main Street
Cedar Grove, WI 53013

Mr. Wayne Fassbender
EnviroForensics, LLC
N16 W23390 Stone Ridge Dr., Suite G
Waukesha, WI 53188
(317) 972.7870

Vapor Mitigation System Installation Report
403 S. Main Street
Cedar Grove, WI 53013

Date of SSDS Installation: April 24, 2018 to April 25, 2018

Vapor Protection Services (VPS) is pleased to provide a Vapor Mitigation System Installation Report that summarizes the scope of services performed at 403 S. Main Street in Cedar Grove, Wisconsin (Site). The scope of services performed at the Site is detailed in VPS Proposal No. 2018-2041 and is noted below.

Scope of Service:

- VPS utilized a combination sub-slab depressurization system (SSDS) with one (1). RadonAway Model RP 265 Fan and a sub-membrane depressurization system (SMDS) with one (1) RadonAway Model RP 380 Fan to depressurize the soil beneath approximately 800 square feet (ft) of concrete slab, and vent approximately 700 square ft of undeveloped crawl/ open dirt space to meet performance criteria.

- The SSDS utilizes one (1) extraction point, approximately 20 ft of 4 inch schedule 40 PVC piping and one (1) RadonAway Model RP 265 Fan.

- The SMDS utilizes one (1) 10 ft long extraction vent, approximately 60 ft of 4 inch schedule 40 PVC piping and one (1) RadonAway Model RP 380 Fan.

- VPS covered the dirt floor portions of the western crawl space with 6 mil membrane which was secured and sealed using polyurethane caulk.

- VPS ran the conveyance piping to the back of the building where the fans are mounted by 24 gauge hanger tape and anchored to vinyl siding with siding screws. The fans were hardwired to a dedicated circuit breaker by a licensed electrician in an existing electrical panel with dedicated on/off switches located next to the mitigation fan.

- Results of post PFE testing indicate the system applies adequate negative pressure across the entire concrete slab. Test point TP-1 had -1.225 inches of water (inH_20); test point TP-2 had -2.092 inH_20. Post PFE readings are depicted on **Figure 1**.

Please Note:

- A figure depicting the SSDS and SMDS layout is included as **Figure 1**.
- Photos taken during the installation have been included as **Attachment 1**.
- VPS's radon mitigation certification is included as **Attachment 2**.
- VI Mitigation Installation Checklist is included as **Attachment 3**.
- O & M manual is included as **Attachment 4**.
- Annual Operating Costs is included as **Attachment 5**.
- RadonAway fan 1 year warranty is included as **Attachment 6.**
- MSDS sheet is included as **Attachment 7**.

Conclusion:

VPS submits this report as written and visual documentation that the contracted work scope for vapor mitigation as detailed in Proposal No. 2018-2041 was successfully completed to the approval of client onsite. Please do not hesitate to contact me with any questions you might have regarding this report.

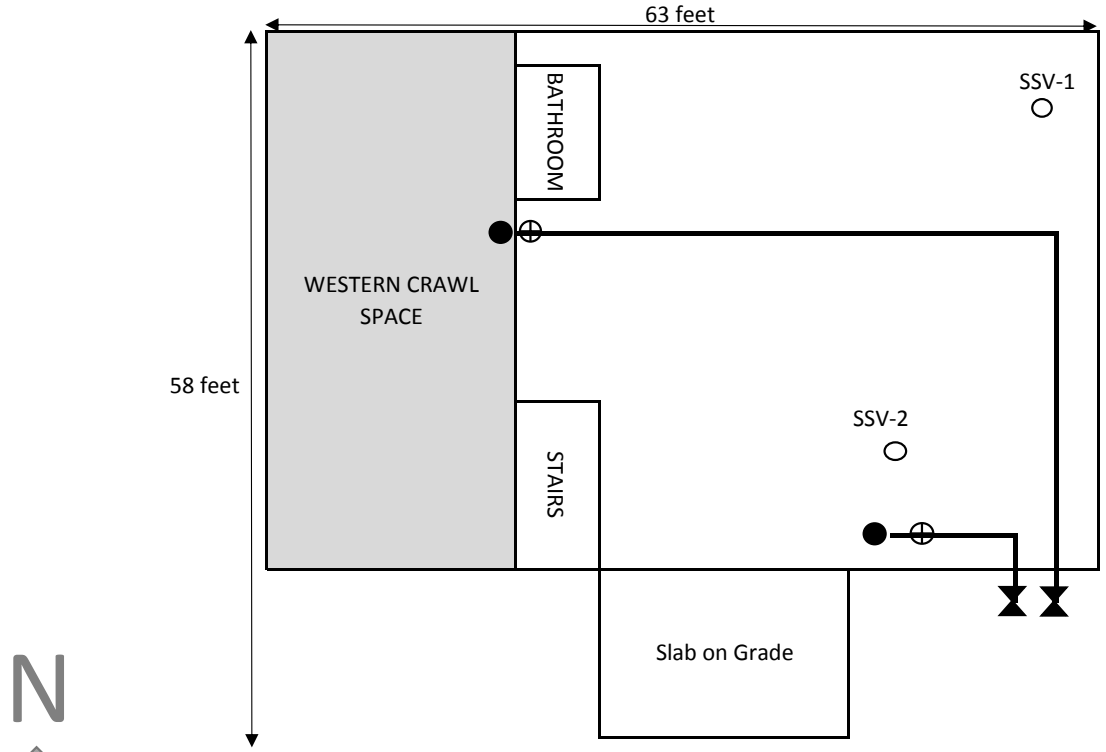
Respectfully Submitted,

Vapor Protection Services®
114 W St Claire St.
Indianapolis, IN 46240
www.vaporprotection.com
NRPP Certification #107740RMT
Indiana Mitigator License #RTM00768
Indianapolis Contractor License #GL1300047

FIGURE 1
SSDS and SMDS LAYOUT

VAPOR PROTECTION SERVICES®

Prepared For: EnviroForensics, LLC
Wayne Fassbender
Former Dutch Cleaners
Location: 103 S. Main Street
Cedar Grove, WI 53013



Extraction Points
4" Schedule 40 PVC Pipe
6 mil Vapor Membrane
RP380/RP265 Fan
Vapor Pins w/post PFE readings
Ball Valve

Post-Install PFE in Inches of Water	
SSV-1	-1.255
SSV-2	-2.042

Attachment 1
Installation Photographs

Attachment 1
Installation Photographs

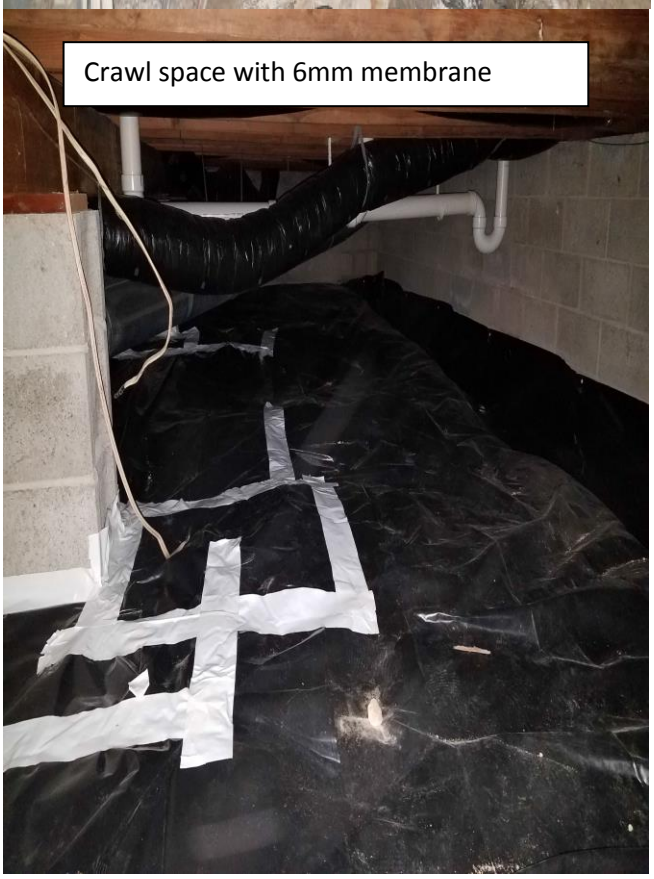
Attachment 1
Installation Photographs

Left (RP265) Right (RP380)

Westward view of mitigation fans

Attachment 1
Installation Photographs

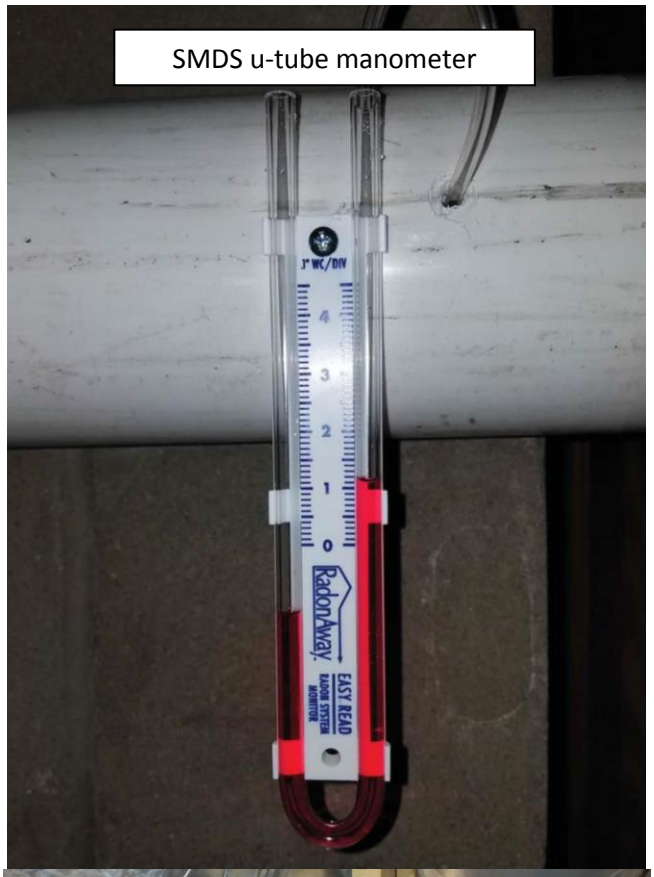
West Crawl Space with Perforated Pipe



Crawl space with 6mm membrane

Attachment 1
Installation Photographs

SMDS u-tube manometer



Conveyance piping for SMDS

Attachment 2
Mitigation Certification

Indiana State Department of Health
Lead and Healthy Homes
2 N. Meridian Street, 5J
Indianapolis, Indiana 46204 (317) 234-4423

Radon Mitigator License

Certificate Number	Status	Expire Date
RTM00768	Active	12/31/2019

Joseph D. Miller

Kristina Box, MD, FACOG
Kristina Box, MD, FACOG
State Health Commissioner
Indiana State Department of Health

VAPOR PROTECTION SERVICES®

Company:	**EnviroForensics, LLC**
Name:	**Wayne Fassbender**
Address:	**403 S. Main Street**
	Cedar Grove, WI 53013
Proposal Number:	**2018-2041**
Date:	**24-Apr-18**
Fan Make/Model:	**RP265 / RP380**

VI Mitigation Installation Checklist

Piping	**Yes**	**No**	**N/A**
Are all pipes solid schedule 40 PVC?	X		
Are all pipe connections permanently sealed?	X		
Are the system pipes supported by existing ductwork, piping, or any equipment?		X	
Do any of the system pipes obstruct windows, doors or service access points?		X	
Are horizontal pipe supports installed at 6- 4 foot increments?	X		
Are vertical pipe runs supported properly in accordance to building code?	X		
Extraction point vertical pipes supported and sealed permanently?	X		
Do Horizontal pipes slope toward extraction pits for condensate drainage?	X		
Are permanent test ports installed on extraction point suction pipes?	X		

Fans			
Is the fan level and properly supported to prevent unnecessary vibration?	X		
Does the fan have a condensate by-pass installed?		X	
Has the fan been mounted to piping using flexible connections?	X		
Is the exhaust vent pipe at least 10 feet above grade, 10 feet from any doors or windows, and 2 feet above the top of any opening into the conditioned space?	X		
If vent pipe exits through a roof penetration, does it extend at least 12 inches above the surface?			X
If vent pipe runs along the exterior wall, is it supported by brackets placed at least every 8 feet?	X		
Is the vent stack made of schedule 40 PVC piping?	X		

Vapor Barrier			
I crawl space(s) free or debris and obstruction that may prevent proper installation of vapor retarder or sub-slab depressurization system?	X		
Has sub-membrane depressurization system been installed?	X		
Was 6mil or thicker reinforced skrim used as the vapor retarder?	X		
Are heavy traffic areas and/or storage areas protected from tears and punctures by carpet or heavy felt padding?	X		
Are all membrane seams overlapped at least 12 inches and sealed properly?	X		
Has the membrane been secured to walls with tape, furring strips, and/or caulk?	X		
Has a perforated/slotted pipe been installed under the membrane and above the soil for proper de-pressurization?	X		
Does suction pipe have permanent test port installed?	X		
Are all utility, foundation, or other penetrations sealed properly?	X		

Electrical	**Yes**	**No**	**N/A**

Has electrical wiring/switching been performed by a licensed electrician?	X		
Is the fan's power supply shutoff switch mounted in a weather tight enclosure?	X		
Is the circuit breaker clearly labeled "Vapor Mitigation System"?		X	
Has a run-time meter been installed, and is it in a weather tight enclosure?		X	
Has a KW meter been installed?		X	

Sump Pit

Is there a sump pit(s) in the basement or crawl space?	X		
Does sump pit have impermeable cover attached with proper sealant?		X	
Are sump lid penetrations properly sealed?		X	
Has sump pit been used as an extraction point?		X	
Does sump lid have a clear view port for pump/pit observation and maintenance?			X

Labels and Monitors

Does each suction pipe have a u-tube manometer or magnehelic gage to measure pressure?	X		
Does each suction pipe have a permanent test port?	X		
Has an audible alarm to inform of possible system malfunction been installed?		X	
Are labels placed on pipes, membrane(s), and prominent locations to identify system components?		X	
Does label include name and number of person(s) to contact in case of system emergency?		X	

Testing and Sealing

Has PFE testing been completed to verify system performance?		X	
Has foundation been smoke tested after mitigation system installation?			X
Have leaks in slab, walls or membrane been sealed properly?		X	

Report

Has an as built drawing been completed depicting system installation?	X		
Have all test point reading been recorded and inserted into the drawing?	X		
Has the system installation been recorded with photographs?	X		

Notes:

PFE testing was done at a later date by EnviroForensics, LLC personnel. The sump pit was not sealed with an impermeable cover because it did not influence the capabilities of the SSDS and was an irregular construction. A condensate bypass will be installed at a later date.

Attachment 4
Vapor Mitigation System Operation and Maintenance

We advise consultants, maintenance personnel or property owners to conduct routine visual inspections of all SSDS to verify that vapor mitigation system components are operating properly. The inspection should include but not be limited to the following:

- Observe the u tube or magnehelic gauges for pressure indication; a pressure of '0' indicates that there is a problem with system piping or fan operation.

- Observe the mitigation fan(s) and note any abnormal sounds or noises coming from the fan including buzzing, scraping, rattling, or et cetera. If any abnormal noises or sounds are audible, contact VPS.

- Most mitigation fans are factory sealed and designed to be maintenance free for the life of the fan. Should the fan's casing be opened or the factory seal broken, any service warranty may be voided. Factory maintenance documentation has been provided to consultant with recommended schedule for maintenance of fans if required.

- Inspect the PVC piping of the system for damage or cracks. If any damage occurs to the PVC piping, contact VPS Piping supports and Hangers should also be inspected for wear and integrity.

- Roof penetrations for system exhaust piping should be inspected to assure no moisture or other intrusion is apparent.

- Sub-membrane depressurization system (SMDS) components should also be periodically inspected to assure proper performance. Should a vapor barrier or membrane become damaged, loss of system pressure can occur affecting overall system performance. Tears should be repaired properly using approved methods.

- Any significant changes to building or structure can and may affect system performance. VPS should be advised of planned changes beforehand to avoid any possible performance issues or system failure.

Contact VPS for Additional Service & Maintenance should any occasion arise that may causes concern that the SSDS or SMDS is not functioning properly as vapor intrusion may no longer be mitigated to meet performance criteria to which VPS completed mitigation.

Attachment 5
ANNUAL OPERATING COSTS

RADONAWAY FANS	AVERAGE KWH	AVERAGE COST PER YEAR
RP140	$0.0894	$13.31
RP145	$0.0894	$42.29
RP260	$0.0894	$48.55
RP265	$0.0894	$88.50
RP380	$0.0894	$101.03
SF180	$0.0894	$42.29
GP201	$0.0894	$39.16
GP301	$0.0894	$56.39
GP401	$0.0894	$66.57
GP500	$0.0894	$78.31
GP501	$0.0894	$82.23
XP151	$0.0894	$40.72
XP201	$0.0894	$43.07
XP261	$0.0894	$66.57
HS2000	$0.0894	$164.46
HS3000	$0.0894	$117.47
HS5000	$0.0894	$250.61
FANTECH FANS		
HP2133	$0.0894	$13.31
HP2190	$0.0894	$56.78
HP175	$0.0894	$42.68
HP190	$0.0894	$56.78
HP220	$0.0894	$92.80
FR250	$0.0894	$101.03
PLASTEC VENTILATION		
STORM 12		$250.00
PLASTEC 20		$250.00

RadonAway®

The world's leading radon fan manufacturer

RP / RPc Series

Installation Instructions

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED. MAKE SURE ELECTRICAL SERVICE TO FAN IS LOCKED IN "OFF" POSITION. DISCONNECT POWER BEFORE SERVICING FAN.

1. **WARNING!** For General Ventilating Use Only. Do Not Use to Exhaust Hazardous, Corrosive or Explosive Materials, Gases or Vapors. See Vapor Intrusion Application Note #AN001 for important information on VI Applications. See RadonAway.com/vapor-intrusion.

2. **NOTE:** Fan is suitable for use with solid state speed controls; however, use of speed controls is not generally recommended.

2. **WARNING!** Check voltage at the fan to insure it corresponds with nameplate.

3. **WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.

4. **NOTICE!** There are no user serviceable parts located inside the fan unit. **Do NOT attempt to open.** Return unit to the factory for service.

5. **WARNING!** Do not leave fan unit installed on system piping without electrical power for more than 48 hours. Fan failure could result from this non-operational storage.

6. **WARNING!** TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

   a) Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.

   b) Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

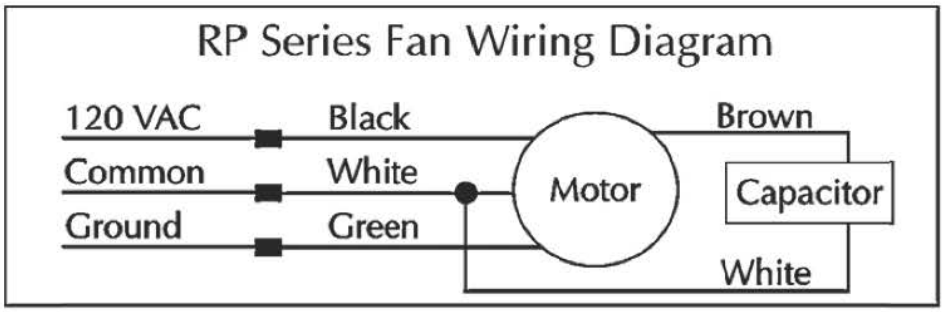
   c) Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire rated construction.

   d) Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent backdrafting. Follow the heating equipment manufacturers' guidelines and safety standards such as those published by any National Fire Protection Association, and the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), and the local code authorities.

   e) When cutting or drilling into a wall or ceiling, do not damage electrical wiring and other hidden utilities.

   f) Ducted fans must always be vented to outdoors.

   g) If this unit is to be installed over a tub or shower, it must be marked as appropriate for the application and be connected to a GFCI (Ground Fault Circuit Interrupter) protected branch circuit.



1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The RP / RPc Series Radon Fans are intended for use by trained, professional, certified/licensed radon mitigators. The purpose of these instructions is to provide additional guidance for the most effective use of an RP / RPC Series Fans. These instructions should be considered supplemental to EPA/radon industry standard practices, state and local building codes and regulations. In the event of a conflict, those codes, practices and regulations take precedence over these instructions.

1.2 FAN SEALING

The RP / RPc Series Fans are factory sealed; no additional caulk or other materials are required to inhibit air leakage.

1.3 ENVIRONMENTALS

The RP / RPc Series Fans are designed to perform year-round in all but the harshest climates without additional concern for temperature or weather. For installations in an area of severe cold weather, please contact RadonAway for assistance. When not in operation, the fan should be stored in an area where the temperature is never less than 32 degrees F or more than 100 degrees F.

1.4 ACOUSTICS

The RP / RPc Series Fans, when installed properly, operate with little or no noticeable noise to the building occupants. The velocity of the outgoing air should be considered in the overall system design. In some cases the “rushing” sound of the outlet air may be disturbing. In these instances, the use of a RadonAway Exhaust Muffler is recommended.

[To ensure quiet operation of inline and remote fans, each fan shall be installed using sound attenuation techniques appropriate for the installation. For bathroom and general ventilation applications, at least 8 feet of insulated flexible duct shall be installed between the exhaust or supply grille(s) and the fan(s). RP / RPc Series Fans are not suitable for kitchen range hood remote ventilation applications.]

1.5 GROUND WATER

In the event that a temporary high water table results in water at or above slab level, water may be drawn into the riser pipes, thus blocking air flow to the RP / RPc Series Fan. The lack of cooling air may result in the fan cycling on and off as the internal temperature rises above the thermal cutoff and falls upon shutoff. Should this condition arise, it is recommended that the fan be turned off until the water recedes, allowing for return to normal operation.

1.6 SLAB COVERAGE

The RP / RPc Series Fans can provide coverage up to 2000+ sq. ft. per slab penetration. This will primarily depend on the sub-slab material in any particular installation. In general, the tighter the material, the smaller the area covered per penetration. Appropriate selection of the RP / RPc Series Fan best suited for the sub-slab material can improve the slab coverage. The RP140/140c and RP145/145c are best suited for general purpose use. The RP260/260c can be used where additional airflow is required, and the RP265/265c and RP380/380c are best suited for large slab, high airflow applications. Additional suction points can be added as required. It is recommended that a small pit (5 to 10 gallons in size) be created below the slab at each suction hole.

1.7 CONDENSATION & DRAINAGE

Condensation is formed in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation. The RP / RPc Series Fan MUST be mounted vertically plumb and level, with the outlet pointing up for proper drainage through the fan. Avoid mounting the fan in any orientation that will allow water to accumulate inside the fan housing. The RP / RPc Series Fans are NOT suitable for underground burial.

For RP / RPc Series Fan piping, the following table provides the minimum recommended pipe diameter and pitch under several system conditions.

Pipe Diameter	Minimum Rise per Ft of Run*				
	@25 CFM	@50 CFM	@100 CFM	@200 CFM	@300 CFM
6”	-	3/16	1/4	3/8	3/4
4”	1/8	1/4	3/8	2 3/8	-
3”	1/4	3/8	1 1/2	-	-

*Typical RP/RPc (except RP380/RP380c) Series Fan operational flow rate is 25 - 90 CFM on 3” and 4” pipe.(For more precision, determine flow rate by measuring Static Pressure, in WC, and correlate pressure to flow in the performance chart in the addendum.)

1.8 SYSTEM MONITOR & LABEL

A System Monitor, such as a manometer (P/N 50017) or audible alarm (P/N 28001-2, 28001-4 or 28421), should be provided and is required to notify the occupants of a fan system malfunction. A System Label (provided with Manometer P/N 50017) with instructions for contacting the installing contractor for service and identifying the necessity for regular radon tests to be conducted by the building occupants must be conspicuously placed in a location where the occupants frequent and can see the label.

1.9 VENTILATION

If used as a ventilation fan, any type of ducting is acceptable; however, flexible nonmetallic ducting is recommended for easy installation and quieter operation. Insulated flexible ducting is highly recommended in cold climates to prevent the warm bathroom air, for example, from forming condensation in the ducting where it is exposed to colder attic air. The outlet of the fan should always be ducted to the outside. Avoid venting the outlet of the fan directly into an attic area. The excess moisture from the bathroom can cause damage to building structure and any items stored in the attic. Multiple venting points may be connected together using a “T” or “Y” fitting. Ideally, the duct should be arranged such that equal duct lengths are used between intake and “T” or “Y” fitting; this will result in equal flow rates in each intake branch. If adjustable intake grilles are used on multi-intake systems, then the opening on each grille should be equal in order to minimize noise and resistance. Straight smooth runs of rigid metal ducting will present the least resistance and maximize system performance. The Equivalent Length of Rigid Metal Ducting resulting in .2”WC pressure loss for each Fan Model is provided in the Specifications section of these instructions. Flexible ducting, if used, must always be as close to being fully extended as possible. Formed rigid metal duct elbows will present the least resistance and maximize system performance; recommended bend radius of elbow is at least 1.5 x duct diameter.

RP / RPc Series fans are not suitable for kitchen range hood remote ventilation applications. For quietest performance, the fan should be mounted farther away from the inlet duct, near the outside vent. A minimum distance of 8 feet is recommended between the fan or T/Y of a multi-intake system and intake grille(s).

Backdraft dampers allow airflow in only one direction, preventing cold/hot draughts from entering the vented area and minimizing possible condensation and icing within the system while the fan is not operating. Backdraft dampers are highly recommended at each intake grille for bathroom ventilation in all cold climate installations. Installation instructions are included with Spruce backdraft dampers.

1.10 ELECTRICAL WIRING
The RP / RPc Series Fans operate on standard 120V, 60Hz AC. All wiring must be performed in accordance with National Fire Protection (NFPA) National Electrical Code, Standard #70, current edition, for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a UL Listed watertight conduit. Ensure that all exterior electrical boxes are outdoor rated and properly sealed to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.11 SPEED CONTROLS
The RP / RPc Series Fans are rated for use with electronic speed controls; however, speed controls are generally not recommended. If used, the recommended speed control is Pass & Seymour Solid State Speed Control.

2.0 INSTALLATION

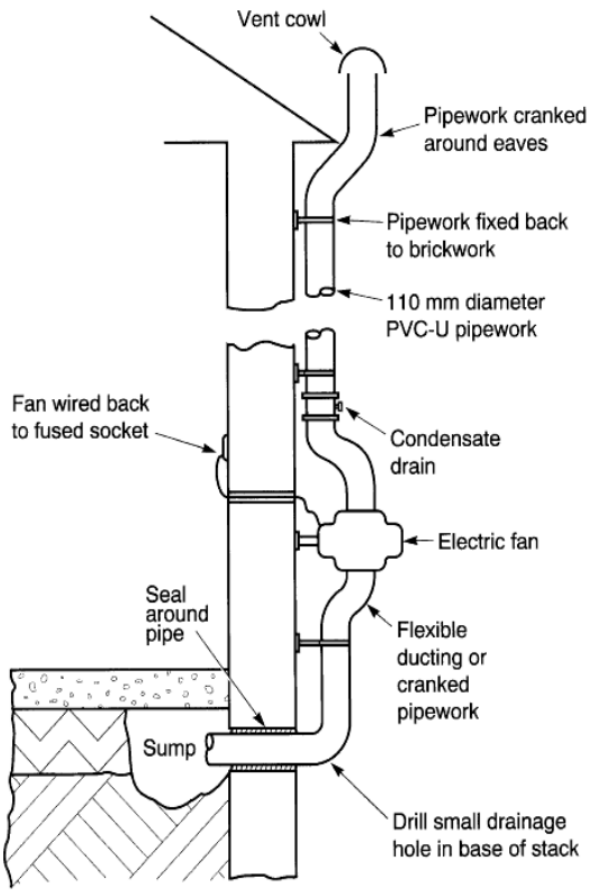
The RP / RPc Series Fans can be mounted indoors or outdoors. (It is suggested that EPA and radon mitigation standards recommendations be followed in choosing the fan location.) The RP / RPc Series Fans may be mounted directly on the system piping or fastened to a supporting structure by means of an optional mounting bracket.

For the ENERGY STAR Labeled RP140 / RP140c , the ducting from the fan to the outside of the building has a strong effect on noise and fan energy use. Use the shortest, straightest duct routing possible for best performance, and avoid installing the fan with smaller ducts than recommended. Insulation around the ducts can reduce energy loss and inhibit mold growth. Fans installed with existing ducts may not achieve their rated airflow.

2.1 MOUNTING
Mount the RP / RPc Series Fan vertically with outlet up. Ensure the unit is plumb and level. When mounting directly on the system piping assure that the fan does not contact any building surface to avoid vibration noise.

2.2 MOUNTING BRACKET (optional)
The RP / RPc Series Fan may be optionally secured with the RadonAway mounting bracket (P/N 25007 or 25033 for RP380 only). Foam or rubber grommets may also be used between the bracket and mounting surface for vibration isolation.

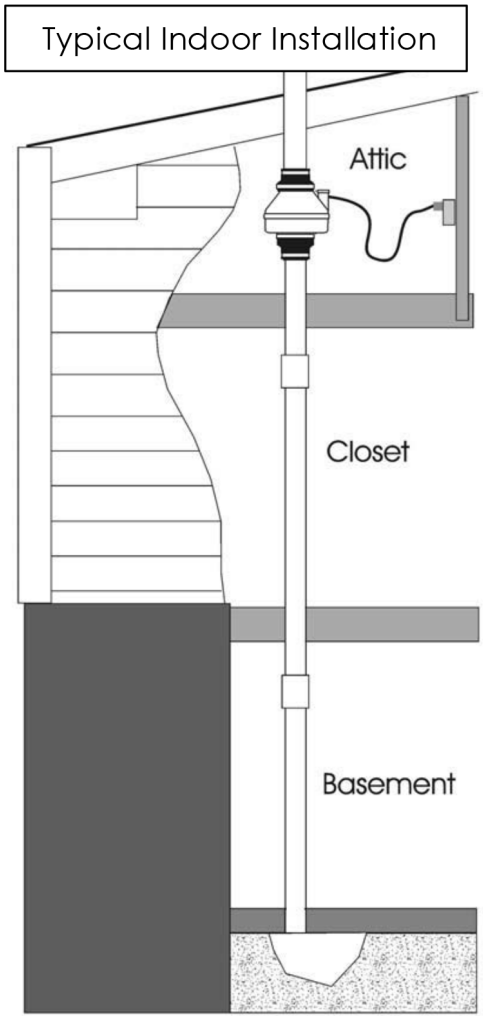
Typical Outdoor Installation.



The externally excavated sump

2.3 SYSTEM PIPING

Complete piping run using flexible couplings as a means of disconnect for servicing the unit and for vibration isolation. As the fan is typically outside of the building thermal boundary and is venting to the outside, installation of insulation around the fan is not required.



2.4 ELECTRICAL CONNECTION

Connect wiring with wire nuts provided, observing proper connections (See Section 1.10). Note that the fan is not intended for connection to rigid metal conduit.

Fan Wire	Connection
Green	Ground
Black	AC Hot
White	AC Common

2.5 VENT MUFFLER (optional)

Install the muffler assembly in the selected location in the outlet ducting. Solvent weld all connections. The muffler is normally installed at the end of the vent pipe.

2.6 OPERATION CHECKS & ANNUAL SYSTEM MAINTENANCE

_____ **Verify** all connections are tight and **leak-free**.

_____ **Ensure** the RP / RPc Series Fan and all ducting are **secure and vibration-free**.

_____ **Verify system vacuum pressure** with manometer. **Ensure** vacuum pressure is within normal operating range and **less than** the maximum recommended operating pressure.

(Based on sea-level operation, at higher altitudes reduce by about 4% per 1000 feet)
(Further reduce Maximum Operating Pressure by 10% for High Temperature environments.)
See Product Specifications. If this is exceeded, increase the number of suction points.

_____ **Verify Radon levels** by testing to EPA Protocol and applicable testing standards.

RP / RPc Series Product Specifications

The following chart shows fan preformance for the RP / RPc Series Fans:

Typical CFM Vs. Static Pressure "WC									
	0"	.25"	.5"	.75"	1.0"	1.25"	1.5"	1.75"	2.0"
RP140/140c	135	103	70	14	-	-	-	-	
RP145/145c	166	146	126	104	82	61	41	21	3
RP260/260c	251	200	157	117	70	26	-	-	-
RP265/265c	334	291	247	210	176	142	116	87	52
RP380/380c	497	401	353	281	220	176	130	80	38

Model	Power Consumption 120VAC, 60Hz, 1.5 Amp Maximum	Maximum Recommended Operation Pressure* (Sea Level Operation)**
RP140/140c	15 - 21 watts	0.7" WC
RP145/145c	41 - 72 watts	1.7" WC
RP260/260c	47-65 watts	1.3" WC
RP265/265c	91 - 129 watts	2.2" WC
RP380/380c	95 - 152 watts	2.0" WC

**Reduce by 10% for High Temperature Operation **Reduce by 4% per 1000 ft. of altitude.*

Model	Size	Weight	Inlet/Outlet	L.2
RP140/140c	8.5"H x 9.7" Dia.	5.5 lbs	4.5"OD (4.0" PVC Sched 40 size compatible)	25
RP145/145c	8.5"H x 9.7" Dia.	5.5 lbs	4,5" OD	15
RP260/260c	8.6"H x 11.75" Dia.	5.5 lbs	6.0" OD	48
RP265/265c	8.6"H x 11.75" Dia.	6.5 lbs	6.0" OD	30
RP380/380c	10.53"H x 13.41" Dia.	11.5 lbs	8.0" OD	57

L.2 = Estimated Equivalent Length of Rigid Metal Ducting resulting in .2" WC pressure loss for Duct Size listed. Longer Equivalent Lengths can be accommodated at Flows Lower than that at .2" WC pressure loss (see CFM Vs Static Pressure "WC Table).

Recommended Ducting: RP/RPc Series Fans (excluding RP380/380c), 3" or 4" Schedule 20/40 PVC Pipe; RP380/RP380c, 6" Schedule 20/40 PVC Pipe

PVC Pipe Mounting: If used for Ventilation, use 4", 6" or 8" Rigid or Flexible Ducting. Mount on the duct pipe or with optional mounting bracket.

Storage Temperature Range: 32-100 degrees F

Thermal Cutout:

RP140/140c	130°C (266°F)
RP145/145c	150°C (302°F)
RP260/260c	150°C (302°F)
RP265/265c	150°C (302°F)
RP380	150°C (302°F))

Continuous Duty

Class F Insulation (RP140/RP140c Class B)

Thermally Protected Manual Reset

3000 RPM

Rated for Indoor or Outdoor Use

LISTED Electric Fan

Intertek 77728

Conforms to UL STD. 507

Certified to CAN/CSA STD. C22.2 No.113

ENERGY STAR RP140 Only

2100 HVI CERTIFIED

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the RadonAway® RP/RPc, GP/GPc, XR/XRc, XP/XPc, XR and SF Series Fan for shipping damage within 15 days of receipt. **Notify RadonAway of any damages immediately.** RadonAway is not responsible for damages incurred during shipping. However, for your benefit, RadonAway does insure shipments.

There are no user serviceable parts inside the fan. **Do not attempt to open the housing.** Return unit to factory for service.

Install the RP/RPc, GP/GPc, XP/XPc, and XR SF Series Fan in accordance with all EPA, ANSI/AARST standard practices, and state and local building codes and regulations.

Provide a copy of this instruction or comparable radon system and testing information to the building occupants after completing system installation.

Warranty

RadonAway® warrants that the RP/RPc, GP/GPc (excluding GP500), XP/XPc, XR, SF Series Fan (the "Fan") will be free from defects in materials and workmanship for a period of 12 months from the date of purchase or 18 months from the date of manufacture, whichever is sooner (the "Warranty Term").

RadonAway® will replace any fan which fails due to defects in materials or workmanship during the Warranty Term. This Warranty is contingent on installation of the Fan in accordance with the instructions provided. This Warranty does not apply where any repairs or alterations have been made or attempted by others, or if the unit has been abused or misused. Warranty does not cover damage in shipment unless the damage is due to the negligence of RadonAway®.

The Fan must be returned (at Owner's cost) to the RadonAway® factory. Any Fan returned to the factory will be discarded unless the Owner provides specific instructions along with the Fan when it is returned regardless of whether or not the Fan is actually replaced under this warranty. Proof of purchase must be supplied upon request for service under this Warranty.

5-YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION.

RadonAway® will extend the Warranty Term of the fan to 60 months (5 years) from date of purchase or 66 months from date of manufacture, whichever is sooner, provided that the fan is installed by a professional radon mitigation contractor. Proof of purchase and/or proof of professional installation may be required for service under this warranty. No extended warranty is offered outside the Continental United States and Canada beyond the standard 12 months from the date of purchase or 18 months from the date of manufacture, whichever is sooner.

RadonAway® is not responsible for installation, removal or delivery costs associated with this Warranty.

LIMITATION OF WARRANTY

EXCEPT AS STATED ABOVE, THE RP/RPc, GP/GPc (excluding GP500), XP/XPc, XR, SF SERIES FANS ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL RADONAWAY BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR RELATING TO, THE FAN OR THE PERFORMANCE THEREOF. RADONAWAY'S AGGREGATE LIABILITY HEREUNDER SHALL NOT IN ANY EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE OF SAID PRODUCT. THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT, TO THE EXTENT THE SAME DOES NOT MEET WITH RADONAWAY'S WARRANTY AS PROVIDED ABOVE.

For service under this Warranty, contact RadonAway for a Return Material Authorization (RMA) number and shipping information. No returns can be accepted without an RMA. If factory return is required, the customer assumes all shipping costs, including insurance, to and from factory.

RadonAway® 3 Saber Way
Ward Hill, MA 01835 USA TEL (978) 521-3703
FAX (978) 521-3964
Email to: Returns@RadonAway.com

Record the following information for your records:

Serial Number: _____ Purchase Date: _____

SAFETY DATA SHEET

Date of issue/Date of revision 5 June 2018
Version 7

Section 1. Identification

Product name : LN-2000 LIQUID NAILS FUZE IT
Product code : 00378931
Other means of identification : Not available.
Product type : Solid.

Relevant identified uses of the substance or mixture and uses advised against

Product use : Consumer applications, Professional applications.
Use of the substance/ mixture : Adhesive.
Uses advised against : Not applicable.

Manufacturer : PPG Industries, Inc.
One PPG Place
Pittsburgh, PA 15272
Emergency telephone number : (412) 434-4515 (U.S.)
(514) 645-1320 (Canada)
01-800-00-21-400 or + 52 55 5559 1588 (Mexico)
Technical Phone Number : 1-800-441-9695 (8:00 am to 5:00 pm EST)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture : EYE IRRITATION - Category 2A
SKIN SENSITIZATION - Category 1
TOXIC TO REPRODUCTION (Fertility) - Category 1B
TOXIC TO REPRODUCTION (Unborn child) - Category 1B
Percentage of the mixture consisting of ingredient(s) of unknown toxicity: 95.4% (Oral), 75.5% (Dermal), 24% (Inhalation)

GHS label elements

Hazard pictograms :

Signal word : Danger

Section 2. Hazards identification

Hazard statements : Causes serious eye irritation.
May cause an allergic skin reaction.
May damage fertility or the unborn child.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Avoid breathing dust. Wash hands thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace.

Response : IF exposed or concerned: Get medical attention. IF ON SKIN: Wash with plenty of soap and water. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements : Trimethoxysilanes are capable of forming methanol if hydrolyzed or ingested. If swallowed, methanol may be harmful or fatal or cause blindness. This product either contains formaldehyde or is capable of releasing formaldehyde above 0.5 ppm under certain conditions. Formaldehyde is a known cancer hazard, a skin sensitizer and a respiratory sensitizer. Emits toxic fumes when heated.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Product name : LN-2000 LIQUID NAILS FUZE IT

Ingredient name	%	CAS number
Limestone	≥50 - ≤75	1317-65-3
proprietary trade secret organic amide wax	≥20 - ≤36	Not available.
N-(3-(trimethoxysilyl)propyl)ethylenediamine	≥1.0 - ≤5.0	Not available.
dibutylbis(pentane-2,4-dionato-O,O')tin	≥1.0 - <3.0	1760-24-3
	<1.0	22673-19-4

SUB codes represent substances without registered CAS Numbers.

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

If ingestion, irritation, any type of overexposure or symptoms of overexposure occur during or persists after use of this product, contact a POISON CONTROL CENTER, EMERGENCY ROOM OR PHYSICIAN immediately; have Safety Data Sheet information available. Never give anything by mouth to an unconscious or convulsing person.

Description of necessary first aid measures

Eye contact : Remove contact lenses, irrigate copiously with clean, fresh water, holding the eyelids apart for at least 10 minutes and seek immediate medical advice.

Inhalation : Remove to fresh air. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel.

Skin contact : Remove contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognized skin cleanser. Do NOT use solvents or thinners.

Ingestion : If swallowed, seek medical advice immediately and show this container or label. Keep person warm and at rest. Do NOT induce vomiting.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

Skin contact : May cause an allergic skin reaction.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
irritation
redness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon oxides
nitrogen oxides
metal oxide/oxides
Formaldehyde.

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Section 6. Accidental release measures

Methods and materials for containment and cleaning up

Small spill : Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Special precautions : Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Vapors are heavier than air and may spread along floors. If this material is part of a multiple component system, read the Safety Data Sheet(s) for the other component or components before blending as the resulting mixture may have the hazards of all of its parts.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Do not store above the following temperature: 50°C (122°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Limestone	**OSHA PEL (United States, 6/2016).** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust
proprietary trade secret organic	**ACGIH TLV (United States). Absorbed through skin.** TWA: 50 ppm
amide wax	**ACGIH TLV (United States).** TWA: 3 mg/m³ Form: Respirable dust TWA: 10 mg/m³ Form: inhalable dust
N-(3-(trimethoxysilyl)propyl)ethylenediamine	None.
dibutylbis(pentane-2,4-dionato-O,O')tin	**ACGIH TLV (United States). Absorbed through skin.** STEL: 0.2 mg/m³ **OSHA PEL (United States).** TWA: 0.1 mg/m³, (as Sn) TWA: 0.1 mg/m³, (as Sn) Form: Total dust **ACGIH TLV (United States, 3/2017). Absorbed through skin.** TWA: 0.1 mg/m³, (as Sn) 8 hours. STEL: 0.2 mg/m³, (as Sn) 15 minutes. **OSHA PEL (United States, 6/2016).** TWA: 0.1 mg/m³, (as Sn) 8 hours.

Key to abbreviations

A	=	Acceptable Maximum Peak	S	=	Potential skin absorption
ACGIH	=	American Conference of Governmental Industrial Hygienists.	SR	=	Respiratory sensitization
C	=	Ceiling Limit	SS	=	Skin sensitization
F	=	Fume	STEL	=	Short term Exposure limit values
IPEL	=	Internal Permissible Exposure Limit	TD	=	Total dust
OSHA	=	Occupational Safety and Health Administration.	TLV	=	Threshold Limit Value
R	=	Respirable	TWA	=	Time Weighted Average
Z	=	OSHA 29 CFR 1910.1200 Subpart Z - Toxic and Hazardous Substances			

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Section 8. Exposure controls/personal protection

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Gloves : butyl rubber

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. If workers are exposed to concentrations above the exposure limit, they must use appropriate, certified respirators. Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.

Section 9. Physical and chemical properties

Appearance

Physical state : Solid.

Color : Gray.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Melting point : Not available.

Boiling point : Not available.

Flash point : Closed cup: Not applicable. [Product does not sustain combustion.]

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Evaporation rate : Not available.

Vapor pressure : Not available.

Section 9. Physical and chemical properties

Vapor density : Not available.

Relative density : 1.47

Density (lbs / gal) : 12.27

Solubility : Insoluble in the following materials: cold water.

Partition coefficient: n-octanol/water : Not available.

Viscosity : Kinematic (40°C (104°F)): Not applicable.

Volatility : 1% (v/v), 0.028% (w/w)

% Solid. (w/w) : 99.972

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : When exposed to high temperatures may produce hazardous decomposition products. Refer to protective measures listed in sections 7 and 8.

Incompatible materials : Keep away from the following materials to prevent strong exothermic reactions: oxidizing agents, strong alkalis, strong acids.

Hazardous decomposition products : Decomposition products may include the following materials: carbon monoxide, carbon dioxide, smoke, oxides of nitrogen.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
proprietary trade secret organic	LC50 Inhalation Gas.	Rat	48000 ppm	4 hours
	LD50 Dermal	Rabbit	3000 mg/kg	-
N-(3-(trimethoxysilyl)propyl) ethylenediamine	LD50 Oral	Rat	2413 mg/kg	-
dibutylbis(pentane-2, 4-dionato-O,O')tin	LD50 Oral	Rat	>2 g/kg	-

Conclusion/Summary : There are no data available on the mixture itself.

Irritation/Corrosion

Conclusion/Summary

Skin : There are no data available on the mixture itself.

Section 11. Toxicological information

Eyes : There are no data available on the mixture itself.
Respiratory : There are no data available on the mixture itself.

Sensitization

Conclusion/Summary
Skin : There are no data available on the mixture itself.
Respiratory : There are no data available on the mixture itself.

Mutagenicity
Conclusion/Summary : There are no data available on the mixture itself.

Carcinogenicity
Conclusion/Summary : There are no data available on the mixture itself.

Reproductive toxicity
Conclusion/Summary : There are no data available on the mixture itself.

Teratogenicity
Conclusion/Summary : There are no data available on the mixture itself.

Specific target organ toxicity (single exposure)

Name	Category
dibutylbis(pentane-2,4-dionato-O,O')tin	Category 1

Specific target organ toxicity (repeated exposure)

Name	Category
dibutylbis(pentane-2,4-dionato-O,O')tin	Category 1

Target organs : Contains material which may cause damage to the following organs: lungs, upper respiratory tract, skin, eyes.

Aspiration hazard
Not available.

Information on the likely routes of exposure

Potential acute health effects
Eye contact : Causes serious eye irritation.
Inhalation : No known significant effects or critical hazards.
Skin contact : May cause an allergic skin reaction.
Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms
Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness
Inhalation : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

Section 11. Toxicological information

Skin contact : Adverse symptoms may include the following:
irritation
redness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

Delayed and immediate effects and also chronic effects from short and long term exposure

Conclusion/Summary : There are no data available on the mixture itself. Trimethoxysilanes are capable of forming methanol if hydrolyzed or ingested. If swallowed, methanol may be harmful or fatal or cause blindness. This product either contains formaldehyde or is capable of releasing formaldehyde above 0.5 ppm under certain conditions. Formaldehyde is a known cancer hazard, a skin sensitizer and a respiratory sensitizer. Ingestion may cause nausea, diarrhea and vomiting. This takes into account, where known, delayed and immediate effects and also chronic effects of components from short-term and long-term exposure by oral, inhalation and dermal routes of exposure and eye contact.

Short term exposure

Potential immediate effects : There are no data available on the mixture itself.

Potential delayed effects : There are no data available on the mixture itself.

Long term exposure

Potential immediate effects : There are no data available on the mixture itself.

Potential delayed effects : There are no data available on the mixture itself.

Potential chronic health effects

General : Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : May damage the unborn child.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : May damage fertility.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	9805.3 mg/kg
Dermal	3496.8 mg/kg
Inhalation (gases)	301670.6 ppm
Inhalation (vapors)	737.4 mg/l
Inhalation (dusts and mists)	100.6 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
amide wax	EC50 29 to 43 mg/l EC50 94 mg/l	Algae Daphnia	72 hours 48 hours

Persistence and degradability

Product/ingredient name	Test	Result	Dose	Inoculum
amide wax	-	63 % - Readily - 28 days	-	-

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
amide wax	-	-	Readily

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees. Section 6. Accidental release measures

14. Transport information

	DOT	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class (es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.
Marine pollutant substances	Not applicable.	Not applicable.	Not applicable.

Additional information

DOT : None identified.

IMDG : None identified.

IATA : None identified.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

United States

United States inventory (TSCA 8b) : All components are listed or exempted.

SARA 302/304

SARA 304 RQ : Not applicable.

Composition/information on ingredients

No products were found.

SARA 311/312

Classification : EYE IRRITATION - Category 2A
SKIN SENSITIZATION - Category 1
TOXIC TO REPRODUCTION (Fertility) - Category 1B
TOXIC TO REPRODUCTION (Unborn child) - Category 1B

Composition/information on ingredients

Section 15. Regulatory information

Name	%	Classification
amide wax	≥1.0 - ≤5.0	COMBUSTIBLE DUSTS SKIN SENSITIZATION - Category 1B
N-(3-(trimethoxysilyl)propyl) ethylenediamine	≥1.0 - <3.0	ACUTE TOXICITY (inhalation) - Category 4 SERIOUS EYE DAMAGE - Category 1 SKIN SENSITIZATION - Category 1B
dibutylbis(pentane-2,4-dionato-O, O')tin	<1.0	ACUTE TOXICITY (oral) - Category 4 SKIN CORROSION - Category 1C SERIOUS EYE DAMAGE - Category 1 SKIN SENSITIZATION - Category 1B GERM CELL MUTAGENICITY - Category 2 TOXIC TO REPRODUCTION (Fertility) - Category 1B TOXIC TO REPRODUCTION (Unborn child) - Category 1B SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) - Category 1 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (immune system) (oral) - Category 1

Additional environmental information is contained on the Environmental Data Sheet for this product, which can be obtained from your PPG representative.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health : 2 * **Flammability** : 0 **Physical hazards** : 0

(*) - Chronic effects

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on MSDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)

Health : 2 **Flammability** : 0 **Instability** : 0

Date of previous issue : **2/7/2018**

Organization that prepared the MSDS : EHS

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)

Section 16. Other information

UN = United Nations

Indicates information that has changed from previously issued version.

Disclaimer

The information contained in this data sheet is based on present scientific and technical knowledge. The purpose of this information is to draw attention to the health and safety aspects concerning the products supplied by PPG, and to recommend precautionary measures for the storage and handling of the products. No warranty or guarantee is given in respect of the properties of the products. No liability can be accepted for any failure to observe the precautionary measures described in this data sheet or for any misuse of the products.

SAFETY DATA SHEET
THE DOW CHEMICAL COMPANY

Product name: FILL AND SEAL™ Expanding Foam Sealant 12oz HC ES STW 12ct **Issue Date:** 01/19/2016

Print Date: 06/16/2016

THE DOW CHEMICAL COMPANY encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: FILL AND SEAL™ Expanding Foam Sealant 12oz HC ES STW 12ct

Recommended use of the chemical and restrictions on use
Identified uses: Polyurethane foam.

COMPANY IDENTIFICATION
THE DOW CHEMICAL COMPANY
2030 WILLARD H DOW CENTER
MIDLAND MI 48674-0000
UNITED STATES

Customer Information Number: 800-258-2436
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: CHEMTREC +1 800-424-9300
Local Emergency Contact: 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification
This material is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.
Flammable aerosols - Category 2
Gases under pressure - Liquefied gas
Skin irritation - Category 2
Eye irritation - Category 2B
Respiratory sensitisation - Category 1
Skin sensitisation - Category 1
Effects on or via lactation
Specific target organ toxicity - single exposure - Category 3
Specific target organ toxicity - repeated exposure - Category 2 - Inhalation

Label elements
Hazard pictograms

Signal word: **DANGER!**

Hazards
Flammable aerosol.
Contains gas under pressure; may explode if heated.
Causes skin and eye irritation.
May cause an allergic skin reaction.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
May cause respiratory irritation.
May cause harm to breast-fed children.
May cause damage to organs (Respiratory Tract) through prolonged or repeated exposure if inhaled.

Precautionary statements

Prevention
Obtain special instructions before use.
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Do not spray on an open flame or other ignition source.
Pressurized container: Do not pierce or burn, even after use.
Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
Avoid contact during pregnancy/ while nursing.
Wash skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Contaminated work clothing should not be allowed out of the workplace.
Wear protective gloves.
In case of inadequate ventilation wear respiratory protection.

Response
IF ON SKIN: Wash with plenty of soap and water.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed or concerned: Get medical advice/ attention.
If skin irritation or rash occurs: Get medical advice/ attention.
If eye irritation persists: Get medical advice/ attention.
Take off contaminated clothing and wash before reuse.

Storage
Store in a well-ventilated place. Keep container tightly closed.
Store locked up.
Protect from sunlight. Do not expose to temperatures exceeding 50 °C/ 122 °F.

Disposal
Dispose of contents/ container to an approved waste disposal plant.

Other hazards
No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature: Polyurethane prepolymer
This product is a mixture.

Component	CASRN	Concentration
Diphenylmethane Diisocyanate, isomers and homologues	9016-87-9	>= 10.0 - <= 30.0 %
Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer	57029-46-6	>= 30.0 - <= 60.0 %
Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer	53862-89-8	>= 10.0 - <= 30.0 %
Tris(1-chloro-2-propyl) phosphate	13674-84-5	>= 5.0 - <= 10.0 %
Paraffin waxes and Hydrocarbon waxes, chlorinated	63449-39-8	>= 5.0 - <= 10.0 %
Isobutane	75-28-5	>= 5.0 - <= 10.0 %
Methyl ether	115-10-6	>= 1.0 - <= 5.0 %
Propane	74-98-6	>= 1.0 - <= 5.0 %
4,4' -Methylenediphenyl diisocyanate	101-68-8	>= 5.0 - <= 10.0 %

Note
Note: CAS 101-68-8 is an MDI isomer that is part of CAS 9016-87-9.

4. FIRST AID MEASURES

Description of first aid measures
General advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Skin contact: Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. An MDI skin decontamination study demonstrated that cleaning very soon after exposure is important, and that a polyglycol-based skin cleanser or corn oil may be more effective than soap and water. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands. Suitable emergency safety shower facility should be available in work area.

Eye contact: Immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention without delay, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.

Ingestion: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed
Notes to physician: Excessive exposure may aggravate preexisting asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome). Repeated excessive exposure may aggravate preexisting lung disease. Maintain adequate ventilation and oxygenation of the patient. May cause respiratory sensitization or asthma-like symptoms. Bronchodilators, expectorants and antitussives may be of help. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs such as epinephrine unless absolutely necessary. If you are sensitized to diisocyanates, consult your physician regarding working with other respiratory irritants or sensitizers. Although cholinesterase depression has been reported with this material, it is not of benefit in determining exposure and need not be considered in the treatment of persons exposed to the material. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIREFIGHTING MEASURES

Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Unsuitable extinguishing media: Do not use direct water stream. Straight or direct water streams may not be effective to extinguish fire.

Special hazards arising from the substance or mixture
Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Isocyanates. Hydrogen chloride. Carbon monoxide. Carbon dioxide. Hydrogen cyanide.

Unusual Fire and Explosion Hazards: Contains flammable propellant. Aerosol cans exposed to fire can rupture and become flaming projectiles. Propellant release may result in a fireball. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Dense smoke is produced when product burns.

Advice for firefighters
Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Water may not be effective in extinguishing fire. Do not use direct water stream. May spread fire. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Eliminate ignition sources. Move container from fire area if this is possible without hazard. Use water spray to cool fire-exposed containers and fire-affected zone until fire is out.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Evacuate area. Only trained and properly protected personnel must be involved in clean-up operations. Keep personnel out of low areas. Keep personnel out of confined or poorly ventilated areas. Keep upwind of spill. Ventilate area of leak or spill. No smoking in area. For large spills, warn public of downwind explosion hazard. Check area with combustible gas detector before reentering area. Ground and bond all containers and handling equipment. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Vapor explosion hazard. Keep out of sewers. See Section 10 for more specific information. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Confined space entry procedures must be followed before entering the area. Refer to section 7, Handling, for additional precautionary measures.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information. Spills or discharge to natural waterways is likely to kill aquatic organisms.

Methods and materials for containment and cleaning up: Contain spilled material if possible. Ground and bond all containers and handling equipment. Isolate area until gas has dispersed. Use non-sparking tools in cleanup operations. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Check area with combustible gas detector before reentering area. Ground and bond all containers and handling equipment. Collect in suitable and properly labeled containers. Absorb with materials such as: Clay. Dirt. Milsorb®. Sand. Sawdust. Vermiculite. See Section 10 for more specific information. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: Keep away from heat, sparks and flame. Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling. Keep container closed. Use only with adequate ventilation. No smoking, open flames or sources of ignition in handling and storage area. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Contents under pressure. Do not puncture or incinerate container. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Do not enter confined spaces unless adequately ventilated. Never use air pressure for transferring product. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage: Minimize sources of ignition, such as static build-up, heat, spark or flame. Store in a dry place. See Section 10 for more specific information.

Storage stability

Storage temperature:	**Storage Period:**
25 °C (77 °F)	12 Month

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure limits are listed below, if they exist.

Component	Regulation	Type of listing	Value/Notation
Isobutane	ACGIH	STEL	1,000 ppm
Methyl ether	US WEEL	TWA	1,000 ppm
Propane	ACGIH		Asphyxiant
	OSHA Z-1	TWA	1,800 mg/m3 1,000 ppm
4,4' -Methylenediphenyl diisocyanate	Dow IHG	TWA	0.005 ppm
	Dow IHG	STEL	0.02 ppm
	ACGIH	TWA	0.005 ppm
	OSHA Z-1	C	0.2 mg/m3 0.02 ppm
	NIOSH REL	TWA	0.05 mg/m3 0.005 ppm
	NIOSH REL	C	0.2 mg/m3 0.02 ppm

Exposure controls

Engineering controls: Use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations. Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. The odor and irritancy of this material are inadequate to warn of excessive exposure. Lethal concentrations may exist in areas with poor ventilation.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields).

Skin protection

Hand protection: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Butyl rubber. Chlorinated polyethylene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Viton. Polyvinyl chloride ("PVC" or "vinyl"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.
Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

Respiratory protection: Atmospheric levels should be maintained below the exposure guideline. When atmospheric levels may exceed the exposure guideline, use an approved air-purifying respirator equipped with an organic vapor sorbent and a particle filter. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive-pressure air-supplying respirator (air line or self-contained breathing apparatus). For emergency response or for situations where the atmospheric level is unknown, use an approved positive-pressure self-contained breathing apparatus or positive-pressure air line with auxiliary self-contained air supply. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply.
The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	
Physical state	Foam
Color	Yellow
Odor	Mild
Odor Threshold	No test data available
pH	*Not applicable*
Melting point/range	No test data available
Freezing point	No test data available
Boiling point (760 mmHg)	Not applicable
Flash point	**closed cup** -104 °C (-155 °F) *Estimated.*
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	No data available
Lower explosion limit	No test data available
Upper explosion limit	No test data available
Vapor Pressure	1,151 kPa at 55 °C (131 °F) *Calculated.*
Relative Vapor Density (air = 1)	No test data available
Relative Density (water = 1)	1.06 *Estimated.*
Water solubility	Insoluble

Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No test data available
Decomposition temperature	No test data available
Kinematic Viscosity	Not applicable
Explosive properties	Not explosive
Oxidizing properties	No
Molecular weight	No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: No data available

Chemical stability: Stable under recommended storage conditions. See Storage, Section 7. Unstable at elevated temperatures.

Possibility of hazardous reactions: Can occur. Exposure to elevated temperatures can cause product to decompose and generate gas. This can cause pressure build-up and/or rupturing of closed containers. Acids.

Conditions to avoid: Avoid temperatures above 50 °C
Elevated temperatures can cause container to vent and/or rupture. Exposure to elevated temperatures can cause product to decompose.

Incompatible materials: Avoid contact with: Acids. Alcohols. Amines. Ammonia. Bases. Metal compounds. Strong oxidizers. Products based on diisocyanates like TDI and MDI react with many materials to release heat. The reaction rate increases with temperature as well as with increased contact; these reactions can become violent. Contact is increased by stirring or if the other material acts as a solvent. Products based on diisocyanates such as TDI and MDI are not soluble in water and will sink to the bottom, but react slowly at the interface. The reaction forms carbon dioxide gas and a layer of solid polyurea. Reaction with water will generate carbon dioxide and heat.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Toxic gases are released during decomposition.

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity

Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Observations in animals include: Gastrointestinal irritation.

As product: Single dose oral LD50 has not been determined.

LD50, Rat, > 2,000 mg/kg Estimated.

Acute dermal toxicity
Prolonged skin contact is unlikely to result in absorption of harmful amounts.

As product: The dermal LD50 has not been determined.

LD50, Rabbit, > 2,000 mg/kg Estimated.

Acute inhalation toxicity
In confined or poorly ventilated areas, vapor can easily accumulate and can cause unconsciousness and death due to displacement of oxygen. Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs. May cause pulmonary edema (fluid in the lungs.) Effects may be delayed. May cause central nervous system depression. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed. Excessive exposure may increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats). Decreased lung function has been associated with overexposure to isocyanates.

The LC50 has not been determined.,

Skin corrosion/irritation
Prolonged contact may cause moderate skin irritation with local redness.
Material may stick to skin causing irritation upon removal.
May stain skin.

Serious eye damage/eye irritation
May cause eye irritation.
May cause slight temporary corneal injury.

Sensitization
Skin contact may cause an allergic skin reaction.
Animal studies have shown that skin contact with isocyanates may play a role in respiratory sensitization.

May cause allergic respiratory reaction.
MDI concentrations below the exposure guidelines may cause allergic respiratory reactions in individuals already sensitized.
Asthma-like symptoms may include coughing, difficult breathing and a feeling of tightness in the chest.
Occasionally, breathing difficulties may be life threatening.

Specific Target Organ Systemic Toxicity (Single Exposure)
May cause respiratory irritation.
Route of Exposure: Inhalation

Specific Target Organ Systemic Toxicity (Repeated Exposure)
Tissue injury in the upper respiratory tract and lungs has been observed in laboratory animals after repeated excessive exposures to MDI/polymeric MDI aerosols.
Contains component(s) which have been reported to cause effects on the following organs in animals: kidney

Liver.

Carcinogenicity
Lung tumors have been observed in laboratory animals exposed to respirable aerosol droplets of MDI/Polymeric MDI (6 mg/m3) for their lifetime. Tumors occurred concurrently with respiratory irritation and lung injury. Current exposure guidelines are expected to protect against these effects reported for MDI.

Teratogenicity
In laboratory animals, MDI/polymeric MDI did not cause birth defects; other fetal effects occurred only at high doses which were toxic to the mother.

Reproductive toxicity
Based on information for component(s): May cause harm to breastfed babies.

Mutagenicity
In vitro genetic toxicity studies were negative for component(s) tested. Genetic toxicity data on MDI are inconclusive. MDI was weakly positive in some in vitro studies; other in vitro studies were negative. Animal mutagenicity studies were predominantly negative.

Aspiration Hazard
Based on physical properties, not likely to be an aspiration hazard.

Carcinogenicity

Component	List	Classification
Paraffin waxes and Hydrocarbon waxes, chlorinated	IARC	Group 2B: Possibly carcinogenic to humans
	US NTP	Reasonably anticipated to be a human carcinogen

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Toxicity

Diphenylmethane Diisocyanate, isomers and homologues

Acute toxicity to fish
The measured ecotoxicity is that of the hydrolyzed product, generally under conditions maximizing production of soluble species.
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
Based on information for a similar material:
LC50, Danio rerio (zebra fish), static test, 96 Hour, > 1,000 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
Based on information for a similar material:
EC50, Daphnia magna (Water flea), static test, 24 Hour, > 1,000 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants
Based on information for a similar material:
NOEC, Desmodesmus subspicatus (green algae), static test, 72 Hour, Growth rate inhibition, 1,640 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
Based on information for a similar material:
EC50, activated sludge, static test, 3 Hour, Respiration rates., > 100 mg/l

Toxicity to soil-dwelling organisms
EC50, Eisenia fetida (earthworms), Based on information for a similar material:, 14 d, > 1,000 mg/kg

Toxicity to terrestrial plants
EC50, Avena sativa (oats), Growth inhibition, 1,000 mg/l
EC50, Lactuca sativa (lettuce), Growth inhibition, 1,000 mg/l

Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer

Acute toxicity to fish
For this family of materials:
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer

Acute toxicity to fish
Not expected to be acutely toxic to aquatic organisms.

Tris(1-chloro-2-propyl) phosphate

Acute toxicity to fish
Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested).
LC50, Lepomis macrochirus (Bluegill sunfish), static test, 96 Hour, 84 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), 48 Hour, 131 mg/l

Acute toxicity to algae/aquatic plants
ErC50, Pseudokirchneriella subcapitata (green algae), static test, 96 Hour, Growth rate inhibition, 82 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
EC50, activated sludge, Respiration inhibition, 3 Hour, 784 mg/l, OECD 209 Test

Chronic toxicity to aquatic invertebrates
NOEC, Daphnia magna (Water flea), semi-static test, 21 d, number of offspring, 32 mg/l
LOEC, Daphnia magna (Water flea), semi-static test, 21 d, number of offspring, > 32 mg/l

Paraffin waxes and Hydrocarbon waxes, chlorinated

Acute toxicity to fish
Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested).

LC50, Oncorhynchus mykiss (rainbow trout), 96 Hour, > 0.1 mg/l

Isobutane

Acute toxicity to fish
No relevant data found.

Methyl ether

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Poecilia reticulata (guppy), semi-static test, 96 Hour, > 4,000 mg/l

Acute toxicity to aquatic invertebrates
LC50, Daphnia magna (Water flea), 48 Hour, > 4,000 mg/l, OECD Test Guideline 202 or Equivalent

Propane

Acute toxicity to fish
No relevant data found.

4,4' -Methylenediphenyl diisocyanate

Acute toxicity to fish
The measured ecotoxicity is that of the hydrolyzed product, generally under conditions maximizing production of soluble species.
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
Based on information for a similar material:
LC50, Danio rerio (zebra fish), static test, 96 Hour, > 1,000 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
Based on information for a similar material:
EC50, Daphnia magna (Water flea), static test, 24 Hour, > 1,000 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants
Based on information for a similar material:
NOEC, Desmodesmus subspicatus (green algae), static test, 72 Hour, Growth rate inhibition, 1,640 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
Based on information for a similar material:
EC50, activated sludge, static test, 3 Hour, Respiration rates., > 100 mg/l

Toxicity to soil-dwelling organisms
EC50, Eisenia fetida (earthworms), Based on information for a similar material:, 14 d, > 1,000 mg/kg

Toxicity to terrestrial plants
EC50, Avena sativa (oats), Growth inhibition, 1,000 mg/l
EC50, Lactuca sativa (lettuce), Growth inhibition, 1,000 mg/l

Persistence and degradability

Diphenylmethane Diisocyanate, isomers and homologues

Biodegradability: In the aquatic and terrestrial environment, material reacts with water forming predominantly insoluble polyureas which appear to be stable. In the atmospheric environment, material is expected to have a short tropospheric half-life, based on calculations and by analogy with related diisocyanates.
10-day Window: Not applicable
Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 302C or Equivalent

Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer

Biodegradability: For this family of materials: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer

Biodegradability: Expected to degrade slowly in the environment.

Tris(1-chloro-2-propyl) phosphate

Biodegradability: Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.
10-day Window: Fail
Biodegradation: 14 %
Exposure time: 28 d
Method: OECD Test Guideline 301E or Equivalent
10-day Window: Not applicable
Biodegradation: 95 %
Exposure time: 64 d
Method: OECD Test Guideline 302A or Equivalent

Theoretical Oxygen Demand: 1.17 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Atmospheric half-life: 0.24 d
Method: Estimated.

Paraffin waxes and Hydrocarbon waxes, chlorinated

Biodegradability: Expected to degrade slowly in the environment.

Theoretical Oxygen Demand: 2.89 mg/mg

Isobutane

Biodegradability: Biodegradation may occur under aerobic conditions (in the presence of oxygen).

Theoretical Oxygen Demand: 3.58 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Atmospheric half-life: 4.4 d

Method: Estimated.

Methyl ether

Biodegradability: Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.
10-day Window: Fail
Biodegradation: 5 %
Exposure time: 28 d
Method: OECD Test Guideline 301A or Equivalent

Theoretical Oxygen Demand: 2.08 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Atmospheric half-life: 6.4 d
Method: Estimated.

Propane

Biodegradability: No relevant data found.

Theoretical Oxygen Demand: 3.64 mg/mg

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Atmospheric half-life: 8.4 d
Method: Estimated.

4,4' -Methylenediphenyl diisocyanate

Biodegradability: In the aquatic and terrestrial environment, material reacts with water forming predominantly insoluble polyureas which appear to be stable. In the atmospheric environment, material is expected to have a short tropospheric half-life, based on calculations and by analogy with related diisocyanates.
10-day Window: Not applicable
Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 302C or Equivalent

Bioaccumulative potential

Diphenylmethane Diisocyanate, isomers and homologues

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Reacts with water. In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.
Bioconcentration factor (BCF): 92 Cyprinus carpio (Carp) 28 d

Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer

Bioaccumulation: No relevant data found.

Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer

Bioaccumulation: In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

Tris(1-chloro-2-propyl) phosphate

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 2.59 Measured
Bioconcentration factor (BCF): 0.8 - 4.6 Cyprinus carpio (Carp) 42 d Measured

Paraffin waxes and Hydrocarbon waxes, chlorinated

Bioaccumulation: Bioconcentration potential is low (BCF less than 100 or log Pow greater than 7).
Partition coefficient: n-octanol/water(log Pow): 7.4 Estimated.

Isobutane

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 2.76 Measured

Methyl ether

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 0.10 Measured

Propane

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 2.36 Measured

4,4' -Methylenediphenyl diisocyanate

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Reacts with water. In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.
Bioconcentration factor (BCF): 92 Cyprinus carpio (Carp) 28 d

Mobility in soil

Diphenylmethane Diisocyanate, isomers and homologues

In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

Polymethylenepolyphenylisocyanate, propoxylated glycerin polymer

No relevant data found.

Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer

In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

Tris(1-chloro-2-propyl) phosphate

Potential for mobility in soil is slight (Koc between 2000 and 5000).
Partition coefficient(Koc): 1300 Estimated.

Paraffin waxes and Hydrocarbon waxes, chlorinated

Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.
Expected to be relatively immobile in soil (Koc > 5000).
Partition coefficient(Koc): > 5000 Estimated.

Isobutane

Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient(Koc): 35 Estimated.

Methyl ether

Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient(Koc): 1.29 - 14 Estimated.

Propane

Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient(Koc): 24 - 460 Estimated.

4,4' -Methylenediphenyl diisocyanate

In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Aerosols
UN number	UN 1950
Class	2.1
Packing group	

Classification for SEA transport (IMO-IMDG):

Proper shipping name	AEROSOLS
UN number	UN 1950
Class	2.1
Packing group	
Marine pollutant	Paraffin waxes and Hydrocarbon waxes, chlorinated
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Proper shipping name	Aerosols, flammable
UN number	UN 1950
Class	2.1
Packing group	

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

OSHA Hazard Communication Standard
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312
Acute Health Hazard
Chronic Health Hazard
Fire Hazard

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313
This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Components	**CASRN**
Diphenylmethane Diisocyanate, isomers and homologues	9016-87-9
4,4' -Methylenediphenyl diisocyanate	101-68-8

Pennsylvania Worker and Community Right-To-Know Act:
The following chemicals are listed because of the additional requirements of Pennsylvania law:

Components	**CASRN**
Isobutane	75-28-5
Methyl ether	115-10-6
Propane	74-98-6

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)
This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

United States TSCA Inventory (TSCA)
All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

16. OTHER INFORMATION

Revision
Identification Number: 101194255 / A001 / Issue Date: 01/19/2016 / Version: 8.0
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
Asphyxiant	Asphyxiant
C	Ceiling
Dow IHG	Dow Industrial Hygiene Guideline
NIOSH REL	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
STEL	Short term exposure limit
TWA	Time weighted average
US WEEL	USA. Workplace Environmental Exposure Levels (WEEL)

Information Source and References
This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

THE DOW CHEMICAL COMPANY urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

SAFETY DATA SHEET

1. Identification

Product identifier **Regular Clear Advanced PVC Cement**

Other means of identification

Product code 1107E

Synonyms Part Numbers: 30881, 31925, 31926, 31927, 31928, 31929, 31958, 31959, 31960, 31961

Recommended use Joining PVC Pipes

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name Oatey Co.

Address 4700 West 160th St.
Cleveland, OH 44135

Telephone 216-267-7100

E-mail info@oatey.com

Transport Emergency Chemtrec 1-800-424-9300 (Outside the US 1-703-527-3887)

Emergency First Aid 1-877-740-5015

Contact person MSDS Coordinator

2. Hazard(s) identification

Physical hazards	Flammable liquids	Category 2
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2A
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
	Specific target organ toxicity, single exposure	Category 3 narcotic effects
	Aspiration hazard	Category 1

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Highly flammable liquid and vapor. Harmful if swallowed. May be fatal if swallowed and enters airways. Causes skin irritation. Causes serious eye irritation. May cause respiratory irritation. May cause drowsiness or dizziness.

Precautionary statement

Prevention Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Avoid breathing mist or vapor. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.

Response If swallowed: Immediately call a poison center/doctor. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor if you feel unwell. Rinse mouth. Do NOT induce vomiting. If skin irritation occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash before reuse. In case of fire: Use appropriate media to extinguish.

Storage	Store in a well-ventilated place. Keep container tightly closed. Keep cool. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis. May form explosive peroxides. Contains a chemical classified by the US EPA as a suspected possible carcinogen.

Supplemental information

Not applicable.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Methyl ethyl ketone	78-93-3	30-45
Cyclohexanone	108-94-1	10-25
Furan, Tetrahydro-	109-99-9	10-25
Acetone	67-64-1	5-15
Polyvinyl chloride	9002-86-2	5-15

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
Skin contact	Take off immediately all contaminated clothing. Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Ingestion	Call a physician or poison control center immediately. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Aspiration may cause pulmonary edema and pneumonitis.
Most important symptoms/effects, acute and delayed	Irritation of nose and throat. Aspiration may cause pulmonary edema and pneumonitis. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation. Vapors have a narcotic effect and may cause headache, fatigue, dizziness and nausea. Skin irritation. May cause redness and pain.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Thermal burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	Take off all contaminated clothing immediately. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Alcohol resistant foam. Water fog. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	Vapors may form explosive mixtures with air. Vapors may travel considerable distance to a source of ignition and flash back. During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	Highly flammable liquid and vapor. This product contains tetrahydrofuran that may form explosive organic peroxide when exposed to air or light or with age.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate protective equipment and clothing during clean-up. Avoid breathing mist or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Take precautionary measures against static discharge. Use only non-sparking tools. Keep combustibles (wood, paper, oil, etc.) away from spilled material. This product is miscible in water.

Large Spills: Stop the flow of material, if this is without risk. Use water spray to reduce vapors or divert vapor cloud drift. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water.

Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions

Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Vapors may form explosive mixtures with air. Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Explosion-proof general and local exhaust ventilation. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. Avoid breathing mist or vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Do not taste or swallow. When using, do not eat, drink or smoke. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store locked up. Keep away from heat, sparks and open flame. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Store in a cool, dry place out of direct sunlight. Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Components	Type	Value
Polyvinyl chloride (CAS 9002-86-2)	STEL	5 ppm
	TWA	1 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Acetone (CAS 67-64-1)	PEL	2400 mg/m3	
		1000 ppm	
Cyclohexanone (CAS 108-94-1)	PEL	200 mg/m3	
		50 ppm	
Furan, Tetrahydro- (CAS 109-99-9)	PEL	590 mg/m3	
		200 ppm	
Methyl ethyl ketone (CAS 78-93-3)	PEL	590 mg/m3	
		200 ppm	
Polyvinyl chloride (CAS 9002-86-2)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Acetone (CAS 67-64-1)	STEL	750 ppm	
	TWA	500 ppm	
Cyclohexanone (CAS 108-94-1)	STEL	50 ppm	
	TWA	20 ppm	
Furan, Tetrahydro- (CAS 109-99-9)	STEL	100 ppm	
	TWA	50 ppm	
Methyl ethyl ketone (CAS 78-93-3)	STEL	300 ppm	
	TWA	200 ppm	
Polyvinyl chloride (CAS 9002-86-2)	TWA	1 mg/m3	Respirable fraction.

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Acetone (CAS 67-64-1)	TWA	590 mg/m3
		250 ppm
Cyclohexanone (CAS 108-94-1)	TWA	100 mg/m3
		25 ppm
Furan, Tetrahydro- (CAS 109-99-9)	STEL	735 mg/m3
		250 ppm
	TWA	590 mg/m3
		200 ppm
Methyl ethyl ketone (CAS 78-93-3)	STEL	885 mg/m3
		300 ppm
	TWA	590 mg/m3
		200 ppm

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
Acetone (CAS 67-64-1)	50 mg/l	Acetone	Urine	*
Cyclohexanone (CAS 108-94-1)	80 mg/l	1,2-Cyclohexanediol, with hydrolysis	Urine	*
	8 mg/l	Cyclohexanol, with hydrolysis	Urine	*
Furan, Tetrahydro- (CAS 109-99-9)	2 mg/l	Tetrahydrofuran	Urine	*
Methyl ethyl ketone (CAS 78-93-3)	2 mg/l	MEK	Urine	*

* - For sampling details, please see the source document.

Exposure guidelines

US - California OELs: Skin designation

Cyclohexanone (CAS 108-94-1) Can be absorbed through the skin.

US - Minnesota Haz Subs: Skin designation applies

Cyclohexanone (CAS 108-94-1) Skin designation applies.

US - Tennessee OELs: Skin designation

Cyclohexanone (CAS 108-94-1) Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Cyclohexanone (CAS 108-94-1) Can be absorbed through the skin.
Furan, Tetrahydro- (CAS 109-99-9) Can be absorbed through the skin.

US. NIOSH: Pocket Guide to Chemical Hazards

Cyclohexanone (CAS 108-94-1) Can be absorbed through the skin.

Appropriate engineering controls	Explosion-proof general and local exhaust ventilation. Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection	Face shield is recommended. Wear safety glasses with side shields (or goggles).
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves.
Other	Wear appropriate chemical resistant clothing.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	When using, do not eat, drink or smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Translucent liquid.
Color	Clear.
Odor	Solvent.
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	151 °F (66.11 °C)
Flash point	-4.0 °F (-20.0 °C)
Evaporation rate	5.5 - 8
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	1.8
Flammability limit - upper (%)	11.8
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	145 mm Hg @ 20 C
Vapor density	2.5
Relative density	0.9 +/- 0.02
Solubility(ies)	
Solubility (water)	Negligible
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	80 - 500 cP
Other information	
VOC (Weight %)	< 510 g/l SCAQMD 1168/M316A

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.

Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid heat, sparks, open flames and other ignition sources. Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Acids. Strong oxidizing agents. Ammonia. Amines. Isocyanates. Caustics.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May be fatal if swallowed and enters airways. Headache. Nausea, vomiting. May cause irritation to the respiratory system. Vapors have a narcotic effect and may cause headache, fatigue, dizziness and nausea. Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation.
Eye contact	Causes serious eye irritation.
Ingestion	May be fatal if swallowed and enters airways. Harmful if swallowed. Harmful if swallowed. Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.
Symptoms related to the physical, chemical and toxicological characteristics	Irritation of nose and throat. Aspiration may cause pulmonary edema and pneumonitis. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation. Skin irritation. May cause redness and pain. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.

Information on toxicological effects

Acute toxicity May be fatal if swallowed and enters airways. Narcotic effects. May cause respiratory irritation.

Components	Species	Test Results
Acetone (CAS 67-64-1)		
Acute		
Dermal		
LD50	Rabbit	20 ml/kg
Inhalation		
LC50	Rat	50 mg/l, 8 Hours
Oral		
LD50	Rat	5800 mg/kg
Cyclohexanone (CAS 108-94-1)		
Acute		
Dermal		
LD50	Rabbit	948 mg/kg
Inhalation		
LC50	Rat	8000 ppm, 4 hours
Oral		
LD50	Rat	1540 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization	Not available.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity In 2012 USEPA Integrated Risk Information System (IRIS) reviewed a two species inhalation lifetime study on THF conducted by NTP (1998). Male rats developed renal tumors and female mice developed liver tumors while neither the female rats nor the male mice showed similar results. Because the carcinogenic mechanisms could not be identified clearly in either species for either tumor, the EPA determined that the male rat and female mouse findings are relevant to the assessment of carcinogenic potential in humans. Therefore, the IRIS review concludes that these data in aggregate indicate that there is "suggestive evidence of carcinogenic potential" following exposure to THF by all routes of exposure.

IARC Monographs. Overall Evaluation of Carcinogenicity

Cyclohexanone (CAS 108-94-1)	3 Not classifiable as to carcinogenicity to humans.
Polyvinyl chloride (CAS 9002-86-2)	3 Not classifiable as to carcinogenicity to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Polyvinyl chloride (CAS 9002-86-2)	Cancer

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Narcotic effects. May cause drowsiness and dizziness. Respiratory tract irritation.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard May be fatal if swallowed and enters airways.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
Acetone (CAS 67-64-1)			
Aquatic			
Fish	LC50	Fathead minnow (Pimephales promelas)	> 100 mg/l, 96 hours
Cyclohexanone (CAS 108-94-1)			
Aquatic			
Fish	LC50	Fathead minnow (Pimephales promelas)	481 - 578 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Partition coefficient n-octanol / water (log Kow)

Acetone (CAS 67-64-1)	-0.24
Cyclohexanone (CAS 108-94-1)	0.81
Furan, Tetrahydro- (CAS 109-99-9)	0.46
Methyl ethyl ketone (CAS 78-93-3)	0.29

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number	UN1133
UN proper shipping name	Adhesives
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Label(s)	3
Packing group	II
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	T11, TP1, TP8, TP27
Packaging exceptions	150
Packaging non bulk	201
Packaging bulk	243

IATA

UN number	UN1133
UN proper shipping name	Adhesives
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Packing group	II
Environmental hazards	No.
ERG Code	3L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN1133
UN proper shipping name	ADHESIVES
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Packing group	II
Environmental hazards	
Marine pollutant	No.
EmS	F-E, S-D
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not available.

15. Regulatory information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Polyvinyl chloride (CAS 9002-86-2)	Cancer Central nervous system Liver Blood Flammability

CERCLA Hazardous Substance List (40 CFR 302.4)

Acetone (CAS 67-64-1)	LISTED
Cyclohexanone (CAS 108-94-1)	LISTED
Furan, Tetrahydro- (CAS 109-99-9)	LISTED
Methyl ethyl ketone (CAS 78-93-3)	LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Acetone (CAS 67-64-1)	6532
Methyl ethyl ketone (CAS 78-93-3)	6714

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Acetone (CAS 67-64-1)	35 %WV
Methyl ethyl ketone (CAS 78-93-3)	35 %WV

DEA Exempt Chemical Mixtures Code Number

Acetone (CAS 67-64-1)	6532
Methyl ethyl ketone (CAS 78-93-3)	6714

US state regulations

US. Massachusetts RTK - Substance List

Acetone (CAS 67-64-1)
Cyclohexanone (CAS 108-94-1)
Furan, Tetrahydro- (CAS 109-99-9)
Methyl ethyl ketone (CAS 78-93-3)

US. New Jersey Worker and Community Right-to-Know Act

Acetone (CAS 67-64-1)
Cyclohexanone (CAS 108-94-1)
Furan, Tetrahydro- (CAS 109-99-9)
Methyl ethyl ketone (CAS 78-93-3)
Polyvinyl chloride (CAS 9002-86-2)

US. Pennsylvania Worker and Community Right-to-Know Law

Acetone (CAS 67-64-1)
Cyclohexanone (CAS 108-94-1)
Furan, Tetrahydro- (CAS 109-99-9)
Methyl ethyl ketone (CAS 78-93-3)

US. Rhode Island RTK

Acetone (CAS 67-64-1)
Cyclohexanone (CAS 108-94-1)
Furan, Tetrahydro- (CAS 109-99-9)
Methyl ethyl ketone (CAS 78-93-3)

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 05-28-2015

Revision date -

Version # 01

HMIS® ratings
Health: 2
Flammability: 3
Physical hazard: 0

NFPA ratings

Disclaimer The information in the sheet was written based on the best knowledge and experience currently available. Oatey Co. cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use.

APPENDIX B

Vapor Mitigation System Commissioning Data

VMS System Commissioning Data

Former Dutch Cleaners

403 S. Main Street, Cedar Grove, Wisconsin

Date: 6/4/18

Personnel: K. Vander Heider

Weather: not recorded

SSDS Commissioning Data

Negative Pressure measurements

U-tube manometer	-2.1	inH_2O
SSV-1	-1.255	inH_2O
SSV-2	-2.042	inH_2O

Flow Rate and temperature in 4" pipe

Flow Rate	437	FPM
Temperature	66.4	°F

Inspection of:

Fan: running, secure

Suction point: sealed

Vent Pipe: no cracks, sealed

Foundation Floor: no new penetrations

Foundation Walls: no new penetrations

Vapor Pin Condition: pin, cap, seal all good

U-tube Manometer Condition: liquid levels to zero

Notes: N/A.

SMDS Commissioning Data

Negative Pressure measurements

U-tube manometer	-1.3	inH_2O

Flow Rate and temperature in 4" pipe

Flow Rate	1297	FPM
Temperature	67.5	°F

Inspection of:

Fan: on, secure

Membrane Seal: air tight seal, intact

Vent Pipe: air tight

Membrane Condition: intact

U-tube Manometer Condition: liquid levels to zero.

Notes: N/A.

VMS System Commissioning Data

Former Dutch Cleaners

403 S. Main Street, Cedar Grove, Wisconsin

Date: 11/12/18

Personnel: K. Vander Heider

Weather: not measured

SSDS Commissioning Data

Negative Pressure measurements

U-tube manometer	-1.9	inH_20
SSV-1	-1.337	inH_20
SSV-2	-2.031	inH_20

Flow Rate and temperature in 4" pipe

Flow Rate	461	FPM
Temperature	65.2	°F

Inspection of:

Fan: operating quietly, mount secure

Suction point: air-tight seal, no cracks

Vent Pipe: no cracks or leaks

Foundation Floor: no new cracks/penetrations

Foundation Walls: no new cracks or penetrations

Vapor Pin Condition: pin + cap in good condition, sealed

U-tube Manometer Condition: liquid levels to zero

Notes: N/A

SMDS Commissioning Data

Negative Pressure measurements

U-tube manometer	-1.3	inH_20

Flow Rate and temperature in 4" pipe

Flow Rate	1362	FPM
Temperature	62.5	°F

Inspection of:

Fan: operates quietly, secured

Membrane Seal: *Seal failed between membrane + walls

Vent Pipe: end of pipe free of obstructions, no cracks

Membrane Condition: no rips/penetrations

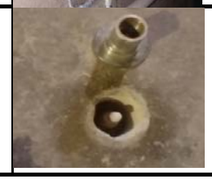
U-tube Manometer Condition: liquid levels to zero.

Notes: 12/10/18 sidewalls have been resealed. Smoke testing was performed as a confirmation study.

APPENDIX C

Inspection and Repair Logs

SSDS Inspection and Repair Log
Former Dutch Cleaners
403 S. Main Street, Cedar Grove, Wisconsin

SYSTEM COMPONENT						ANNUAL INSEPECTION	
NAME	**PHOTO**	**FUNCTION**	**CHECK**	**NORMAL OBSERVATION**	**POSSIBLE REPAIR**	**DATE**	**NOTES / REPAIR COMPLETED**
Fan		Fan creates a vacuum and lowers pressure below foundation. The fan also removes soil gases from below foundation for discharge to atmosphere.	Fan Operation Fan Location Motor Noise	Fan is on Fan mounted outside and secure Fan motor is quiet (loud motor may indicate a problem)	Fan may need to be replaced every 15 to 20 years. Replacement fan to have similar specifications as original with respect to flow and vacuum. **Fan Type = RadonAway RP265**		
Suction Point with Vent Pipe		Suction Point : Soil gases are collected in a pit below the foundation, and tight seal prevents soil gas from entering the building. Vent Pipe: Pipe conveys the vacuum from the fan, and collects soil gases for discharge to the atmosphere.	Suction Point Seal Vent Pipe Condition	Seal is air tight around pipe penetration. Vent pipe is connected to fan and has not cracked.	Suction point seal or vent pipe may need to be replaced or re-sealed if cracks or leaks appear.		
Manometer or Differential Pressure Gauge		Measures differential pressure between vacuum side of vent pipe and indoor space. This measurement confirms the fan is creating a vacuum.	Liquid Level in Manometer	Liquid level in manometer is between 1 and 4 "WC	A change in liquid level indicates a change in the vacuum below the foundation. This could be caused by fan failure, vent pipe blockage, shallow water below foundation, or other conditions. Troubleshoot or hire professional to identify the cause and repair if needed.		
Outdoor Vent Pipe		Pipe carries soil gas outside and vents it to the atmosphere.	Vent Pipe Condition Vent Pipe Location	Vent pipe remains connected to fan. End of pipe free from obstructions. The exhaust is more than 15 feet from windows and air intakes.	Vent pipe may require replacement if damaged.		
Foundation Floor/Walls		Foundation is a barrier that minimizes soil gas entry into building.	Foundation Condition Foundation Footprint	No penetrating cracks or holes in foundation. No alterations or additions to building foundation.	Seal cracks or other penetrations in the foundation as they occur. If building floor plan has changed, contact a professional contractor or WDNR to evaluate if modifications to the mitigation system are necessary.		
Vapor Pin		This is a sample port to measure vacuum or collect soil gas sample(s) if needed.	Pin Seal/Cap Pin Condition	Vacuum measured with a manometer at vapor pin should be greater than -0.004 in H_20. Pin is sealed and capped when not in use.	If system maintenance is required, professionals may test negative pressure using this port. Permanently seal hole if vapor pin is ever removed.		

SMDS Inspection and Repair Log
Former Dutch Cleaners
403 S. Main Street, Cedar Grove, Wisconsin

SYSTEM COMPONENT						ANNUAL INSEPECTION	
NAME	**PHOTO**	**FUNCTION**	**CHECK**	**NORMAL OBSERVATION**	**POSSIBLE REPAIR**	**DATE**	**NOTES / REPAIR COMPLETED**
Fan		Fan creates a vacuum and lowers pressure below foundation. The fan also removes soil gases from below foundation for discharge to atmosphere.	Fan Operation Fan Location Motor Noise	Fan is on Fan mounted outside and secure Fan motor is quiet (loud motor may indicate a problem)	Fan may need to be replaced every 15 to 20 years. Replacement fan to have similar specifications as original with respect to flow and vacuum. **Fan Type = RadonAway RP380**		
Crawl space seal and conveyance piping		Soil gases are collected through a slotted pipe located below the plastic membrane and routed through a plastic seal on the crawlspace. Vent Pipe: Pipe conveys the vacuum from the fan, and collects soil gases for discharge to the atmosphere.	Crawl Space Seal and Vent Pipe Condition	Seal is air tight around pipe penetration. Vent pipe is connected to fan and has not cracked.	Crawl space seal or vent pipe may need to be replaced in cracks or leaks appear.		
Manometer or Differential Pressure Gauge		Measures differential pressure between vacuum side of vent pipe and indoor space. This measurement confirms the fan is creating a vacuum.	Liquid Level in Manometer	Liquid level in manometer is between 1 and 4 "WC	A change in liquid level indicates a change in the vacuum below the foundation. This could be caused by fan failure, vent pipe blockage, shallow water below foundation, or other conditions. Troubleshoot or hire professional to identify the cause and repair if needed.		
Outdoor Vent Pipe		Pipe carries soil gas outside and vents it to the atmosphere.	Vent Pipe Condition Vent Pipe Location	Vent pipe remains connected to fan. End of pipe free from obstructions. The exhaust is more than 15 feet from windows and air intakes.	Vent pipe may require replacement if damaged.		
Membrane Condition		A vapor-tight membrane is installed to act as a vapor barrier in the absence of an impermeable subslab.	Membrane Seal Membrane Appearance	Membrane is intact with no rips or penetrations. Document membrane condition.	Suction must be achieved across the full extent of the membrane. Seal rips or penetrations to membrane when necessary. **Membrane Type = 6 mil membrane**		

APPENDIX C

Groundwater Analytical Laboratory Reports

Synergy Environmental Lab, INC.

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

WAYNE FASSBENDER
ENVIROFORENSICS
N16 W 23390 STONERIDGE DR
WAUKESHA WI 53188

Report Date *21-Jun-18*

Project Name FMR DUTCH CLEANERS **Invoice #** E34806
Project # 6420 PO#2018-0859

Lab Code 5034806A
Sample ID 6420-MW-102
Sample Matrix Water
Sample Date 6/14/2018

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 2.2	ug/l	2.2	7.1	10	8260B		6/18/2018	CJR	1
Bromobenzene	< 4.4	ug/l	4.4	13.8	10	8260B		6/18/2018	CJR	1
Bromodichloromethane	< 3.3	ug/l	3.3	10.6	10	8260B		6/18/2018	CJR	1
Bromoform	< 4.5	ug/l	4.5	14.4	10	8260B		6/18/2018	CJR	1
tert-Butylbenzene	< 2.5	ug/l	2.5	8	10	8260B		6/18/2018	CJR	1
sec-Butylbenzene	< 7.9	ug/l	7.9	25.3	10	8260B		6/18/2018	CJR	1
n-Butylbenzene	< 7.1	ug/l	7.1	22.5	10	8260B		6/18/2018	CJR	1
Carbon Tetrachloride	< 3.1	ug/l	3.1	9.8	10	8260B		6/18/2018	CJR	1
Chlorobenzene	< 2.6	ug/l	2.6	8.3	10	8260B		6/18/2018	CJR	1
Chloroethane	< 6.1	ug/l	6.1	19.5	10	8260B		6/18/2018	CJR	1
Chloroform	< 2.6	ug/l	2.6	8.2	10	8260B		6/18/2018	CJR	1
Chloromethane	< 5.4	ug/l	5.4	17.2	10	8260B		6/18/2018	CJR	1
2-Chlorotoluene	< 3.1	ug/l	3.1	9.8	10	8260B		6/18/2018	CJR	1
4-Chlorotoluene	< 2.6	ug/l	2.6	8.3	10	8260B		6/18/2018	CJR	1
1,2-Dibromo-3-chloropropane	< 29.6	ug/l	29.6	94.3	10	8260B		6/18/2018	CJR	1
Dibromochloromethane	< 2.2	ug/l	2.2	6.9	10	8260B		6/18/2018	CJR	1
1,4-Dichlorobenzene	< 7	ug/l	7	22.2	10	8260B		6/18/2018	CJR	1
1,3-Dichlorobenzene	< 8.5	ug/l	8.5	27	10	8260B		6/18/2018	CJR	1
1,2-Dichlorobenzene	< 8.6	ug/l	8.6	27.4	10	8260B		6/18/2018	CJR	1
Dichlorodifluoromethane	< 3.2	ug/l	3.2	10.2	10	8260B		6/18/2018	CJR	1
1,2-Dichloroethane	< 2.5	ug/l	2.5	7.8	10	8260B		6/18/2018	CJR	1
1,1-Dichloroethane	< 3.6	ug/l	3.6	11.4	10	8260B		6/18/2018	CJR	1
1,1-Dichloroethene	< 4.2	ug/l	4.2	13.4	10	8260B		6/18/2018	CJR	1
cis-1,2-Dichloroethene	28	ug/l	3.7	11.6	10	8260B		6/18/2018	CJR	1
trans-1,2-Dichloroethene	6.3 "J"	ug/l	3.4	10.7	10	8260B		6/18/2018	CJR	1
1,2-Dichloropropane	< 4.4	ug/l	4.4	13.9	10	8260B		6/18/2018	CJR	1
1,3-Dichloropropane	< 3	ug/l	3	9.4	10	8260B		6/18/2018	CJR	1
trans-1,3-Dichloropropene	< 3.2	ug/l	3.2	10.1	10	8260B		6/18/2018	CJR	1
cis-1,3-Dichloropropene	< 2.6	ug/l	2.6	8.1	10	8260B		6/18/2018	CJR	1

Project Name FMR DUTCH CLEANERS **Invoice #** E34806
Project # 6420 PO#2018-0859

Lab Code 5034806A
Sample ID 6420-MW-102
Sample Matrix Water
Sample Date 6/14/2018

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Di-isopropyl ether	< 2.1	ug/l	2.1	6.6	10	8260B		6/18/2018	CJR	1
EDB (1,2-Dibromoethane)	< 3.4	ug/l	3.4	10.9	10	8260B		6/18/2018	CJR	1
Ethylbenzene	< 2.6	ug/l	2.6	8.3	10	8260B		6/18/2018	CJR	1
Hexachlorobutadiene	< 13.4	ug/l	13.4	42.8	10	8260B		6/18/2018	CJR	1
Isopropylbenzene	< 7.8	ug/l	7.8	24.7	10	8260B		6/18/2018	CJR	1
p-Isopropyltoluene	< 2.4	ug/l	2.4	7.6	10	8260B		6/18/2018	CJR	1
Methylene chloride	< 13.2	ug/l	13.2	42.1	10	8260B		6/18/2018	CJR	1
Methyl tert-butyl ether (MTBE)	< 2.8	ug/l	2.8	8.9	10	8260B		6/18/2018	CJR	1
Naphthalene	< 21	ug/l	21	66.5	10	8260B		6/18/2018	CJR	1
n-Propylbenzene	< 6.1	ug/l	6.1	19.5	10	8260B		6/18/2018	CJR	1
1,1,2,2-Tetrachloroethane	< 3	ug/l	3	9.7	10	8260B		6/18/2018	CJR	1
1,1,1,2-Tetrachloroethane	< 3.5	ug/l	3.5	11.3	10	8260B		6/18/2018	CJR	1
Tetrachloroethene	570	ug/l	3.8	12.1	10	8260B		6/18/2018	CJR	1
Toluene	< 1.9	ug/l	1.9	6	10	8260B		6/18/2018	CJR	1
1,2,4-Trichlorobenzene	< 11.5	ug/l	11.5	36.7	10	8260B		6/18/2018	CJR	1
1,2,3-Trichlorobenzene	< 17.1	ug/l	17.1	54.3	10	8260B		6/18/2018	CJR	1
1,1,1-Trichloroethane	< 3.3	ug/l	3.3	10.5	10	8260B		6/18/2018	CJR	1
1,1,2-Trichloroethane	< 4.2	ug/l	4.2	13.2	10	8260B		6/18/2018	CJR	1
Trichloroethene (TCE)	53	ug/l	3	9.4	10	8260B		6/18/2018	CJR	1
Trichlorofluoromethane	< 3.5	ug/l	3.5	11	10	8260B		6/18/2018	CJR	1
1,2,4-Trimethylbenzene	< 8	ug/l	8	25.5	10	8260B		6/18/2018	CJR	1
1,3,5-Trimethylbenzene	< 6.3	ug/l	6.3	20	10	8260B		6/18/2018	CJR	1
Vinyl Chloride	< 2	ug/l	2	6.5	10	8260B		6/18/2018	CJR	1
m&p-Xylene	< 4.3	ug/l	4.3	13.8	10	8260B		6/18/2018	CJR	1
o-Xylene	< 2.9	ug/l	2.9	9.3	10	8260B		6/18/2018	CJR	1
SUR - Dibromofluoromethane	98	REC %			10	8260B		6/18/2018	CJR	1
SUR - 1,2-Dichloroethane-d4	99	REC %			10	8260B		6/18/2018	CJR	1
SUR - 4-Bromofluorobenzene	99	REC %			10	8260B		6/18/2018	CJR	1
SUR - Toluene-d8	97	REC %			10	8260B		6/18/2018	CJR	1

Project Name FMR DUTCH CLEANERS **Invoice #** E34806
Project # 6420 PO#2018-0859

Lab Code 5034806B
Sample ID 6420-MW-106
Sample Matrix Water
Sample Date 6/14/2018

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 2.2	ug/l	2.2	7.1	10	8260B		6/18/2018	CJR	1
Bromobenzene	< 4.4	ug/l	4.4	13.8	10	8260B		6/18/2018	CJR	1
Bromodichloromethane	< 3.3	ug/l	3.3	10.6	10	8260B		6/18/2018	CJR	1
Bromoform	< 4.5	ug/l	4.5	14.4	10	8260B		6/18/2018	CJR	1
tert-Butylbenzene	< 2.5	ug/l	2.5	8	10	8260B		6/18/2018	CJR	1
sec-Butylbenzene	< 7.9	ug/l	7.9	25.3	10	8260B		6/18/2018	CJR	1
n-Butylbenzene	< 7.1	ug/l	7.1	22.5	10	8260B		6/18/2018	CJR	1
Carbon Tetrachloride	< 3.1	ug/l	3.1	9.8	10	8260B		6/18/2018	CJR	1
Chlorobenzene	< 2.6	ug/l	2.6	8.3	10	8260B		6/18/2018	CJR	1
Chloroethane	< 6.1	ug/l	6.1	19.5	10	8260B		6/18/2018	CJR	1
Chloroform	< 2.6	ug/l	2.6	8.2	10	8260B		6/18/2018	CJR	1
Chloromethane	< 5.4	ug/l	5.4	17.2	10	8260B		6/18/2018	CJR	1
2-Chlorotoluene	< 3.1	ug/l	3.1	9.8	10	8260B		6/18/2018	CJR	1
4-Chlorotoluene	< 2.6	ug/l	2.6	8.3	10	8260B		6/18/2018	CJR	1
1,2-Dibromo-3-chloropropane	< 29.6	ug/l	29.6	94.3	10	8260B		6/18/2018	CJR	1
Dibromochloromethane	< 2.2	ug/l	2.2	6.9	10	8260B		6/18/2018	CJR	1
1,4-Dichlorobenzene	< 7	ug/l	7	22.2	10	8260B		6/18/2018	CJR	1
1,3-Dichlorobenzene	< 8.5	ug/l	8.5	27	10	8260B		6/18/2018	CJR	1
1,2-Dichlorobenzene	< 8.6	ug/l	8.6	27.4	10	8260B		6/18/2018	CJR	1
Dichlorodifluoromethane	< 3.2	ug/l	3.2	10.2	10	8260B		6/18/2018	CJR	1
1,2-Dichloroethane	< 2.5	ug/l	2.5	7.8	10	8260B		6/18/2018	CJR	1
1,1-Dichloroethane	< 3.6	ug/l	3.6	11.4	10	8260B		6/18/2018	CJR	1
1,1-Dichloroethene	< 4.2	ug/l	4.2	13.4	10	8260B		6/18/2018	CJR	1
cis-1,2-Dichloroethene	1550	ug/l	3.7	11.6	10	8260B		6/18/2018	CJR	1
trans-1,2-Dichloroethene	29.9	ug/l	3.4	10.7	10	8260B		6/18/2018	CJR	1
1,2-Dichloropropane	< 4.4	ug/l	4.4	13.9	10	8260B		6/18/2018	CJR	1
1,3-Dichloropropane	< 3	ug/l	3	9.4	10	8260B		6/18/2018	CJR	1
trans-1,3-Dichloropropene	< 3.2	ug/l	3.2	10.1	10	8260B		6/18/2018	CJR	1
cis-1,3-Dichloropropene	< 2.6	ug/l	2.6	8.1	10	8260B		6/18/2018	CJR	1
Di-isopropyl ether	< 2.1	ug/l	2.1	6.6	10	8260B		6/18/2018	CJR	1
EDB (1,2-Dibromoethane)	< 3.4	ug/l	3.4	10.9	10	8260B		6/18/2018	CJR	1
Ethylbenzene	< 2.6	ug/l	2.6	8.3	10	8260B		6/18/2018	CJR	1
Hexachlorobutadiene	< 13.4	ug/l	13.4	42.8	10	8260B		6/18/2018	CJR	1
Isopropylbenzene	< 7.8	ug/l	7.8	24.7	10	8260B		6/18/2018	CJR	1
p-Isopropyltoluene	< 2.4	ug/l	2.4	7.6	10	8260B		6/18/2018	CJR	1
Methylene chloride	< 13.2	ug/l	13.2	42.1	10	8260B		6/18/2018	CJR	1
Methyl tert-butyl ether (MTBE)	< 2.8	ug/l	2.8	8.9	10	8260B		6/18/2018	CJR	1
Naphthalene	< 21	ug/l	21	66.5	10	8260B		6/18/2018	CJR	1
n-Propylbenzene	< 6.1	ug/l	6.1	19.5	10	8260B		6/18/2018	CJR	1
1,1,2,2-Tetrachloroethane	< 3	ug/l	3	9.7	10	8260B		6/18/2018	CJR	1
1,1,1,2-Tetrachloroethane	< 3.5	ug/l	3.5	11.3	10	8260B		6/18/2018	CJR	1
Tetrachloroethene	8000	ug/l	38	121	100	8260B		6/20/2018	CJR	1
Toluene	< 1.9	ug/l	1.9	6	10	8260B		6/18/2018	CJR	1
1,2,4-Trichlorobenzene	< 11.5	ug/l	11.5	36.7	10	8260B		6/18/2018	CJR	1
1,2,3-Trichlorobenzene	< 17.1	ug/l	17.1	54.3	10	8260B		6/18/2018	CJR	1
1,1,1-Trichloroethane	< 3.3	ug/l	3.3	10.5	10	8260B		6/18/2018	CJR	1
1,1,2-Trichloroethane	< 4.2	ug/l	4.2	13.2	10	8260B		6/18/2018	CJR	1
Trichloroethene (TCE)	200	ug/l	3	9.4	10	8260B		6/18/2018	CJR	1
Trichlorofluoromethane	< 3.5	ug/l	3.5	11	10	8260B		6/18/2018	CJR	1
1,2,4-Trimethylbenzene	< 8	ug/l	8	25.5	10	8260B		6/18/2018	CJR	1

Project Name FMR DUTCH CLEANERS **Invoice #** E34806
Project # 6420 PO#2018-0859

Lab Code 5034806B
Sample ID 6420-MW-106
Sample Matrix Water
Sample Date 6/14/2018

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,3,5-Trimethylbenzene	< 6.3	ug/l	6.3	20	10	8260B		6/18/2018	CJR	1
Vinyl Chloride	3.2 "J"	ug/l	2	6.5	10	8260B		6/18/2018	CJR	1
m&p-Xylene	< 4.3	ug/l	4.3	13.8	10	8260B		6/18/2018	CJR	1
o-Xylene	< 2.9	ug/l	2.9	9.3	10	8260B		6/18/2018	CJR	1
SUR - Toluene-d8	99	REC %			10	8260B		6/18/2018	CJR	1
SUR - 1,2-Dichloroethane-d4	107	REC %			10	8260B		6/18/2018	CJR	1
SUR - 4-Bromofluorobenzene	102	REC %			10	8260B		6/18/2018	CJR	1
SUR - Dibromofluoromethane	104	REC %			10	8260B		6/18/2018	CJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	*Comment*
1	Laboratory QC within limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature

CHAIN OF CUSTODY RECORD

Synergy Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # Nº 3603

Page 1 of 1

Sample Handling Request
____ Rush Analysis Date Required ____
(Rushes accepted only with prior authorization)
X Normal Turn Around

Lab I.D. #	
Account No. :	**Quote No.:**
Project #: 6420	
Sampler: (signature)	

Project (Name / Location): Former Dutch Cleaners, Cedar Grove, WI			
Reports To: W. Fassbender	Invoice To:		
Company Enviroforensics	Company		
Address N16W23390 Stoneridge Dr.	Address		
City State Zip Waukesha, WI 53188	City State Zip		
Phone 414-982-3988	Phone		
FAX	FAX		

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	LEAD	NITRATE/NITRITE	OIL & GREASE	PAH (EPA 8270)	PCB	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	TOTAL SUSPENDED SOLIDS	VOC DW (EPA 524.2)	VOC (EPA 8260)	8-RCRA METALS	PID/FID
5034806 A	6420-MW-102	6-14-18	1140		X	N	2	GW	HCL													X		
B	6420-MW-106	6-14-18	1126		X	N	2	GW	HCL													X		

Analysis Requested | **Other Analysis**

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

PO# 2018-0859

Sample Integrity - To be completed by receiving lab.
Method of Shipment: GC
Temp. of Temp. Blank ____ °C On Ice: X
Cooler seal intact upon receipt: X Yes ____ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
	16:34	6-15-18			

Received in Laboratory By: Time: 10:00 Date: 6/16/18

10515 Research Drive
Knoxville, TN 37932
Phone: (865) 573-8188
Fax: (865) 573-8133

Client: Wayne Fassbender
EnviroForensics
N16 W23390 Stone Ridge Drive
Suite G
Waukesha, WI 53188

Phone: 317-972-7870

Fax:

Identifier: 066PF **Date Rec:** 06/15/2018 **Report Date:** 06/19/2018

Client Project #: 6420 **Client Project Name:** Dutch Cleaners

Purchase Order #: 2018-0827

Analysis Requested: CENSUS

Reviewed By:

MICROBIAL INSIGHTS, INC.

10515 Research Dr., Knoxville, TN 37932
Tel. (865) 573-8188 Fax. (865) 573-8133

CENSUS

Client: **EnviroForensics**
Project: Dutch Cleaners

MI Project Number: **066PF**
Date Received: 06/15/2018

Sample Information

Client Sample ID:		**6420-MW-102**	**6420-MW-106**
Sample Date:		06/14/2018	06/14/2018
Units:		cells/mL	cells/mL
Analyst/Reviewer:		CB	CB

Dechlorinating Bacteria

Dehalococcoides	*DHC*	<1.35E+01	<9.60E+00
tceA Reductase	TCE	<1.35E+01	<9.60E+00
BAV1 Vinyl Chloride Reductase	BVC	<1.35E+01	<9.60E+00
Vinyl Chloride Reductase	VCR	<1.35E+01	<9.60E+00

Legend:
NA = Not Analyzed NS = Not Sampled J = Estimated gene copies below PQL but above LQL I = Inhibited
< = Result not detected

Quality Assurance/Quality Control Data

Samples Received **6/15/2018**

Component	Date Prepared	Date Analyzed	Arrival Temperature	Positive Control	Extraction Blank	Negative Control
DHC	06/15/2018	06/19/2018	3 °C	100%	non-detect	non-detect
BVC	06/15/2018	06/19/2018	3 °C	100%	non-detect	non-detect
TCE	06/15/2018	06/19/2018	3 °C	102%	non-detect	non-detect
VCR	06/15/2018	06/19/2018	3 °C	106%	non-detect	non-detect

REPORT TO:

Name: Wayne Fassbender
Company: EnviroForensics
Address: N16 W23390 Stone Ridge Dr. Suite G
Waukesha WI 53188
email: wfassbender@enviroforensics.com
Phone: 414-982-3988
Fax:

INVOICE TO: (For Invoices paid by a third party it is imperative that all information be provided)

Name:
Company:
Address:
email:
Phone:
Fax:

microbialinsights
10515 Research Dr
Knoxville, TN 37932
865-573-8188
www.microbe.com

Project Manager: Wayne Fassbender
Project Name: Dutch Cleaners
Project No.: 6420

Purchase Order No. 2018-0827
Subcontract No.
MI Quote No.

Please Check One:
☐ More samples to follow
☒ No Additional Samples

Report Type: ☒ Standard (default) ☐ Microbial Insights Level III raw data(15% surcharge) ☐ Microbial Insights Level IV (25% surcharge) ☐ Comprehensive Interpretive(15%) ☐ Historical Interpretive (35%)

EDD type: ☒ Microbial Insights Standard (default) ☐ All other available EDDs (5% surcharge) Specify EDD Type:

Please contact us with any questions about the analyses or filling out the COC at (865) 573-8188 (9:00 am to 5:00 pm EST, M-F). After hours email: customerservice@microbe.com

Sample Information						Analyses				CENSUS: Please select the target organism/gene																							
MI ID (Laboratory Use Only)	Sample Name	Date Sampled	Time Sampled	Matrix	Total Number of Containers	PLFA	NGS	QuantArray Chlor	QuantArray Petro	DHC (Dehalococcoides)	DHC Functional genes (bvc, tce, vcr)	DHBt (Dehalobacter)	DHG (Dehalogenimonas)	DSM (Desulfuromonas)	DSB (Desulfiobacterium)	EBAC (Total)	SRB (Sulfate Reducing Bacteria-APS)	MGN (Methanogens)	MOB (Methanotrophs)	SMMO	DNF (Dentrifiers-nirS and nirK)	AMO (ammonia oxidizing bacteria)	PM1 (MTBE aerobic)	RMO (Toluene Monooxygenase)	RDEG (Toluene Monooxygenase)	PHE (Phenol Hydroxylase)	NAH (Napthalene-aerobic)	BSSA (Toluene/Xylene-Anaerobic)	add. qPCR:	RNA (Expression Option)*	Other:	Other:	Other:
0606PF1	6420-MW-102	6-14-18	1140	GW	1					X	X																						
2	6420-MW-106	6-14-18	1128	GW	1					X	X																						

Relinquished by: Date 6-14-18
Received by: Date 6/15/18

It is vital that chain of custody is filled out correctly & that all relative information is provided.
Failure to provide sufficient and/or correct information regarding reporting, invoicing & analyses requested information may result in delays for which MI will not be liable.

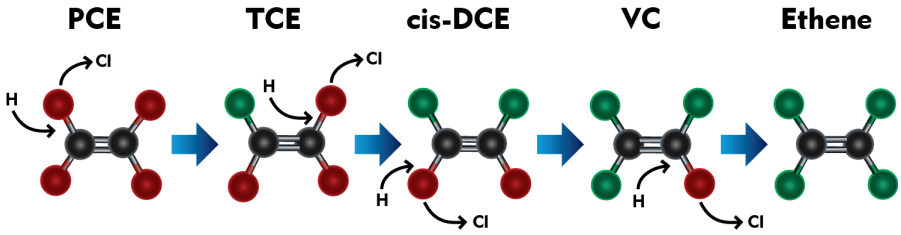
* additional cost and sample preservation are associated with RNA samples.

** Saturday delivery: See sampling protocol for alternate shipping address.

DHC Interpretation

Dehalococcoides 16S rRNA gene (qDHC)

Under anaerobic conditions, tetrachloroethene (PCE) and trichloroethene (TCE) can undergo sequential reductive dechlorination through the daughter products *cis*-dichloroethene (*cis*-DCE) and vinyl chloride to nontoxic ethene (1,2).



While a number of bacterial cultures capable of utilizing PCE and TCE as growth supporting electron acceptors have been isolated (3-7), *Dehalococcoides* spp. may be the most important because they are the only bacterial group that has been isolated to date which is capable of complete reductive dechlorination of PCE to ethene (8). In fact, the presence of *Dehalococcoides* spp. has been associated with complete dechlorination to ethene at sites across North America and Europe (9).

Status	*Dehalococcoides spp.*	Observation
	**≥ 10^4** (cells/mL)	Lu et al. proposed that a concentration of 1 x 10^4 DHC cells/mL could be used as a screening criterion to identify sites where reductive dechlorination will yield a generally useful biodegradation rate (10). Similarly, in an internal study conducted with nearly 1000 groundwater samples obtained from sites across the US, ethene production was observed in approximately 80% of samples in which CENSUS® qDHC results were greater than or equal to 10^4 DHC cells/mL.
	**10^1 to < 10^4** (cells/mL)	When vinyl chloride reductase genes (See DHC functional genes discussion below) are also detected, complete reductive dechlorination of PCE and TCE to ethene may still occur even with moderate DHC concentrations. When the DHC population is below the 10^4 cells/mL criterion proposed by Lu et al. (10), project managers should carefully consider other site-specific data to determine whether subsurface conditions may be limiting reductive dechlorination. For example, the addition of an electron donor may be able to stimulate DHC growth and enhance anaerobic bioremediation.
	**< 10^1** (cells/mL)	DHC concentrations are low suggesting that complete reductive dechlorination of PCE and TCE to ethene is unlikely to occur under existing conditions. Enhanced anaerobic bioremediation options (biostimulation or bioaugmentation) may need to be considered.

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

DHC Functional Genes (*tce*A, *bvc*A, *vcr*A)

A "stall" where daughter products *cis*-DCE and vinyl chloride accumulate can occur at PCE- and TCE-impacted sites especially under MNA conditions. The accumulation of vinyl chloride, generally considered more carcinogenic than the parent compounds, is particularly problematic. Although elevated *Dehalococcoides* concentrations correspond to ethene production in numerous studies, the range of chlorinated ethenes metabolized and cometabolized varies among species and strains within the *Dehalococcoides* genus. For example, *Dehalococcoides ethenogenes* str. 195 metabolizes PCE, TCE, and *cis*-DCE and cometabolizes vinyl chloride (8) to produce ethene. Conversely, *Dehalococcoides* sp. CBDB1 utilizes PCE and TCE but does not cometabolize additional chloroethenes (11). Other *Dehalococcoides* strains, such as BAV1, GT and VS, are known to fully dechlorinate cis-DCE and VC to ethene (14,16,19). Quantification of reductive dehalogenase genes is used to more definitively confirm the potential for reductive dechlorination of TCE, cis-DCE, and vinyl chloride (12-15).

Functional Gene	Observation
TCE Reductase	
***tce*A gene**	The *tce*A gene encodes the enzyme responsible for reductive dechlorination of TCE to *cis*-DCE in some strains of *Dehalococcoides*. Absence of *tce*A does not preclude the potential for reductive dechlorination of TCE in the field since the *tce*A gene is not universally distributed among all DHC and is not present in other microorganisms capable of reductive dechlorination of TCE (e.g. *Dehalobacter*). Detection of the *tce*A gene provides an additional line of evidence indicating the potential for dechlorination of TCE.
Vinyl Chloride Reductase	
***bvc*A gene**	The *bvc*A gene encodes the vinyl chloride reductase enzyme responsible for reductive dechlorination of vinyl chloride to ethene by *Dehalococcoides* sp. str. BAV1 (16). Presence of *bvc*A gene indicates the potential for reductive dechlorination of VC to ethene. Absence of both *bvc*A and *vcr*A genes suggests VC may accumulate. An internal study with ~1,000 samples showed ethene production was observed in 80% of the samples that the DHC population was greater than or equal to 10^4 cells/mL. The *bvc*A gene was detected in over 50% of these samples. Van Der Zaan et al (17) noted that the bvcA gene was the only VC reductase gene detected at three of their sites. Alfred Spormann's laboratory at Stanford University (18) reported that the *bvc*A gene was the most abundant and active at the outflow of a PCE fed column study. This section of the column was in the DCE to VC stages of reductive dechlorination thus confirming the importance of the *bvc*A gene for complete reductive dechlorination.
***vcr*A gene**	The *vcr*A gene encodes the vinyl chloride reductase enzyme responsible for reductive dechlorination of *cis*-DCE and vinyl chloride by *Dehalococcoides* sp. strain VS (14). Presence of *vcr*A gene indicates the potential for reductive dechlorination of DCE and/or VC to ethene. Absence of both *bvc*A and *vcr*A genes suggest VC may accumulate. As with the *bvc*A gene, detection of the *vcr*A gene is associated with ethene production in internal studies (67%) and vinyl chloride reduction in independent studies (14, 17).

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Reporting

Microbial Insights can provide a variety of data packages and reporting levels to suit the needs of any project. Data packages range from simple analytical reports with results only to more complex data packages that include a report narrative, analytical results, QC data, and supporting materials including all raw data and chain-of-custody documentation. The figure below shows our standard report and explains the way values are reported.

Microbial Insights, Inc.

2340 Stock Creek Blvd. Rockford, TN 37853-3044
Tel. (865) 573-8188 Fax. (865) 573-8133

CENSUS

Client: Company Name
Project: Your Project Name

MI Project Number: Unique Laboratory Identifier
Date Received: Date Samples Arrived

Sample Information

Client Sample ID:		Sample A	Sample B	Sample C
Sample Date:		00/00/0000	00/00/0000	00/00/0000
Units:		cells/mL	cells/mL	cells/mL
Analyst:		Intials	Intials	Intials
Dechlorinating Bacteria				
Dehalococcoides spp.	DHC	**1.84E+05**	**2.76E+02**	**2.28E+01 (J)**
Functional Genes				
tceA Reductase	TCE	**6.00E+01**	**3.23E+01**	<4.00E-01
bvcA Reductase	BVC	**1.17E+04**	**1.81E+01**	<4.00E-01
vcrA Reducatase	VCR	**8.42E+04**	**1.74E+02**	<4.00E-01

"J" value
Result is an estimated value. This data qualifier (flag) is used when the target gene is detected but at a concentration or abundance below the practical quantification limit (PQL).

Legend:
NA = Not Analyzed NS = Not Sampled J = Estimated gene copies below PQL but above LQL I = Inhibited
< = Result not detected

< value
The target gene was not detected at the limit of quantitation (LOQ) reported for that sample.

"I" value
QA Procedure indicated that the sample may have exhibited PCR inhibition. Although relatively rare, PCR inhibition can occur due to the presence of metals or humic acids at high concentrations in the sample.

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Quality Assurance

Microbial Insights' comprehensive Quality Assurance (QA) Program is the foundation of all laboratory analyses, ensuring that our clients receive high-quality analytical services that are timely, reliable, and meet their intended purpose in a cost effective manner. MI is committed to providing quality data that surpasses regulatory and industry standards, thus enabling the client to make well-informed decisions. MI maintains strict standard operating procedures and QA/QC measures throughout all of the analyses offered. The following Table details specific QA/QC procedures that are used for CENSUS.

QA/QC	Description
Date of Extraction	DNA and RNA extractions are performed the day the samples are received by MI to minimize the possibility of any changes to the microbial community prior to analysis.
Laboratory Method Blanks	An extraction blank (no sample added) is processed alongside each set of field samples from DNA extraction through CENSUS® analysis to ensure that cross contamination has not occurred. Although MI has never experienced this issue, the detection of the CENSUS® target (e.g. *Dehalococcoides*) in an extraction blank is direct evidence of cross contamination with a sample or contamination of a reagent and would invalidate the results. If this were to occur, MI would re-extract the sample. If not possible to re-extract, MI would contact the client immediately and notate it on the laboratory report.
Laboratory Control Samples (LCS)	A laboratory control sample (LCS) or positive control (target DNA) is included with each CENSUS® plate to confirm amplification and as a continuing calibration check.
Negative Controls	A negative control (no DNA) is included with each CENSUS plate to ensure that cross contamination has not occurred during amplification. As with the extraction blank, detection of CENSUS target (e.g. DHC) in a negative control is direct evidence of contamination and would invalidate the results. If this were to occur, MI would rerun the analysis.

References

1. Freedman, D. L. and J. M. Gossett. 1989. Biological reductive dechlorination of tetrachloroethylene and trichloroethylene to ethylene under methanogenic conditions. Applied and Environmental Microbiology 55(9): 2144-2151.

2. DiStefano, T. D., J.M. Gossett, and S.H. Zinder. 1991. Reductive dechlorination of high concentrations of tetrachlorethene to ethene by an anaerobic enrichment culture in the absence of methanogenesis. Applied and Environmental Microbiology 57(8): 2287-2292.

3. Gerritse, J., V. Renard, T. M. Pedro Gomes, P. A. Lawson, M. D. Collins, and J. C. Gottschal. 1996. *Desulfitobacterium* sp. Strain PCE1, an anaerobic bacterium that can grow by reductive dechlorination of tetrachloroethene or ortho-chlorinated phenols. Archives of Microbiology 165(2): 132-140.

4. Gerritse, J., O. Drzyzga, G. Kloetstra, M. Keijmel, L. P. Wiersum, R. Hutson, M. D. Collins, and J. C. Gottschal. 1999. Influence of different electron donors and acceptors on dehalorespiration of tetrachloroethene by *Desulfitobacterium frappieri* TCE1. Applied and Environmental Microbiology 65(12): 5212-5221.

5. Holliger, C., G. Schraa, A.J.M. Stams, and A.J.B. Zehnder. 1993. A highly purified enrichment culture couples the reductive dechlorination of tetrachloroethene to growth. Applied and Environmental Microbiology 59 (9): 2991-2997.

6. Krumholz, L. R., R. Sharp, and S. S. Fishbain. 1996. A freshwater anaerobe coupling acetate oxidation to tetrachloroethylene dehalogenation. Applied and Environmental Microbiology 62(11): 4108-4113.

7. Löffler, F.E., R.A. Sanford, and J.M. Tiedje. 1996. Initial characterization of a reductive dehalogenase from *Desulfitobacterium chlororespirans* Co23. Applied and Environmental Microbiology 62(10): 3809–3813.

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

8. Maymó-Gatell, X., T. Anguish, and S.H. Zinder. 1999. Reductive dechlorination of chlorinated ethenes and 1,2-dichloroethane by *Dehalococcoides ethenogenes* 195. Applied and Environmental Microbiology 65(7): 3108–3113.

9. Hendrickson, E.R., J. Payne, R.M. Young, M.G. Starr, M.P. Perry, S. Fahnestock, D.E. Ellis, and R.C. Eversole. 2002. Molecular analysis of *Dehalococcoides* 16S ribosomal DNA from chloroethene-contaminated sites throughout North America and Europe. Applied and Environmental Microbiology 68(2): 485-495.

10. Lu, X., J.T. Wilson, and D.H. Kampbell. 2006. Relationship between *Dehalococcoides* DNA in ground water and rates of reductive dechlorination at field scale. Water Research 40:3131-3140.

11. Adrian, L, U. Szewzyk, J. Wecke, and H. Görisch. 2000. Bacterial dehalorespiration with chlorinated benzenes. Nature 408(6812): 580-583.

12. Holmes, V.F., J. He, P.K.H. Lee, and L. Alvarez-Cohen. 2006. Discrimination of multiple *Dehalococcoides* strains in a trichlorethene enrichment by quantification of their reductive dehalogenase genes. Applied and Environmental Microbiology 72(9): 5877-5883.

13. Lee, P.K.H., D.R. Johnson, V.F. Holmes, J. He, and L. Alvarez-Cohen. 2006. Reductive dehalogenase gene expression as a biomarker for physiological activity of *Dehalococcoides* spp. Applied and Environmental Microbiology 72(9): 6161-6168.

14. Müller, J.A., B.M. Rosner, G. von Avendroth, G. Meshulam-Simon, P.L. McCarty, and A.M. Spormann. 2004. Molecular identification of the catabolic vinyl chloride reductase from *Dehalococcoides* sp. strain VS and its environmental distribution. Applied and Environmental Microbiology 70(8): 4880-4888.

15. Ritalahti, K.M., B.K. Amos, Y. Sung, Q. Wu, S.S. Koenigsberg, and F.E. Löffler. 2006. Quantitative PCR targeting 16S rRNA and reductive dehalogenase genes simultaneously monitors multiple *Dehalococcoides* strains. Applied and Environmental Microbiology 72(4): 2765-2774.

16. Krajmalnik-Brown, R., T. Hölscher, I. N. Thomson, F. M. Saunders, K. M. Ritalahti, and F. E. Löffler. 2004. Genetic identification of a putative vinyl chloride reductase in *Dehalococcoides* sp. strain BAV1. Applied and Environmental Microbiology 70:6347–6351.

17. van der Zaan, B., F. Hannes, N. Hoekstra, H. Rijnaarts, W.M. de Vos, H. Smidt, and J. Gerritse. 2010. Correlation of *Dehalococcoides* 16S rRNA and chlorethene-reductive dehalogenase genes with geochemical conditions in chloroethene-contaminated groundwater. Applied and Environmental Microbiology 76(3):843-850.

18. Behrens, S., M.F., Azizian, P.J. McMurdie, A. Sabalowsky, M.E. Dolan, L. Semprini, and A.M. Spormann. 2008. Monitoring abundance and expression of *Dehalococcoides* species chloroethene-reductive dehalogenases in a tetrachloroethene-dechlorinating flow column. Applied and Environmental Microbiology 74(18):5695-5703.

19. Sung, Y., K. M. Ritalahti, R. P. Apkarian, and F. E. Löffler. 2006. Quantitative PCR confirms purity of strain GT, a novel trichloroethene (TCE)-to-ethene respiring Dehalococcoides isolate. Appl. Environ. Microbiol. 72:1980-1987

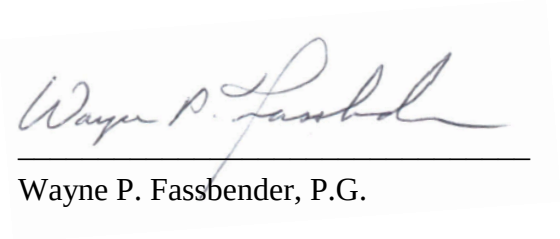
10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

APPENDIX D

Hydrogeologist Certification

HYDROGEOLOGIST CERTIFICATION

"I, Wayne P. Fassbender, certify I am a Hydrogeologist as that term is defined in s NR 712.03 (1) Wisconsin Administrative Code; and that to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements of chs. NR 700 to 726, Wisconsin Administrative Code."



Wayne P. Fassbender, P.G.

January 31, 2019

Date

Document Reference: Supplemental Site Investigations Report, Former Dutch Cleaners, 403 S. Main Street, Cedar Grove, Wisconsin, BRRTS#02-60-271527