**Documentation of Remedial Action (Attachment C)**

**C.1** Site Investigation Documentation (Post SVE Operation)
**C.2** Investigative Waste **(not included, disposal of soil cuttings and development water was handled by tenant)**
**C.3** Methodology
**C.4** Construction documentation
**C.5** Decommissioning of Remedial System **(no attached, the owner would like to leave the system in-place for potential future use)**
**C.6** Other (not attached)

# C.1 - Site Investigation Documentation

Site investigations conducted prior to the installation and operation of the Soil Vapor Extraction (SVE) system were detailed in the Remedial Action Options and Design Report dated July 24, 2018. Site investigations conducted post installation and operation of the SVE system are summarized below.

The SVE System was put into operation on September 18, 2018 and allowed to run for approximately three months before the system was shut off on December 20, 2018. Approximately two weeks later, on January 4, 2019, Apex returned to the Site to collect three confirmatory sub-slab vapor samples to assess the effectiveness of the SVE System. The vapor samples were analyzed for VOCs by EPA Method TO-15. The initial round of post SVE System operation showed significant decreases in the VOC vapor concentrations beneath the floor slab. No VOCs were detected in the vapor samples in exceedance of the Sub-Slab VALs for a commercial property use based on the U.S. EPA Vapor Intrusion Screening Level Calculator (Version 3.5.1, May 2016) with an excess lifetime cancer risk of 1 x 10-5 in accordance with Wisconsin Administrative Code NR 716.

The system remained shut down for another five months and Apex returned on June 27, 2019 to collect another round of sub-slab vapor samples. This second round of post SVE System operation was intended to evaluate the potential for seasonal fluctuations of the sub-slab vapor concentrations. The samples collected on June 27, 2019 showed that the sub-slab vapor concentrations had remained well below the Sub-Slab VALs. Based on the two rounds of confirmatory sampling post remedial operation, the SVE System appears to have remediated the potential vapor intrusion issue beneath the building floor slab.

In addition to the post vapor sampling, Apex collected soil samples from beneath the building floor slab where previous soil impacts were detected. The three soil samples (HA-1, HA-2 and HA-3) were submitted to a subcontract laboratory for analysis of VOCs. No VOCs were detected in the three soil samples above the Residual Contaminant Levels. Based on the post SVE operation soil sampling and analysis, it appears that the SVE system remediated the soil beneath the building.

**The soil cuttings and purge water from the monitoring wells had been placed in 55-gallon drums. However, when Apex went out to resample the vapor points as part of post SVE system installation, the 55-gallon drums had been removed. It is believed that the waste services retained by the dry cleaner had removed them by mistake along with wastes generated as part of the dry-cleaning operations.**

**C.3**

**The RCLs from**
**http://dnr.wi.gov/topic/Brownsfields/Professionals.html**
**were used as the cleanup standards.**

Apex designed a Soil Vapor Extraction (SVE) System intended to vent the soil-vapor below the floor slab in the vicinity of soil-gas exceedances. The design included a post-installation communication test to determine the radius of influence for the SVE. The areas for soil-gas venting (depressurization) are shown in **Figure 3**. The SVE installation, and the results of post-installation communication test are described below. Photographs showing the SVE installation are attached.

### 3.1 Installation of Sub-Slab Depressurization System

Apex retained RadoVent Illinois, LLC to install the SVE on September 18, 2018. The SSDS consisted of the following:

1. A total of three 4" suction points were installed at the locations shown in **Figure 3**. 5" holes were cored through the slab on grade to reach the sub grade materials under the building, and about 4 gallons of material were removed from each core location.

2. A 3-inch diameter PVC pipe extends from each suction point to the intake side of the AMG Maverick in-line fan installed on the outside of the eastern wall of the dry cleaner tenant space. The fan extracts vapors from the three suction pits. The fan is capable of achieving a static vacuum of at least 0.25 inches water column (wc) at the suction point. Specifications for the AMG Maverick fans are enclosed

Vacuum measurements show a differential pressure reading of at least -0.003 inches wc below the slab at the farthest edges of the area served by the suction pit. Further, visible downward flow of air at test holes was observed at a 15-foot radius from the suction pit using the flame or a butane lighter.

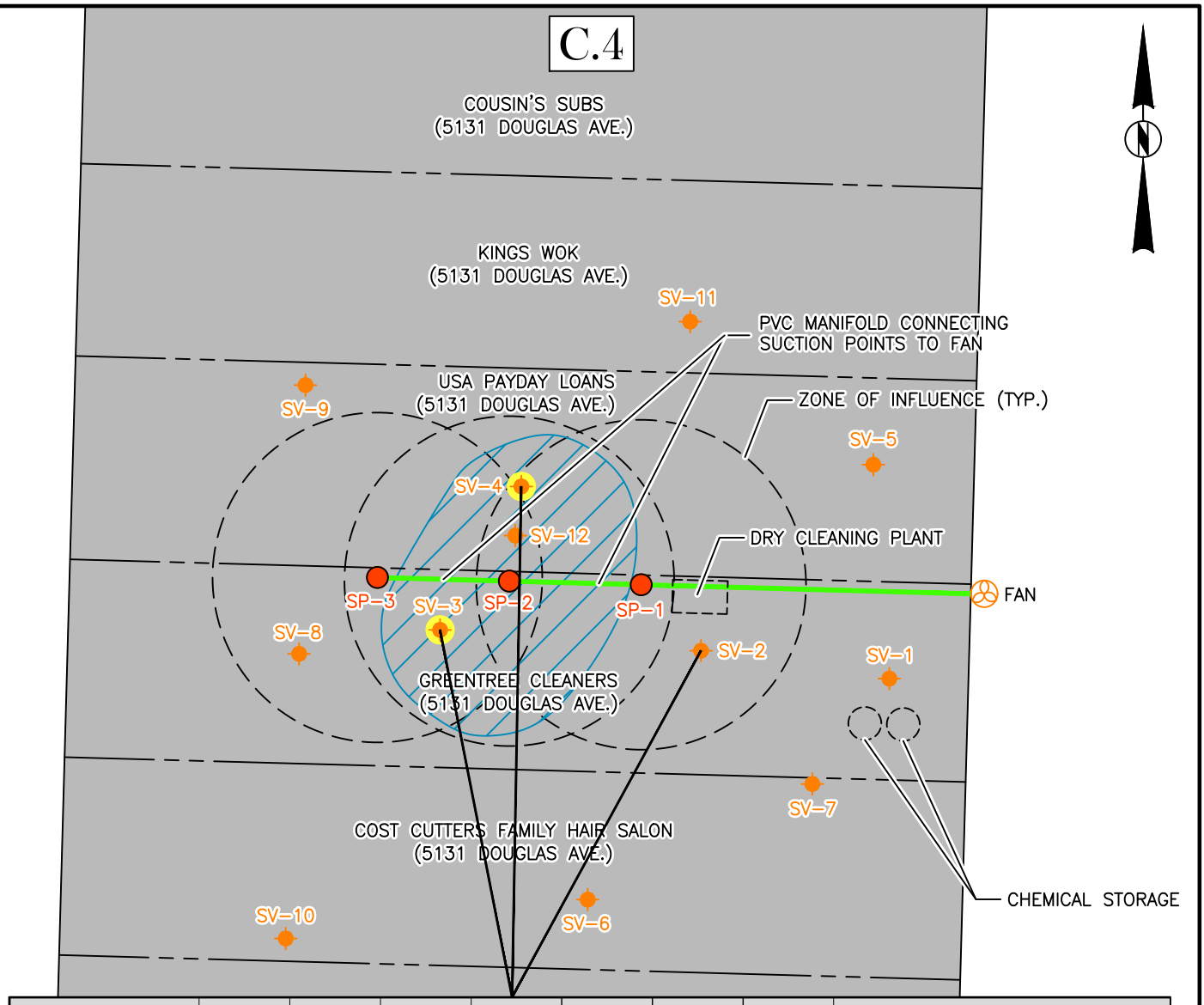
3. A manometer was installed on the outer surface of each vent pipe to allow maintenance staff to routinely monitor on-going system operation via a visual check on the gauge. A photograph of a micrometer is also included. Manometer measurements and the volume of vented airflow recorded on October 4, 2018 are summarized in attached **Table 1**.

4. The pipes exhausts outside the building at approximately 10-12' feet above grade level. The vent stack continues up the back of the building to stick up 2'-3' feet above the roof.

Materials and installation techniques followed guidelines put forth in ASTM E2121.

Following the SVE installation, a sub-slab communication tests were performed to confirm that the extraction system was performing as intended. A micro manometer was used to measure pressure gradients and to determine how easily air can move from one point to another beneath the floor slab. During the test, small holes were cored in strategic locations through the slab. Pressure differentials during the communication test were used to determine the most efficient configuration for the active venting system. Photographs showing use of the micro manometer are included as part of **C.4**. As mentioned above, visible downward flow of air at test holes was observed at a 15-foot radius from the suction pits using the flame or a butane lighter. Based upon the results of the butane flame test, the radius of the vacuum near each extraction point exceeds 15 feet. The radius of the vacuum for each extraction point is shown the enclosed Figure within **C.4**.

# C.4




| Sub-slab Sample Number | SV-2 | SV-2 | SV-3 | SV-3 | SV-3 | SV-4 | SV-4 | Sub-Slab Vapor Action Levels | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | RESIDENTIAL | SMALL COMMERCIAL | LARGE COMMERCIAL |
| | 6/13/2017 | 1/4/2019 | 6/13/2017 | 1/4/2019 | 6/27/2019 | 8/16/2017 | 6/27/2019 | AF = 0.03 | AF = 0.03 | AF = 0.01 |
| Chloroform | **39.0** | **27.3** | **29.8** | **13.6** | **16.2** | **630** | **0.58** | 40.0 | 180 | 530 |
| Tetrachloroethene | **4,570** | **490** | **7,720** | **128** | **61** | **26,100** | **4.3** | 1,400.0 | 6,000 | 18,000 |
| Trichloroethene | **28.6** | **44.9** | **48.0** | **2.0** | **2.1** | **491.0** | <0.339 | 70.0 | 290 | 880 |

LEGEND

- SUCTION POINT
- SUB-SLAB SOIL VAPOR SAMPLE
- VOLATILE ORGANIC COMPOUNDS EXCEED SUB-SLAB VAPOR ACTION LEVELS

CONCENTRATIONS IN MICROGRAMS PER CUBIC METER (ug/m³)

CONCENTRATIONS EXCEEDING VAL'S ARE SHOWN AS BOLD

ESTIMATED AREA WITH VAPOR EXCEEDANCES PRE-SVE OPERATION

DOUGLAS AVENUE DINER STORAGE

SCALE IN FEET

0 7.5 15 30

| | |
|---|---|
| CHECK BY | SN |
| DRAWN BY | OS |
| DATE | 9-9-20 |
| SCALE | AS SHOWN |
| CAD NO. | PEC0.2017.100b3 |
| PRJ NO. | PEC0_2017-100 |

SITE DETAILS SHOWING
SUB-SLAB DEPRESSURIZATION

GREENTREE CENTRE
5131 DOUGLAS AVENUE, UNIT D
RACINE, WISCONSIN

APEX

FIGURE

**PHOTO LOG FOR GREENTREE CLEANERS**
**5055 & 5111-5141 DOUGLAS AVE, RACINE, WISCONSIN**

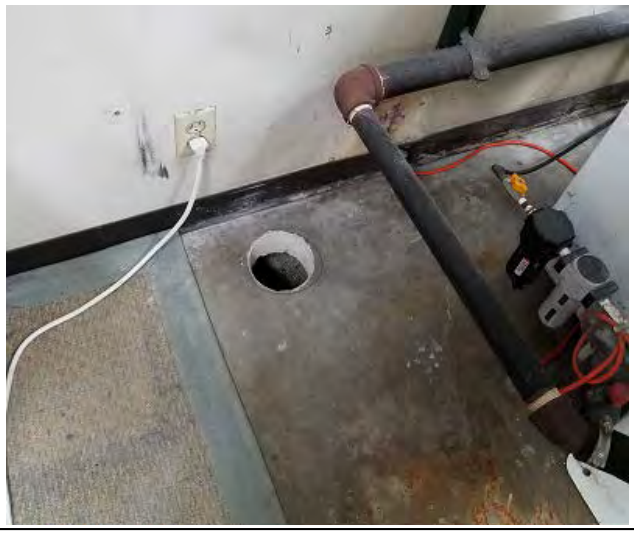
| | |
|---|---|
| Photo No. 1 showing one of the three 4" suction points inside the building. |  |
| Photo No. 2 showing one of the three 4" suction points inside the building. |  |
| Photo No. 3 showing a suction point and correlated PVC piping. |  |

**PHOTO LOG FOR GREENTREE CLEANERS**
**5055 & 5111-5141 DOUGLAS AVE, RACINE, WISCONSIN**

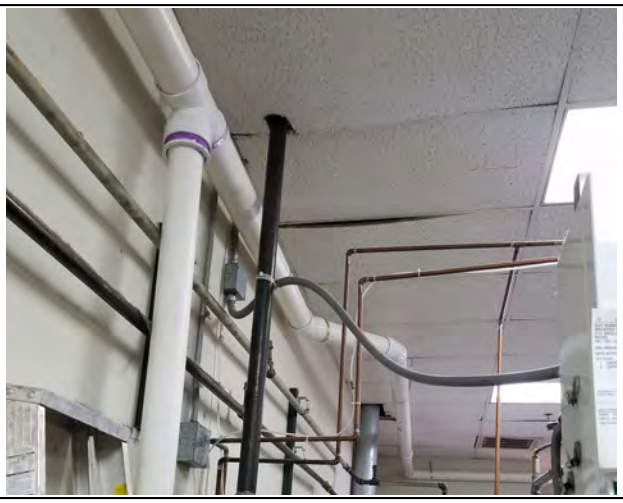
| | |
|---|---|
| Photo No. 4 showing the sub-slab depressurization system. |  |
| Photo No. 5 showing the sub-slab depressurization system. |   |
| Photo No. 6 showing the sub-slab depressurization system. |  |

**PHOTO LOG FOR GREENTREE CLEANERS**
**5055 & 5111-5141 DOUGLAS AVE, RACINE, WISCONSIN**

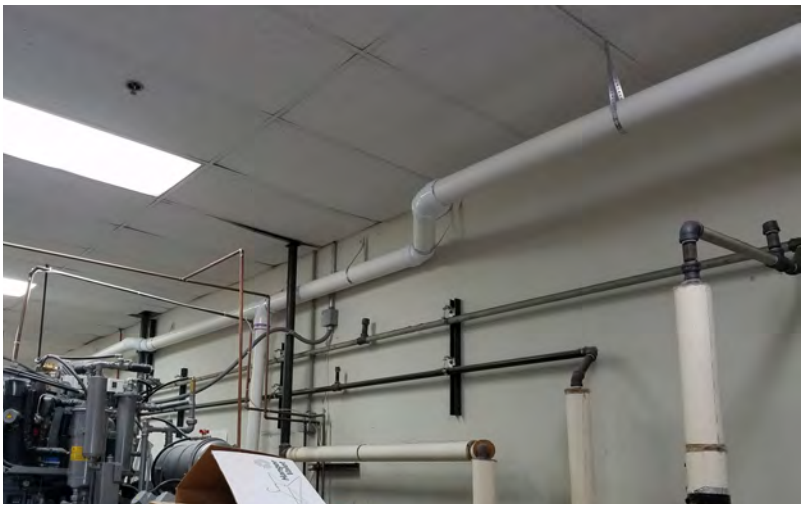
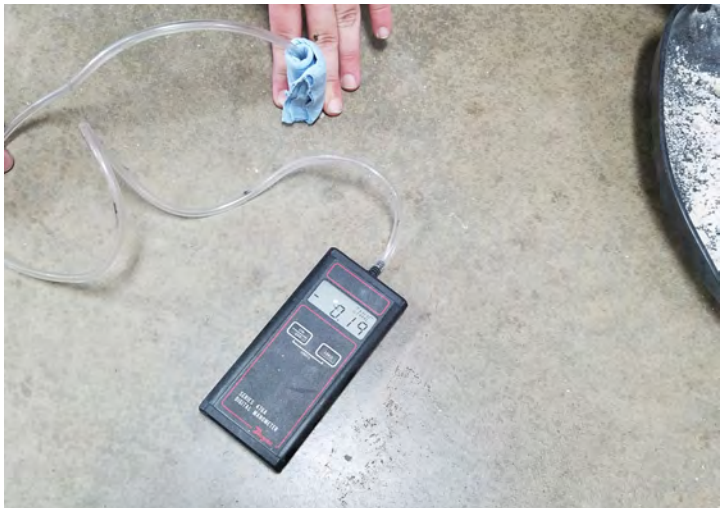
| | |
|---|---|
| Photo No. 7 showing the sub-slab depressurization system. |  |
| Photo No. 8 showing the mounted fan on the exterior of the building. |  |
| Photo No. 9 documenting a communication test on the system. |  |

**PHOTO LOG FOR GREENTREE PLAZA**

| | |
|---|---|
| Photo No. 11 showing the manometer installed on suction point number one. |  |
| Photo No. 12 showing the manometer installed on suction point number 2. |  |
| Photo No. 13 showing the manometer installed on suction point number 3. |  |

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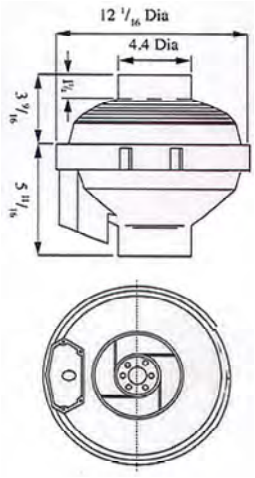
# AMG Maverick




Performance shown is for installation type D - Ducted inlet, Ducted outlet.
Speed (rpm) shown is nominal. Performance is based on actual speed of test. Performance ratings do not include the effects of appurtenances in the air stream. The performance figures shown have been corrected to standard air density.

*We have brackets, too!

| | | | | CFM at STATIC PRESSURE in. w.g. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | Volts | Watts | Max. Amps | 0" | 0.5" | 0.75" | 1.0" | 1.25" | 1.5" | 1.75" | 1.88" |
| AMG Maverick | 150V 60Hz | 85 | 0.75 | 220 | 136 | 111 | 82 | 51 | 21 | 7 | 0 |
| Weight: 8 lbs. 3 oz. Fan Speed: 2200 rpm | | | | | | | | | | | |

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**Table 1**

**Summary of Manometer Measurements**
**Greentree Dry Cleaner, Racine, Wisconsin**

| Suction Point Location | Date | Pressure (Inches $H_2O$) | Volume Vented (CFM) |
|---|---|---|---|
| SP-1 | October 4, 2018 | 1.10 | 70 |
| SP-2 | October 4, 2018 | 1.15 | 63 |
| SP-3 | October 4, 2018 | 1.10 | 70 |

CFM = cubic feet per minute

# C.5

The owner wants to keep the SVE system for potential future use. They do not plan to decommission the system.

## C.6

No other relevant documentation exists.