



January 29, 2013

W

Shirley A. Carlson
Shirdon, Inc./dba Shorewood Queensway Dry Cleaners
4300 N. Oakland Avenue
Shorewood, WI 53211

Subject: SSDS Installation Summary Report
 4312-4316 North Oakland Avenue
 Shorewood, Wisconsin
 WDNR BRRTS 02-41-552089
 EnviroForensics Project 6107

FID 241099 590

Dear Ms. Carlson:

Environmental Forensic Investigations, Inc. (EnviroForensics) is pleased to provide this sub-slab depressurization system (SSDS) installation summary report for Shorewood Queensway Dry Cleaners located at 4300 North Oakland Avenue in Shorewood, Wisconsin (the Site). The SSDS was installed in the three southernmost commercial tenant spaces of the adjoining building located at 4312-4334 North Oakland Avenue in Shorewood, Wisconsin (Aunt Peg's). Aunt Peg's is a multi-use building with leased commercial spaces and second floor residential apartments. Sub-slab vapor samples collected at Aunt Peg's in 2011 contained volatile organic compounds (VOCs) at concentrations exceeding applicable screening levels. The SSDS was installed to mitigate potential vapor intrusion impacts at Aunt Peg's as required by the Wisconsin Department of Natural Resources (WDNR).

BACKGROUND

The Site is a plant-on-premises dry cleaning operation adjoining the Aunt Peg's building. The results of previous subsurface investigations performed at the Site by EnviroForensics revealed that soil and groundwater had been impacted with the dry cleaning solvent tetrachloroethylene (PCE). The greatest impacts have been detected in the northeast portion of the Site and near the southeast corner of the Aunt Peg's building. The nature and extent of impacts has been defined and a remedial action plan is currently in development.

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Environmental Forensic Investigations, Inc.
200 S. Executive Drive, Suite 101, Brookfield, WI 53005
Phone: 414 982-3988 • Fax 262-745-6699

Sub-slab vapor and indoor air samples were collected at Aunt Peg's to investigate the potential vapor intrusion exposure pathway. PCE was detected in the sub-slab vapor and indoor air samples at concentrations exceeding the screening levels established by the WDNR. Consequently, the WDNR issued a letter requiring that an SSDS be installed at Aunt Peg's to eliminate the threat of vapor intrusion.

SUB-SLAB DEPRESSURIZATION SYSTEM

The SSDS was installed in accordance with the *Work Plan and Cost Estimate for SSDS Installation* dated July 28, 2011 and the consent agreement between Aunt Peg's LLC and Shirdon, Inc dated August 22, 2012 and executed September 17, 2012.

System Design and Installation

EnviroForensics retained Radon Measurement and Elimination Services (RMES) of Elm Grove, Wisconsin to install the SSDS on November 5, 2012. The SSDS is comprised of two (2) sub-slab suction points, pipe headers and a single fan capable of generating a maximum pressure of -2.3 inches of water. The suction points are located in the 4312 (Salon Divine) and 4316 (RJ Builders) tenant spaces. The suction points consist of open-end PVC pipes with separate headers that extend from below the floor slab, through the exterior wall just above grade, to the roofline. The headers connect to a single fan positioned approximately three feet above the roofline. The system is equipped with a RadonAway™ RP265 fan designed and fabricated for use in radon mitigation systems, and is suitable for outside installation. A licensed electrician made the electrical connections from the 4312 Oakland Avenue electrical panel to the fan on November 19, 2012. The layout of the SSDS is depicted on Figure 1. An as-built exterior photo of the piping and fan is also shown on Figure 1.

The suction points intersect the perimeter clay tile drain of the Aunt Peg's basement. The system is designed to induce negative pressure on the tile drain and, therefore, the entire slab under the basement of the building. Prior to installation, the concrete floors were surveyed for accessible cracks, joints and floor drains. No cracks or separated joints were observed. Dranjer® valves installed in two accessible floor drains enhance the effectiveness of the system by preventing the movement of indoor air into the sub-slab space through potential leaks in the drains.

EnviroForensics installed eight (8) permanent sub-slab monitoring points to measure the induced negative pressure under the floor slab. Four (4) sub-slab monitoring points were

installed around each installed suction point at distances of 5, 15, 25, and 50 feet. The layout of the monitoring point network is depicted on Figure 1. Additionally, a stack sampling port (1/4-inch brass plug) was installed in the piping outside the building. The port is utilized to collect vapor samples to measure the concentrations of VOCs in the SSDS exhaust.

PERFORMANCE MONITORING

To evaluate the operating conditions induced by the SSDS, sub-slab pressure measurements and stack vapor grab samples were collected on the day of system startup (November 19, 2012) and again on December 20, 2012. Sub-slab pressure measurements were collected using an electronic micro-manometer with a resolution of 0.001 inches of water. Stack vapor samples were collected using 1-liter vacuum canisters, which were connected to the stack sampling port using compression fittings and Teflon-lined polyethylene tubing. The vacuum canisters were batch-certified by the laboratory for quality assurance purposes. Vapor samples were submitted to Test America of Knoxville, Tennessee for analysis of VOCs according to EPA Method TO-15.

Monitoring Results

Sub-slab pressure measurement data are summarized on Table 1. The micro-manometer measurements indicate that the SSDS has induced a negative pressure beneath the floor slab. The measurements collected on December 20, 2012, one month after system start-up, ranged from -0.884 to -0.001 inches of water. The highest (i.e. most negative) measurements were detected in monitoring points located 15 feet from each suction point.

Stack sample results are summarized on Table 2 and the relevant portions of the laboratory reports are provided in Attachment A. PCE, TCE and cis-1,2-dichloroethylene were detected in the stack samples, providing further indication that the SSDS is mitigating potential vapor intrusion impacts.

CONCLUSIONS

The performance monitoring data indicates that the installed SSDS is operating as designed. The induced negative pressure beneath the basement slab and the presence of VOCs in the stack vapor samples confirms that the system is effective. We appreciate the



opportunity to provide you with this summary report. If you have any questions or require additional information, please feel free to contact us at 414-326-4412.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brian Kappen".

Brian Kappen, PG
Project Manager

A handwritten signature in blue ink, appearing to read "Wayne Fassbender".

Wayne Fassbender, PG, PMP
Senior Project Manager

cc: William P. Scott, Gonzalez Saggio & Harlan
L. Gartenberg, Aunt Peg's Oakland Ave, LLC
William J. Mulligan, Davis and Kuelthau
Michael Scott, Davis and Kuelthau

attachments



TABLES

TABLE 2
SUMMARY OF STACK SAMPLE ANALYTICAL RESULTS
AUNT PEG'S OAKLAND AVE, LLC
Shorewood Queensway Dry Cleaners
Shorewood, Wisconsin

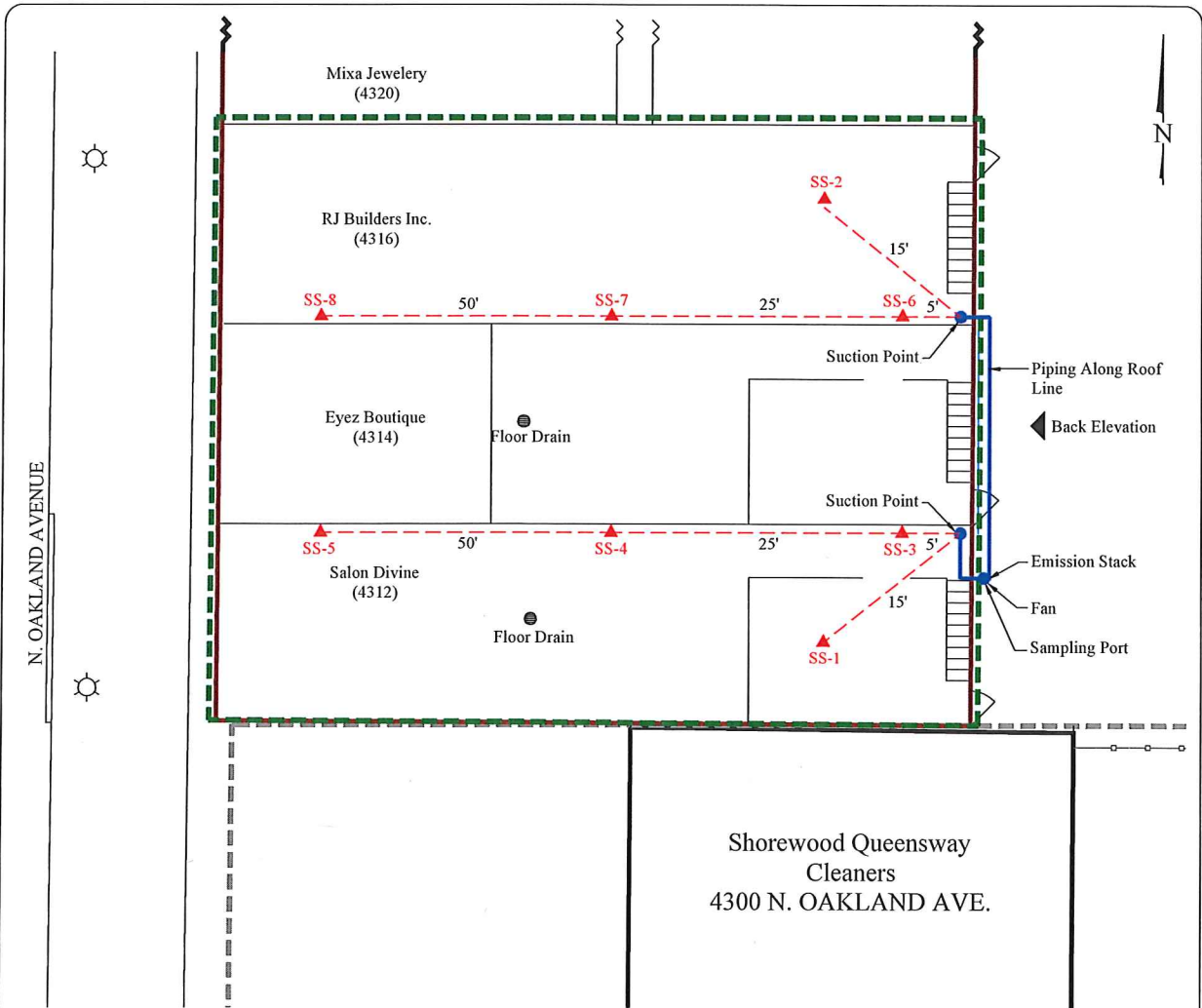
Sample ID	Date	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene
6107-SSDS	11/19/2012	5,700	330	770
6107-SSDS-2	12/20/2012	680	39	79

Notes:

Only detected compounds are listed in this table.

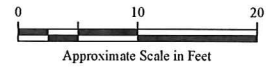
All Concentrations reported in units of $\mu\text{g}/\text{m}^3$.

Bolded values are above method detection limits.



Legend

- SS-1 ▲ Pressure testing points
- Shorewood Queensway property boundary
- .-.- Aunt Peg's basement area



Back of Building Showing As-Built System

No.	Date	Revision	Approved

ENVIROforensics
 ENVIRONMENTAL FORENSIC INVESTIGATIONS, INC.
 602 N Capitol Ave, Suite 210 • Indianapolis, IN 46204
 EnviroForensics.com

Date: 1/11/13
 Designed: MMM
 Drawn: MMM
 Checked: BK
 DWG file: 63101-11

SSDS INSTALLATION SCHEMATIC
 Aunt Peg Oakland LLC
 4312-4334 N. Oakland Avenue
 Shorewood, Wisconsin

Figure
1
Project
6107

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ATTACHEMENT A

Laboratory Analytical Reports

Environmental Forensic Investigation Inc

Client Sample ID: 6107 SSDS

GC/MS Volatiles

Lot-Sample # H2K290409 - 001 Work Order # MXFVN1AA Matrix.....: AIR

Date Sampled...: 11/19/2012 Date Received...: 11/27/2012

Prep Date.....: 11/30/2012 Analysis Date...: 11/30/2012

Prep Batch #.....: 2338038

Dilution Factor.: 101.68 Method.....: TO-15

PARAMETER	RESULTS (ppb(v/v))	REPORTING LIMIT (ppb(v/v))	RESULTS (ug/m3)	REPORTING LIMIT (ug/m3)
Dichlorodifluoromethane	ND	20	ND	100
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	20	ND	140
Chloromethane	ND	51	ND	100
Vinyl chloride	ND	20	ND	52
Bromomethane	ND	20	ND	79
Chloroethane	ND	20	ND	54
Trichlorofluoromethane	ND	20	ND	110
1,1-Dichloroethene	ND	20	ND	81
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	20	ND	160
Methylene chloride	ND	51	ND	180
1,1-Dichloroethane	ND	20	ND	82
cis-1,2-Dichloroethene	190	20	770	81
Chloroform	ND	20	ND	99
1,1,1-Trichloroethane	ND	20	ND	110
Carbon tetrachloride	ND	20	ND	130
Benzene	ND	20	ND	65
1,2-Dichloroethane	ND	20	ND	82
Trichloroethene	62	20	330	110
1,2-Dichloropropane	ND	20	ND	94
cis-1,3-Dichloropropene	ND	20	ND	92
Toluene	ND	20	ND	77
trans-1,3-Dichloropropene	ND	20	ND	92
1,1,2-Trichloroethane	ND	20	ND	110
Tetrachloroethene	840	20	5700	140
1,2-Dibromoethane (EDB)	ND	20	ND	160
Chlorobenzene	ND	20	ND	94
Ethylbenzene	ND	20	ND	88
m-Xylene & p-Xylene	ND	20	ND	88
o-Xylene	ND	20	ND	88
Styrene	ND	20	ND	87
1,1,2,2-Tetrachloroethane	ND	20	ND	140
1,3,5-Trimethylbenzene	ND	20	ND	100
1,2,4-Trimethylbenzene	ND	20	ND	100
1,3-Dichlorobenzene	ND	20	ND	120
1,4-Dichlorobenzene	ND	20	ND	120
1,2-Dichlorobenzene	ND	20	ND	120
Benzyl chloride	ND	41	ND	210

Environmental Forensic Investigation Inc

Client Sample ID: 6107 SSDS

GC/MS Volatiles

Lot-Sample # H2K290409 - 001 Work Order # MXFVN1AA Matrix.....: AIR

PARAMETER	RESULTS (ppb(v/v))	REPORTING LIMIT (ppb(v/v))	RESULTS (ug/m3)	REPORTING LIMIT (ug/m3)
1,2,4-Trichlorobenzene	ND	100	ND	750
Hexachlorobutadiene	ND	100	ND	1100
SURROGATE		PERCENT RECOVERY		LABORATORY CONTROL LIMITS (%)
4-Bromofluorobenzene		108		60 - 140

The 'Result' in ug/m3 is calculated using the following equation: Amount Found(before rounding)*(Molecular Weight/24.45)

The 'Reporting Limit' in ug/m3 is calculated using the following equation: (Reporting Limit(before rounding) * Dilution Factor) * (Molecular Weight/24.45)

Environmental Forensic Investigation Inc

Client Sample ID: 6107-SSDS-2

GC/MS Volatiles

Lot-Sample # H2L280417 -004 Work Order # MXQM91AA Matrix.....: AIR

Date Sampled...: 12/20/2012 Date Received...: 12/28/2012
 Prep Date.....: 01/02/2013 Analysis Date...: 01/03/2013
 Prep Batch #.....: 3002069
 Dilution Factor.: 10 Method.....: TO-15

PARAMETER	RESULTS (ppb(v/v))	REPORTING LIMIT (ppb(v/v))	RESULTS (ug/m3)	REPORTING LIMIT (ug/m3)
Dichlorodifluoromethane	ND	2.0	ND	9.9
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	2.0	ND	14
Chloromethane	ND	5.0	ND	10
Vinyl chloride	ND	2.0	ND	5.1
Bromomethane	ND	2.0	ND	7.8
Chloroethane	ND	2.0	ND	5.3
Trichlorofluoromethane	ND	2.0	ND	11
1,1-Dichloroethene	ND	2.0	ND	7.9
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.0	ND	15
Methylene chloride	ND	5.0	ND	17
1,1-Dichloroethane	ND	2.0	ND	8.1
cis-1,2-Dichloroethene	20	2.0	79	7.9
Chloroform	ND	2.0	ND	9.8
1,1,1-Trichloroethane	ND	2.0	ND	11
Carbon tetrachloride	ND	2.0	ND	13
Benzene	ND	2.0	ND	6.4
1,2-Dichloroethane	ND	2.0	ND	8.1
Trichloroethene	7.3	2.0	39	11
1,2-Dichloropropane	ND	2.0	ND	9.2
cis-1,3-Dichloropropene	ND	2.0	ND	9.1
Toluene	ND	2.0	ND	7.5
trans-1,3-Dichloropropene	ND	2.0	ND	9.1
1,1,2-Trichloroethane	ND	2.0	ND	11
Tetrachloroethene	100	2.0	680	14
1,2-Dibromoethane (EDB)	ND	2.0	ND	15
Chlorobenzene	ND	2.0	ND	9.2
Ethylbenzene	ND	2.0	ND	8.7
m-Xylene & p-Xylene	ND	2.0	ND	8.7
o-Xylene	ND	2.0	ND	8.7
Styrene	ND	2.0	ND	8.5
1,1,2,2-Tetrachloroethane	ND	2.0	ND	14
1,3,5-Trimethylbenzene	ND	2.0	ND	9.8
1,2,4-Trimethylbenzene	ND	2.0	ND	9.8
1,3-Dichlorobenzene	ND	2.0	ND	12
1,4-Dichlorobenzene	ND	2.0	ND	12
1,2-Dichlorobenzene	ND	2.0	ND	12
Benzyl chloride	ND	4.0	ND	21

Environmental Forensic Investigation Inc

Client Sample ID: 6107-SSDS-2

GC/MS Volatiles

Lot-Sample # H2L280417 - 004 Work Order # MXQM91AA Matrix.....: AIR

PARAMETER	RESULTS (ppb(v/v))	REPORTING LIMIT (ppb(v/v))	RESULTS (ug/m3)	REPORTING LIMIT (ug/m3)
1,2,4-Trichlorobenzene	ND	10	ND	74
Hexachlorobutadiene	ND	10	ND	110
SURROGATE		PERCENT RECOVERY		LABORATORY CONTROL LIMITS (%)
4-Bromofluorobenzene		89		60 - 140

The 'Result' in ug/m3 is calculated using the following equation: Amount Found(before rounding)*(Molecular Weight/24.45)

The 'Reporting Limit' in ug/m3 is calculated using the following equation: (Reporting Limit(before rounding) * Dilution Factor) * (Molecular Weight/24.45)