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## **OPERATION AND MAINTENANCE MANUAL**

**VAPOR COLLECTION SYSTEM  
2305 SOUTHWEST 6<sup>TH</sup> AVENUE  
PORTLAND, OREGON**

**Submitted by:  
Farallon Consulting, L.L.C.  
4380 South Macadam Avenue, Suite 500  
Portland, Oregon 97239**

**Farallon PN: 2383-001**

**For:  
Pacific Skyline Holdings II, LLC  
2545 Southwest Terwilliger Boulevard  
Portland, Oregon 97201**

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Prepared by:

A handwritten signature in black ink, appearing to read "Soren Hill".

Soren Hill  
Project Scientist

Reviewed by:

A handwritten signature in blue ink, appearing to read "Charles Esler".

Charles Esler  
Principal Scientist



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## 1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this operation and maintenance (O&M) manual on behalf of Pacific Skyline Holdings II, LLC (Pacific Skyline) for the vapor collection system at the Pacific Skyline property at 2305 Southwest 6<sup>th</sup> Avenue in Portland, Oregon (herein referred to as the Site) (Figure 1).

The Site is the location of the former Five Star Cleaners, which is listed in the Oregon Department of Environmental Quality (DEQ) Environmental Cleanup Site Information database as site ID No. 6276. Dry cleaning solvents, including tetrachloroethene (PCE) and its breakdown products, have been detected in soil and soil gas at the Site. The vapor collection system was installed in the Site building by the DEQ in 2018 to mitigate vapor intrusion conditions at the Site and nearby properties.<sup>1</sup> DEQ operated the system until Pacific Skyline purchased the Site under the DEQ Prospective Purchaser Program in July 2021.

Pacific Skyline intends to redevelop the Site with a long-term assisted care facility for seniors. Redevelopment activities will address the impacted soil and soil gas at the Site. In the interim, the vapor collection system will be operated as necessary to mitigate vapor intrusion risk.

The purpose of this O&M manual is to describe normal operating procedures for the vapor collection system. This O&M manual summarizes the Site history and previous work, identifies project personnel responsible for implementation of this O&M manual, provides a description of the vapor collection system components, describes routine system monitoring and maintenance, and discusses considerations for Site safety.

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<sup>1</sup> *Interim Removal Measure Work Plan, Five Star Cleaners, 23305 SW 6<sup>th</sup> Avenue, Portland, Oregon* dated March 5, 2019 prepared for DEQ by Apex.



## **2.0 SITE DESCRIPTION**

### **2.1 SITE LOCATION**

The Site is located at 2305 Southwest 6<sup>th</sup> Avenue, which is at the corner of Southwest Sherman Street and Southwest 6<sup>th</sup> Avenue in Portland, Oregon. (Figure 2). The Site building currently is vacant, except for the vapor collection system that is operating as described in this O&M Manual.

The south-adjacent property consists of a three-story residence above a one-story commercial building (St. Barba Bakery), which is structurally integrated with the residence's basement; both the commercial building and the residence basement are at street level. The commercial building is accessed at street level; the first floor of the residence, which is leased with the bakery, is one story up from street level and accessed from exterior stairs leading from Southwest 6<sup>th</sup> Avenue and from interior stairs leading from the basement. These two levels have used the addresses of 2309 and 2311 Southwest 6<sup>th</sup> Avenue (the bakery currently uses 2311 Southwest 6<sup>th</sup> Avenue) historically. The second story of the residence is an apartment with the address of 2315 Southwest 6<sup>th</sup> Avenue. The third story of the residence is an apartment with the address of 2313 Southwest 6<sup>th</sup> Avenue. The two apartments are accessed from exterior staircases on the western side of the building in the backyard of the property. The entire property comprising the commercial space and apartments is identified as the 2309 Property for the purposes of this O&M Manual.

The Site building and the 2309 Property building are separated by a narrow concrete sidewalk with an exterior grade approximately 4 feet above the interior floor of the Site building.

### **2.2 SITE HISTORY**

The former Five Star Cleaners operated at the Site from 1965 to 2015. Black Mountain Consulting completed a Phase II Environmental Site Assessment of the 2309 Property, on behalf of a prospective purchaser, in 2016 and found that chlorinated solvents may have been released from the former Five Star Cleaners operations. In April 2018, DEQ was provided a copy of a report describing the results from the Phase II Environmental Site Assessment. Following an Orphan Site Declaration by DEQ, Apex Companies was contracted by DEQ to perform indoor air sampling and interim removal and remedial actions at the Site. During site investigations in 2016 through 2018, chlorinated volatile organic compounds (CVOCs); primarily PCE and trichloroethene [TCE]) were detected in indoor air samples collected in the 2309 Property building.

### **2.3 SITE OCCUPANCY AND STATUS**

As of the date of this O&M Manual, the occupancy status of the Site building and 2309 Property was as follows:

- The Site was vacant with no plans for occupation;
- The street-level commercial space and the first residence floor of the 2309 Property building were occupied by the St. Barbara Pinoy Bakery; and



- The second and third residence floors of the 2309 Property building were leased as apartments.

Pacific Skyline intends to maintain the Site building as-is until the Site undergoes redevelopment in the 2027 to 2029 time frame. If there are significant changes in occupancy from what is provided above, Pacific Skyline will notify DEQ of the change in a quarterly progress report.



### 3.0 PROJECT PERSONNEL

Project personnel and their contact information are presented below:

**Technical Contacts:** Lisa Thompson, P.E., Associate Engineer  
Farallon Consulting, L.L.C.  
Phone: (425) 395-4636  
Email: [lthompson@farallonconsulting.com](mailto:lthompson@farallonconsulting.com)

Charles Esler, Principal Scientist  
Farallon Consulting, L.L.C.  
Phone: (503) 816-9874  
Email: [cesler@farallonconsulting.com](mailto:cesler@farallonconsulting.com)

**Project Manager:** Soren Hill, Project Scientist  
Farallon Consulting, L.L.C.  
Phone: (503) 880-6230  
Email: [shill@farallonconsulting.com](mailto:shill@farallonconsulting.com)

**Client Contact:** Andie Fitzgerald, Chief Operating Officer  
Pacific Skyline Holdings II, LLC  
2545 Southwest Terwilliger Boulevard  
Portland, Oregon 97201  
Email: [afitzgerald@terwilligerplaza.com](mailto:afitzgerald@terwilligerplaza.com)

**DEQ Contact:** Mark Pugh, R.G.  
Oregon Department of Environmental Quality  
700 Northeast Multnomah Street, Suite 600  
Portland, Oregon 97232  
Email: [mark.pugh@deq.state.or.us](mailto:mark.pugh@deq.state.or.us)



## 4.0 SYSTEM DESCRIPTION

A vapor collection system was installed on the Site to intercept soil gas vapors beneath the concrete slab floor of the Site building and the concrete sidewalk between the on- and off-Site buildings. The vapor collection system consists of three subslab vapor collection pits in the floor; five vapor recovery wells along the southern wall (angled beneath the median space between the Site building and the 2309 Property building); two ventilation fans; a 500-pound vessel containing granular activated carbon (GAC); piping connecting the vapor collection pits and recovery wells, ventilation fans, and the GAC vessel; and ancillary equipment. Soil gas vapors are extracted from the subsurface through the collection pits and recovery wells using vacuum applied by the ventilation fans. The vapors from the vapor collection pits are discharged without treatment through an exhaust stack that extends beyond the roof of the Site building. The vapors from the vapor recovery wells installed along the southern wall are conveyed through the piping to the GAC vessel for treatment. Treated vapors are then discharged to the atmosphere via an exhaust stack that extends above the roof of the Site building.

A complete description of the vapor collection system was provided in the IRM Work Plan.<sup>2</sup> The locations of the vapor collection pits and recovery wells and details of system installation are shown on Figure 2, and on IRM Work Plan Figure 4, which is provided in Appendix A. Details regarding the vapor collection pits, vapor recovery wells, ventilation fans, system piping, and the GAC vessel are provided below.

**Vapor Collection Pits.** The vapor collection pits consist of 2- by 2- by 2-foot concrete vaults installed beneath the concrete slab floor of the Site building. The pits are filled with 2-inch-diameter uniform drain rock and covered with a concrete slab. The vapor collection pits are equipped with a 2-inch-diameter Schedule 40 polyvinyl chloride (PVC) pipe with four-way (“X”) fitting for vapor collection embedded in the drain rock. Three exposed ends of the X fitting are capped with a 0.5-inch wire screen (or similar). The remaining end of the PVC pipe is connected to subslab soil gas conveyance piping that directs soil vapor to the discharge vent piping in the southeastern portion of the Site building.

**Vapor Recovery Wells.** The five vapor recovery wells are constructed of 2-inch-diameter PVC piping installed at an angle along the southern building wall. The vapor recovery wells were installed to a maximum depth of approximately 8 feet below ground surface. Vapor recovery well PVC piping is connected to PVC conveyance piping along the interior of the Site building that connects to the GAC vessel and ventilation fan.

**Piping.** System piping consists of 2-, 3-, or 4-inch-diameter PVC piping.

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<sup>2</sup> *Interim Removal Measure Work Plan, Five Star Cleaners, 23305 SW 6<sup>th</sup> Avenue, Portland, Oregon* dated March 5, 2019 prepared for DEQ by Apex.



**GAC vessel.** Soil gas vapor collected from the vapor recovery wells is routed to a pressurized vessel containing approximately 500 pounds of vapor-phase GAC for volatile organic adsorption prior to discharge to the atmosphere. Monitoring ports are installed at the influent and effluent of the GAC vessel to allow for vapor sampling.

**Ventilation Fans.** Ventilation fans are installed on the exhaust vents for both the vapor collection pits and the vapor recovery wells. The ventilation fans are RadonAway model RP145, and provide an air flow rate of approximately 40 standard cubic feet per minute at a vacuum of 1.5 inches of water. The fans are installed vertically in the system piping within the building, with a Y-fitting installed just above ground level in each vent pipe to function as a clean-out for the subslab piping. A copy of the RadonAway manual is provided in Appendix B.



## **5.0 SITE SAFETY**

A Site-specific Health and Safety Plan developed in general accordance with the Occupational Safety and Health Act and the Oregon Administrative Rules is used during O&M duties. Farallon personnel performing work at the Site will read and be familiar with the Health and Safety Plan. At a minimum, modified Level D personal protective equipment, including eye protection, nitrile gloves, and steel-toed boots, will be worn when O&M field work is performed at the Site.



## 6.0 ROUTINE MONITORING AND MAINTENANCE

General monitoring and maintenance, and emissions monitoring will be performed as described below.

### 6.1 GENERAL MONITORING AND MAINTENANCE

The following general monitoring and maintenance activities will be performed monthly to ensure proper system operation:

- The general security of the Site building will be evaluated.
- Access to vapor collection system equipment will be maintained as necessary to facilitate monitoring and maintenance.
- Operation of the ventilation fans will be verified.
- The following operational parameters will be recorded:
  - The system vacuum from both the vapor collection pits and the vapor recovery wells, pre- and post-GAC, using a portable manometer;
  - The gradient across the building subslab at vapor pin locations;
  - Photoionization detector readings from the vapor collection pits discharge stack; and
  - Photoionization detector readings from the vapor recovery well effluent (pre-GAC) and discharge stack (post-GAC).
- Condensate will be removed from the low point in the vapor collection pits piping, as needed to maintain vapor flow. If removed, the condensate will be containerized and profiled for proper handling.
- Monitoring activities will be documented using the Monthly Inspection Form (Appendix C).

### 6.2 EMISSIONS MONITORING

Periodic monitoring will be performed to ensure that emissions from the system do not exceed the limit of 2,300 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) for PCE and 88  $\mu\text{g}/\text{m}^3$  for TCE established in the Consent Judgment.<sup>3</sup>

Semi-annual air samples will be collected from the effluent of the vapor recovery wells, pre- and post-GAC treatment, during a monthly system monitoring visit. The air samples will be collected using laboratory-provided Summa canisters and submitted under chain-of-custody protocols to

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<sup>3</sup> Consent Judgment, DEQ v. Pacific Skyline Holdings II, LLC served June 10, 2021.



Pace Laboratories of Mount Juliet, Tennessee. for analysis using U.S. Environmental Protection Agency Method TO-15. The semi-annual vapor sampling will be scheduled in February and October of each year concurrent with the semi-annual indoor air monitoring presented in Section 7.0.

Spent GAC will be removed from the vessel and containerized in labeled drums or 1-cubic-yard supersacks prior to transport for off-Site regeneration or disposal. GAC designated for disposal will be managed as Resource Conservation and Recovery Act Hazardous Waste (F-Listed spent solvent containing waste) in accordance with Part 261.32 of Title 40 of the Code of Federal Regulations. Each container will be labeled with an appropriate “Hazardous Waste” label that will include the waste generation date and generator's name and address. All necessary manifest information will be recorded prior to transport off the Site.

### **6.3 CONTINGENCY ACTIVITIES AND DEQ NOTIFICATION**

If breakthrough is anticipated or observed based on testing of the GAC vessel effluent, arrangements will be made to change out the GAC. If effluent PCE or TCE concentrations exceed the levels authorized by the Consent Judgment, the system will be temporarily shut down until GAC changeout occurs.

If conditions that affect system performance are observed, such as condensate settling into low lying areas of the pipe, they will be addressed appropriately. If system conditions indicate a temporary period of more frequent monitoring is warranted, the routine O&M schedule will be adjusted accordingly.

System shutdowns for planned maintenance will be limited to the extent practical, and DEQ will be notified by email prior to a planned shutdown. DEQ will be notified of emergency shutdowns lasting longer than 24 hours within 48 hours of the shutdown.

If Site conditions indicate O&M activities require substantial modification, or the system itself is modified, this O&M Manual will be updated to reflect the changes and provided to DEQ for its approval.



## 7.0 INDOOR AIR MONITORING

In addition to routine system testing, semi-annual indoor air monitoring will be conducted at the Site and the south-adjacent property at 2309 Southwest 6<sup>th</sup> Avenue. Passive sorbent samplers (brand name Radiello or similar) will be deployed for this monitoring. This type of sampler is left in place for multiple days to allow for a longer time-weighted sample. The Radiello samplers provide quantitative data similar to that provided through Summa canisters for select CVOCs, including PCE and TCE.

Semi-annual indoor air monitoring will consist of deploying a Radiello sampler at each of the following five locations:

1. Site building;
2. Bakery kitchen area at 2309 Property building;
3. House basement at 2309 Property building;
4. First floor of 2309 Property building; and
5. Outside (ambient) air sample, typically collected between the 2309 Property building and the Site building.

The samplers will be deployed for a minimum of 7 days. Following collection, the samplers will be submitted for laboratory analysis of PCE and TCE by EPA Method TO-17.

If outside conditions are deemed too humid for a Radiello sampler, the outside (ambient) air sample may be collected in a 6-liter Summa canister over a 24-hour time period.

The monitoring will be conducted in February to represent the colder rainy season and October to represent the end of the warmer and dry season. Monitoring will be conducted semi-annually while the vapor collection system is operational.



## **8.0 PROGRESS REPORTING**

Progress reports will be provided to DEQ containing the following information:

- System maintenance, repairs, operations, and overall status during the previous reporting period;
- Sampling, test results, and other data generated or received during the previous reporting period; and
- Activities scheduled for the next reporting period.

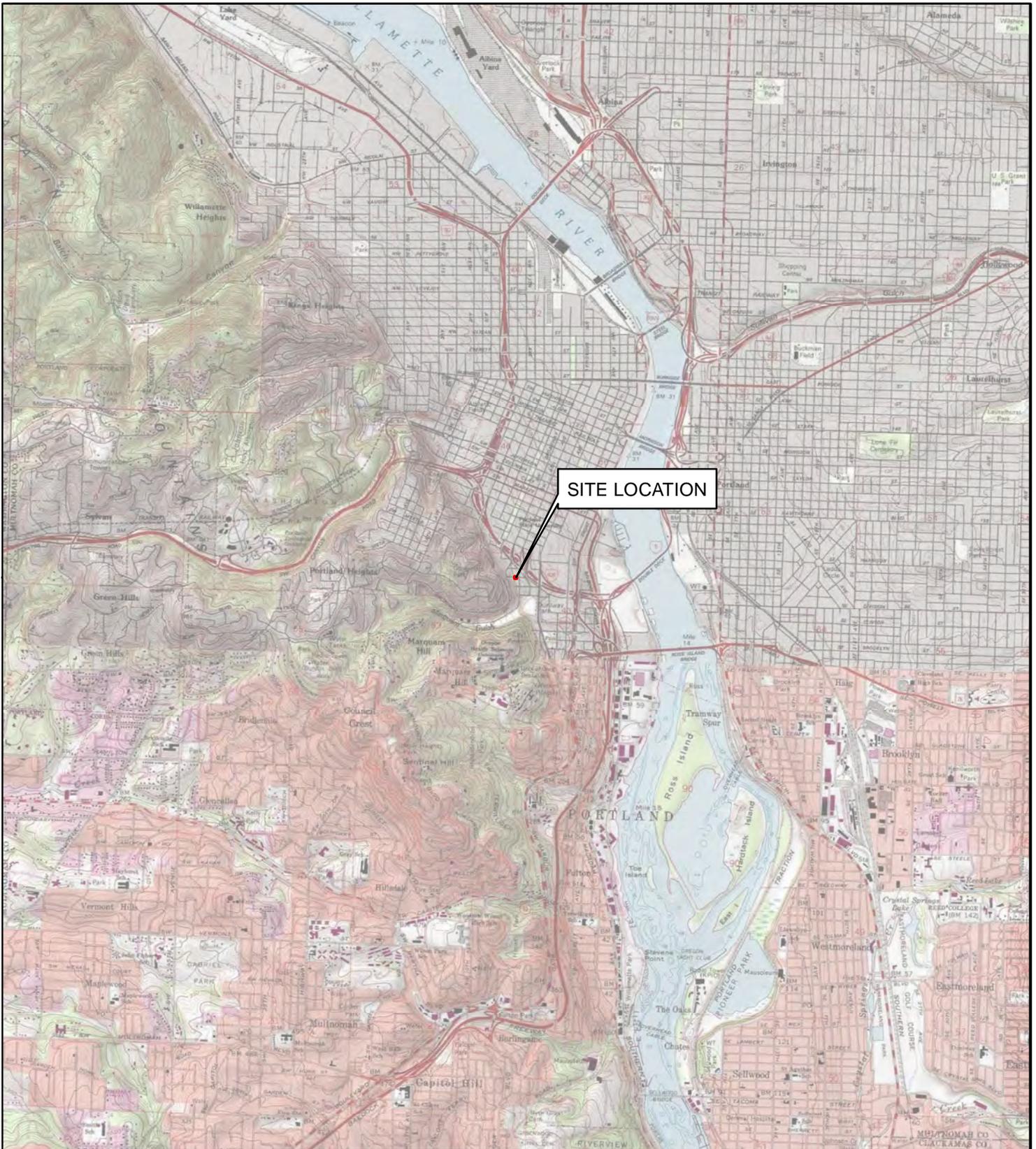
The reports will be delivered to DEQ in email format on or before the 10<sup>th</sup> working day of January, April, July, and October of each year the system is in operation. Field reports generated during activities will be attached to the email report.

As noted in the Consent Judgment, DEQ may approve less frequent reporting, if warranted. Therefore, a less frequent reporting schedule may be proposed in the future.

## **FIGURES**

OPERATION AND MAINTENANCE MANUAL  
VAPOR COLLECTION SYSTEM  
2305 Southwest 6<sup>th</sup> Avenue  
Portland, Oregon

Farallon PN: 2383-001



REFERENCE: 7.5 MINUTE USGS QUADRANGLE PORTLAND, OREGON, DATED 2013



SCALE IN FEET



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**FIGURE 1**  
**SITE VICINITY**  
**2305 SOUTHWEST 6th AVENUE**  
**PORTLAND, OREGON**

FARALLON PN: 2383-001

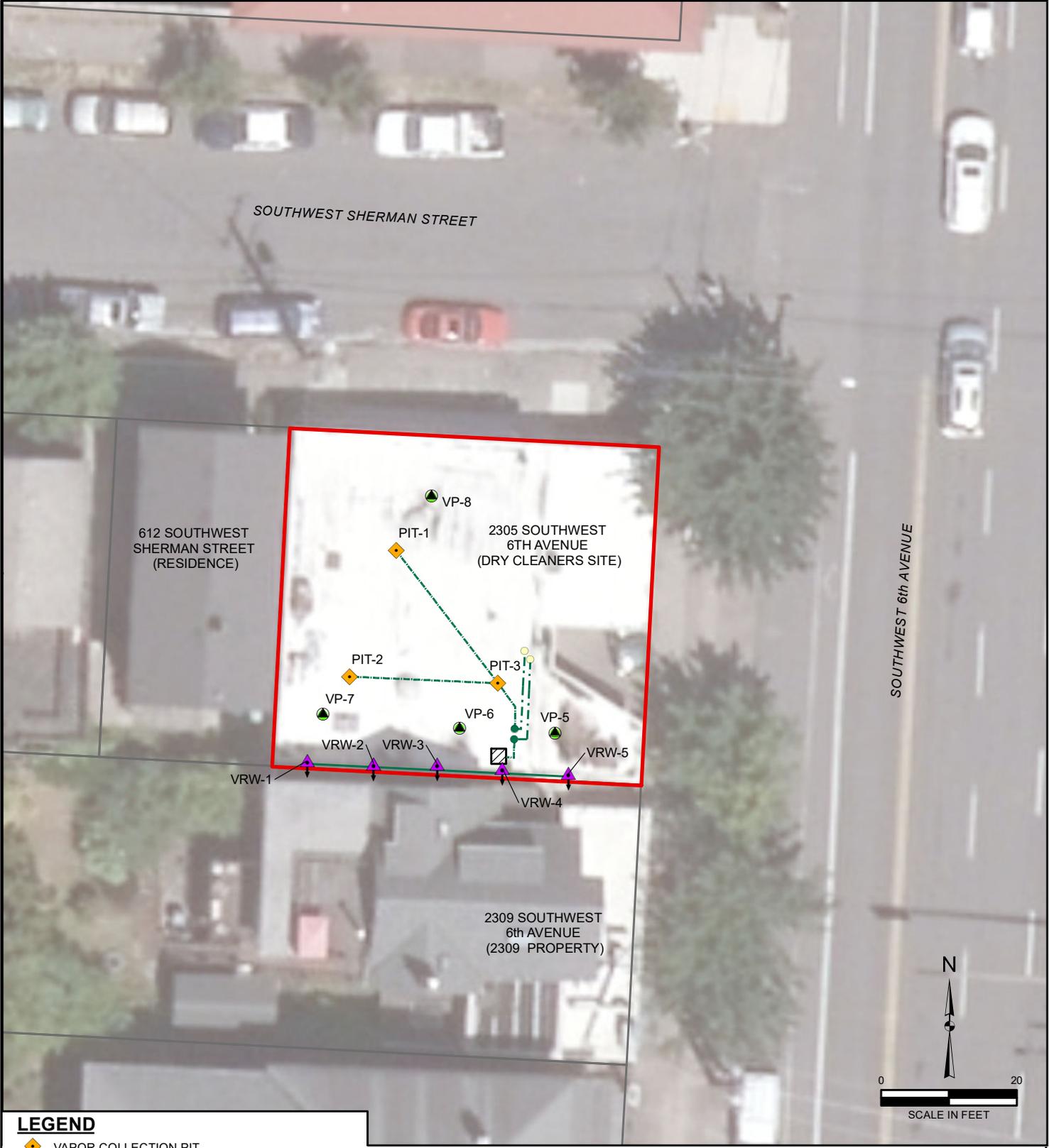
Drawn By: vpehlivan

Checked By: TB

Date: 8/26/2021

Disc Reference:

Q:\Projects\2383 Pacific Skyline Holdings\001 2305 SW 6th Ave\Mapfiles\DFCR\Figure-01\_SiteVicinityMap.mxd



**LEGEND**

- VAPOR COLLECTION PIT
- ANGLED VAPOR RECOVERY WELL
- SUBSLAB VAPOR POINT
- VENT DISCHARGE STACK
- VENT RISERS TO ABOVE-ROOF DISCHARGE
- 2" BURIED PIPING FOR VAPOR RECOVERY SYSTEM
- 3" WALL-MOUNTED PIPING FOR VAPOR RECOVERY SYSTEM
- ROOF-MOUNTED PIPING FOR VAPOR RECOVERY SYSTEM
- CARBON VESSEL
- SITE BOUNDARY
- MULTNOMAH COUNTY TAX LOT

NOTES:  
 1. ALL LOCATIONS ARE APPROXIMATE  
 2. FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION.

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**FIGURE 2**

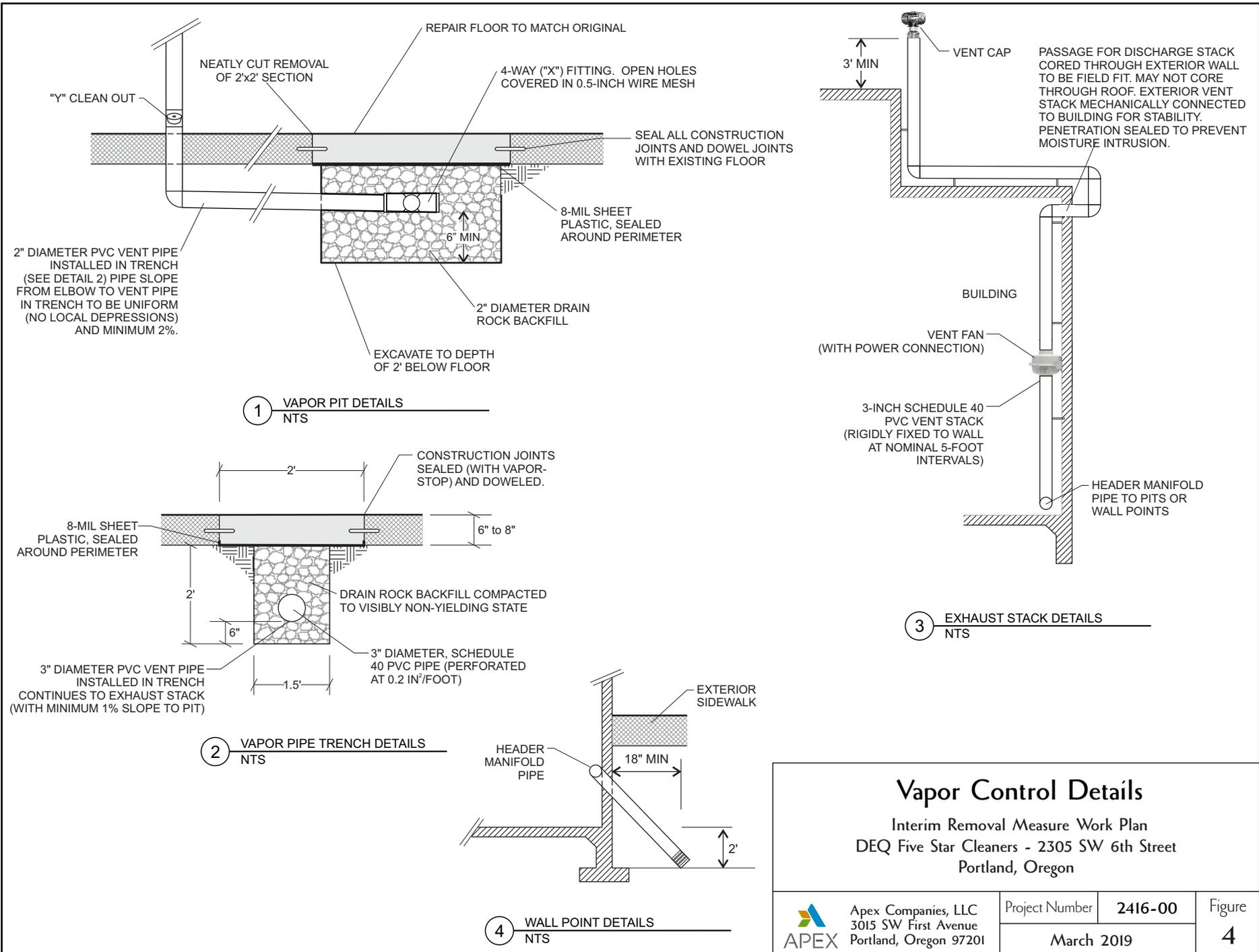
**SITE PLAN**  
 2305 SOUTHWEST 6th AVENUE  
 PORTLAND, OREGON

FARALLON PN: 2383-001

**APPENDIX A**  
**IRM WORK PLAN FIGURE 4**

OPERATION AND MAINTENANCE MANUAL  
VAPOR COLLECTION SYSTEM  
2305 Southwest 6<sup>th</sup> Avenue  
Portland, Oregon

Farallon PN: 2383-001



## Vapor Control Details

Interim Removal Measure Work Plan  
DEQ Five Star Cleaners - 2305 SW 6th Street  
Portland, Oregon

**APPENDIX B**  
**EQUIPMENT SPECIFICATIONS**

OPERATION AND MAINTENANCE MANUAL  
VAPOR COLLECTION SYSTEM  
2305 Southwest 6<sup>th</sup> Avenue  
Portland, Oregon

Farallon PN: 2383-001

## 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: \_\_\_\_\_



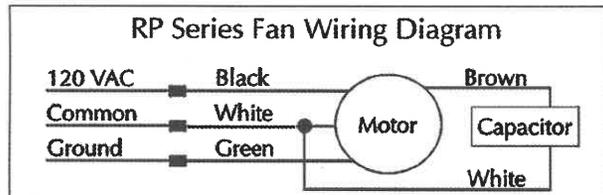
# RP / RPc Series Installation Instructions



**Fan Installation & Operating Instructions**  
*Please Read and Save These 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.



**Fan Installation & Operating Instructions**  
 Fan Series

RP140	P/N 28460	RP140c	P/N 23029-1
RP145	P/N 28461	RP145c	P/N 23030-1
RP260	P/N 28462	RP260c	P/N 23032-1
RP265	P/N 28463	RP265c	P/N 23033-1
RP380	P/N 28464		

**1.0 SYSTEM DESIGN CONSIDERATIONS**

**1.1 INTRODUCTION**

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

**1.3 ENVIRONMENTALS**

The RP / R/Pc 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 / R/Pc 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 / R/Pc 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 / R/Pc 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 / R/Pc 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 / R/Pc 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.

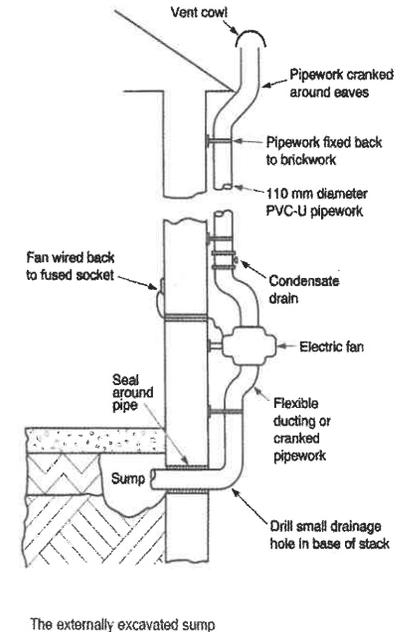
## 2.1 MOUNTING

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.



### 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.

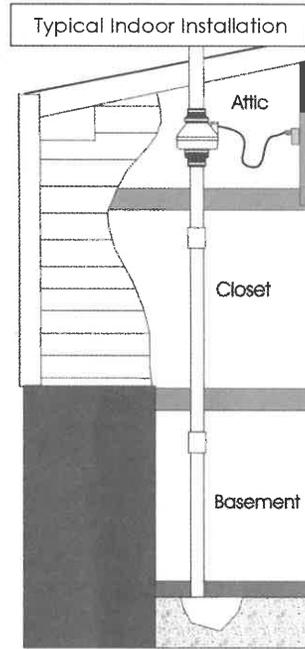
Fan Wire	Connection
Green	Ground
Black	AC Hot
White	AC Common

### 2.5 VENT MUFLER (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 performance 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)

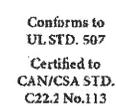
**Continuous Duty**

**Class F Insulation (RP140/RP140c Class B)**

**Thermally Protected Manual Reset**

**3000 RPM**

**Rated for Indoor or Outdoor Use**



**APPENDIX C**  
**MONTHLY INSPECTION FORM**

OPERATION AND MAINTENANCE MANUAL  
VAPOR COLLECTION SYSTEM  
2305 Southwest 6<sup>th</sup> Avenue  
Portland, Oregon

Farallon PN: 2383-001



**VAPOR COLLECTION SYSTEM MONTHLY INSPECTION FORM  
FORMER FIVE STAR CLEANERS  
2305 SOUTHWEST 6<sup>TH</sup> AVENUE, PORTLAND, OREGON**

<b>Date of Inspection:</b>			
<b>Farallon Personnel:</b>			
<b>Manometer Make/Model</b>		<b>Serial Number</b>	
<b>PID Make/Model</b>		<b>Serial Number</b>	
<b>Is the System operating?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No   (if no, provide comments below)		
<b>Building security concerns?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No   (if yes, provide comments below)		
<b>Comments:</b>			

	System Location	PID Reading (ppm)	Pressure Reading (in wc)
<b>Vapor Collection System</b>	Vapor Collection Pits Exhaust		
	Vapor Recovery Wells Effluent (Pre-carbon)	(turn fan off prior to reading)	
	Vapor Recovery Wells Effluent (Post-carbon)		



**Vapor Collection System Monthly Inspection Form**  
**Former Five Star Cleaners**  
**2305 Southwest 6th Avenue, Portland, Oregon**

Subslab Vapor Pins	Location ID	PID Reading (ppm; <i>fan off</i> )	Pressure Reading (in wc; <i>fan on</i> )
	VP-5		
	VP-6		
	VP-7		
	VP-8		

Vapor Recovery Wells	Location ID	PID Reading (ppm; <i>fan off</i> )
	VRW-1	
	VRW-2	
	VRW-3	
	VRW-4	
	VRW-5	

<b>Maintenance performed:</b>				
<b>Issue(s) identified or maintenance that will be addressed at subsequent visit:</b>				
<b>Final System Check: (before leaving the Site)</b>	Fans running <input type="checkbox"/>	Valves closed <input type="checkbox"/>	Cleanout plugged <input type="checkbox"/>	Door locked <input type="checkbox"/>

**System Laboratory Samples (February and October ONLY)**

System Sample Location	Sample ID	Laboratory	Tracking Number
VRW Effluent (Pre-carbon)			
VRW Effluent (Post-carbon)			