SUB-SLAB DEPRESSURIZATION SYSTEM

LUBRICANT PACKAGING SITE

FINAL REPORT

Prepared for:

CDM Smith Inc.
110 Fieldcrest Ave., #8
Edison, NJ 08837

Prepared by:

INTEX Environmental Group, Inc.
33 Appletree Lane
Pipersville, PA 18947

November 2019

Introduction

The major work activities as requested include the design and installation of a SSDS, post-installation testing to confirm the operational effectiveness (through pressure readings) and document that there was sufficient vacuum coverage to depressurize the affected area, and prepare a SSDS installation report. The SSDS was installed within the office/clean room and work area (approximately 4,400 square feet) which is slab on grade construction divided by interior walls into the two sections and a basement area (approximately 2400 square feet). The building is a one story structure that is approximately 7,000 total square feet in size. (See Figure 1) The installation of these systems was conducted in two phases with the basement installation being the last phase.

Design Considerations

The proposed SSDS was designed to be compliant with relevant guidance contained within the Final NYSDOH CEH BEEI Soil Vapor Intrusion Guidance October 2006 - 69, issued by the New York State Department of Health (NYSDOH) in consultation with the New York DOH. The basis of design is summarized as follows:

- The systems were designed to avoid the creation of other health, safety, or environmental hazards to building occupants (e.g., backdrafting of natural draft combustion appliances).

- The systems were designed to minimize soil vapor intrusion effectively while minimizing excess energy usage, to avoid compromising moisture and temperature controls and other comfort features, and to minimize noise.

- To avoid re-circulation of extracted subsurface vapors into the building, the vent pipe's exhaust was;
  - above the eave of the roof (preferably, above the highest eave of the building at least 12 inches above the surface of the roof),
  - at least 10 feet above ground level,
  - at least 10 feet away from any opening that is less than 2 feet below the exhaust point, and iv. 10 feet from any adjoining or adjacent buildings, or HVAC intakes or supply registers
  - rain caps, if used, were installed so as not to increase the potential for extracted subsurface vapors to enter the building.
  - To avoid accidental changes to the system that could disrupt its function, the depressurization system components were labeled clearly.

- A warning device/indicator (Radonaway Checkpoint IIa) was installed to alert building occupants if the active system stops working properly. Examples of system failure warnings and indicators include the following: a liquid gauge (e.g., anemometer), a sound alarm, a light indicator, and a dial (needle display) gauge. The warning device or indicator for each blower was placed where it can be easily heard or seen.

Former SSDS Removal and Installation

INTEX removed the existing SSDS system and sealed the floor and wall penetrations prior to the installation of the upgraded SSDS system.

The first section was in the office/clean room area and consisted of three vapor extraction points and a vacuum blower. The second portion of the system was installed in the work area, where an additional three vapor extraction points and another blower were installed. This installation was completed during the period November – December 2017. On completion of the installation sub slab vapor measurements were taken in thee work area and the office/clean room area. Again, based on sub slab vacuum data, a decision was made to install a third sub slab depressurization system in the basement area. This installation, four vapor extraction points and a third blower, was completed and the last rounds of sub slab pressure/vacuum readings were taken on May 9, 2019 and May 30, 2019. (See Figure 2 & 3)

SSDS Confirmation Testing

INTEX determined the effectiveness of the system by creating a negative pressure beneath the office and work areas. On completion of the installation of the third and final system, INTEX confirmed that a negative pressure exists throughout the sub slab by obtaining site-specific pressure measurements at the pressure monitoring points and on the piping manifold(s).

INTEX presents the following summary of work performed. This includes the following information:

SSDS System

a. Blower: INTEX installed three Radonaway High Suction Series Fans Model HS2000. One blower in conjunction with four extraction points was installed to develop the required negative pressure gradient below the basement section of the building and the second and third blowers each in conjunction with three extraction points each area were sufficient to develop the required negative pressure gradient below the office/clean room and the work area.

The manufacturer product performance and efficiency are:

Model	Part #	Watts	Max "WC	CFM at 0" WC	CFM at 10"WC	CFM at 15" WC
HS2000	23004-4	150-270	18	110	72	40

The key features are:

- Internal condensate bypass
- Mounts vertically indoors or outdoors
- Inlet: 3.0" PVC/ Outlet: 2.0" PVC
- Weight: 18 lbs.
- Size 15"W x 13"H x 8"D

b. Energy Usage: The approximate annual energy cost are $183.96 based on a $0.10 per kwh utility rate for each blower

c. Summary of the installation activities:

- Blower Installation

The blowers were mounted externally on the sidewall of the masonry building. The blower unit is supported by galvanized angle brackets attached to the wall with toggle anchors. The discharge stack is terminated roughly two feet above the existing eave and greater than ten feet above the ground level. All blowers are installed in a similar manner on the exterior wall of the work area.

The blowers are powered from a dedicated breaker installed and labeled as such in the existing electrical distribution panel. A new ½-inch EMT electrical conduit was mounted on high on the inside walls going above the existing warehouse doorway running from the breaker panel to junction boxes located next to each of the wall penetrations. A dedicated electrical outlet was mounted on the junction box to provide power for the audible alarm device. The electrical conductors from the junction box to the blower were installed flexible metallic conduit.

- Extraction Points Installation

Three extraction points, each, were installed in the office clean area and the work area. Four extraction points were installed in the basement area based on the confirmation testing in the office and work area. At each extraction point, the floor was penetrated with a 4-inch diamond core barrel using a hand held core drill. Roughly one gallon of water was used per penetration for dust suppression. The material directly below the floor was hand excavated to create an extraction pit.

Extraction points were constructed by drilling or cutting holes through the building slab, making sure that any vapor barriers are breached and the sub-slab materials are encountered. Wherever practicable, extraction points and piping were placed in the most unobtrusive locations. A 10 to 12-inch diameter pit was excavated at the extraction point(s), to a depth of about 18 inches. Crushed stone was then backfilled around the extraction pipe, and the extraction hole was then patched around the piping using mortar or non-shrink grout, to insure a good seal.

As a final note, care was taken to ensure that extraction points/pits intercepted the thin void zone that typically exists directly beneath poured slabs. Specifically, differential settlement over time typically creates a series of interconnected void spaces beneath concrete slabs. While the extent and significance of these voids in

transmitting soil gases is highly site-dependent, it makes sense to use every advantage possible.

- Extraction Manifold Installation

  The overhead extraction manifolds consist of 3-inch diameter schedule 40 PVC pipe supported at a minimum of every six feet by a swivel hanger mounted on a 3/8 allthread rod hung from the ceiling. The piping from the blower was sloped back towards the extraction points so that no condensation will accumulate in the piping or impact the blower.

- Extraction Riser Installation

  The extraction risers consist of 2-inch diameter schedule 40 PVC pipe. A two-inch PVC gate valve was installed, just below the 3" x 2" reducer tee used in the extraction manifold for the transition, so that the flow from each extraction point may be balanced during the initial confirmation testing. To avoid accidental changes to the system that could disrupt its function, the risers were labeled clearly. Each extraction point and associated riser were equipped with a pressure (u-tube manometer) gauge which will continuously monitor the pressure of the vapor mitigation system and indicate that a negative pressure exists between the sub-slab and indoor air.

- Warning Device

  A warning device/indicator was installed to alert building occupants if the active system stops working properly. INTEX used three Radonaway Checkpoint IIa alarms, one for each blower. These units produce both an audible and visual alarm indicator.

Figure 1

- Interior Locations of Extraction Points

- Vacuum Blower Locations

0 20 40
SCALE

D:\F-Folder\CDM\Lubricant Site Middletown NY\sub slab reading aerial view

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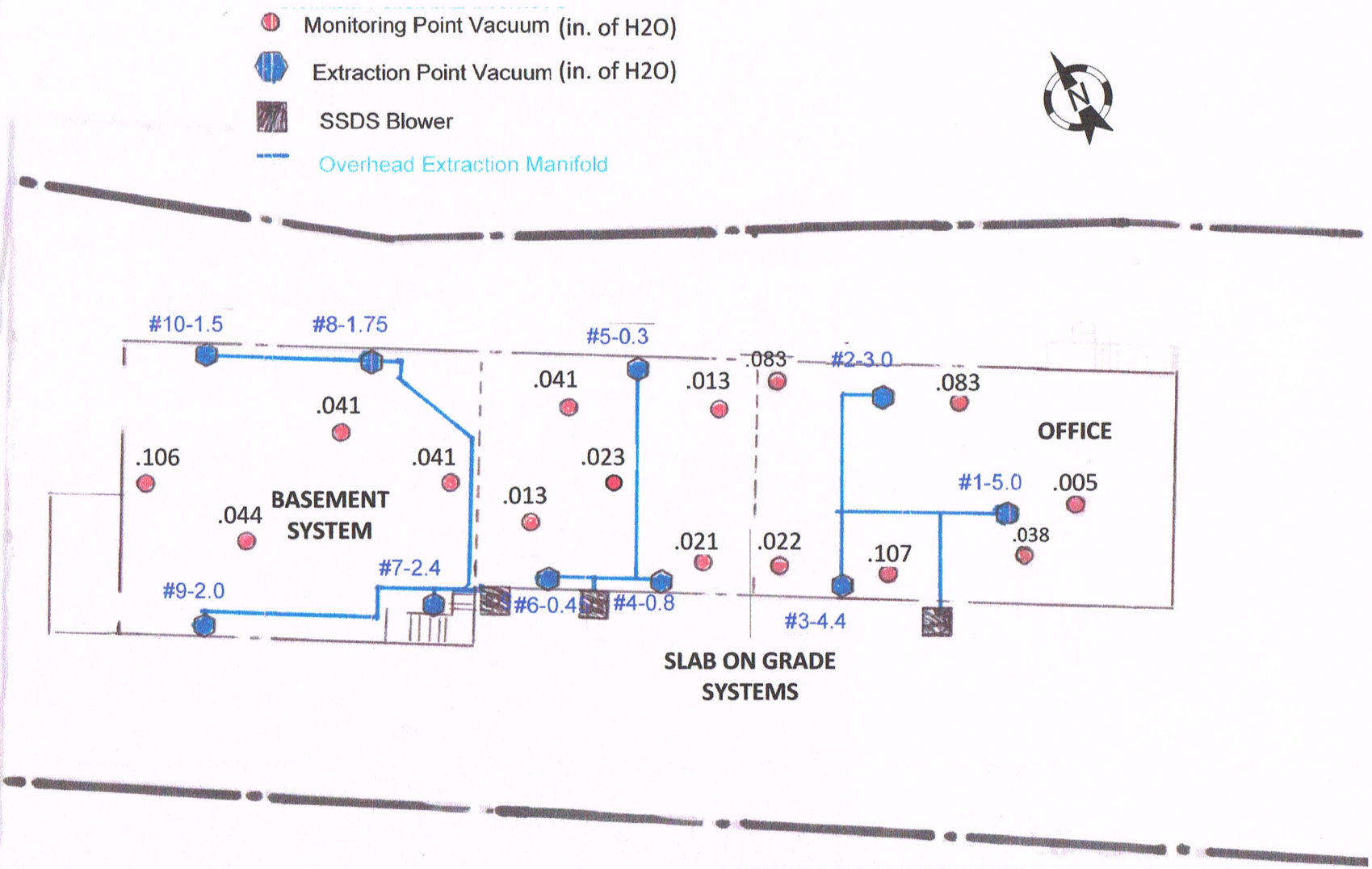
Middletown Sub-slab Vapor Mitigation System Expansion at Lubricant Packaging

Middletown, NY

DRAWN BY: S.B.	June 2019	Draft Locations

Figure 2



LUBRICATION PRODUCT
SSDS SYSTEM READINGS 5-09-2019

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INTEX Environmental Group, Inc 33 Appletree Lane Pipersville, PA 18947 215-766-7230 fax 215-766-9730 info@intexenv.com	Middletown Sub-slab Vapor Mitigation System Expansion at Lubricant Packaging Middletown, NY DRAWN BY: S.B. | June 2019 | System Readings

Figure 3

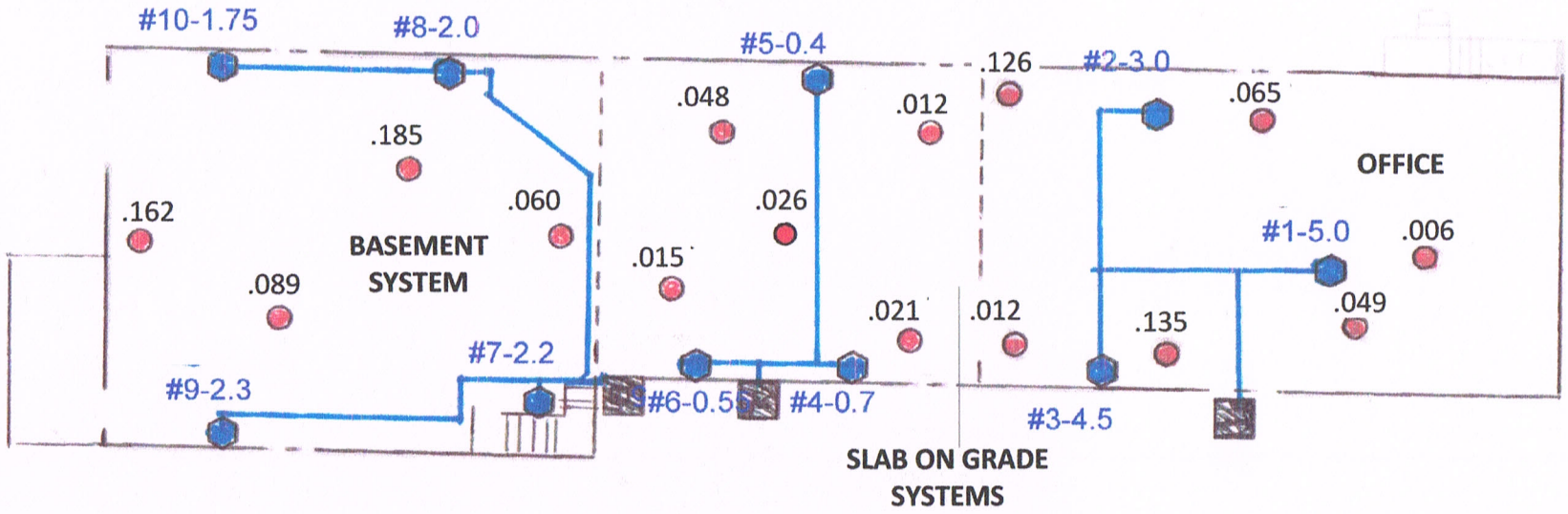
Monitoring Point Vacuum (in. of H2O)

Extraction Point Vacuum (in. of H2O)

SSDS Blower

Overhead Extraction Manifold

Lubrication Product
SSDS System Readings
5-30-2019



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Middletown Sub-slab Vapor Mitigation System Expansion at Lubricant Packaging

Middletown, NY

DRAWN BY: S.B.	June 2019	System Readings

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SUB-SLAB DEPRESSURIZATION SYSTEM OPERATION, MAINTENANCE, & MONITORING (OM&M) PLAN

Prepared for:
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Table of Contents

List of Appendices

1.0 Introduction

The major work activities as requested include the design and installation of a SSDS, post-installation testing to confirm the operational effectiveness (through pressure readings) and document that there was sufficient vacuum coverage to depressurize the affected area, and prepare a SSDS installation report. The SSDS was installed within the office/clean room and work area (approximately 4,400 square feet) which is slab on grade construction divided by interior walls into the two sections and a basement area (approximately 2400 square feet). The building is a one story structure that is approximately 7,000 total square feet in size. (See Figure 1) The installation of these systems was conducted in two phases with the basement installation being the last phase.

2.0 Design Considerations

The proposed SSDS was designed to be compliant with relevant guidance contained within the Final NYSDOH CEH BEEI Soil Vapor Intrusion Guidance October 2006 - 69, issued by the New York State Department of Health (NYSDOH) in consultation with the New York DOH. The basis of design is summarized as follows:

- The systems were designed to avoid the creation of other health, safety, or environmental hazards to building occupants (e.g., backdrafting of natural draft combustion appliances).

- The systems were designed to minimize soil vapor intrusion effectively while minimizing excess energy usage, to avoid compromising moisture and temperature controls and other comfort features, and to minimize noise.

- To avoid re-circulation of extracted subsurface vapors into the building, the vent pipe's exhaust was;
  - above the eave of the roof (preferably, above the highest eave of the building at least 12 inches above the surface of the roof),
  - at least 10 feet above ground level,
  - at least 10 feet away from any opening that is less than 2 feet below the exhaust point, and iv. 10 feet from any adjoining or adjacent buildings, or HVAC intakes or supply registers
  - rain caps, if used, were installed so as not to increase the potential for extracted subsurface vapors to enter the building.
  - To avoid accidental changes to the system that could disrupt its function, the depressurization system components were labeled clearly.

- An audible warning device/indicator (Radonaway Checkpoint IIa) were installed on the three systems to alert building occupants if the active system stops working properly. Examples of system failure warnings and indicators include the following: a liquid gauge (e.g., anemometer),

a sound alarm, a light indicator, and a dial (needle display) gauge. The warning device or indicator for each blower was placed where it can be easily heard

- to establish a negative pressure field extension beneath building that would effectively minimize the potential for VI of VOCs from sub-slab soils into indoor air. Installation of the SSDS was conducted in general accordance with the following guidance documents:

3.0 Former SSDS Removal and Installation

INTEX removed the existing SSDS system and sealed the floor and wall penetrations prior to the installation of the upgraded SSDS system.

The first section was in the office/clean room area and consisted of three vapor extraction points and a vacuum blower. The second portion of the system was installed in the work area consisting of three extraction points and a vacuum. This installation was completed during the period November – December 2017. On completion of the installation sub slab vapor measurements were taken in thee work area and the office/clean room area. Again, based on sub slab vacuum data, a decision was made to install a third sub slab depressurization system in the basement area consisting of four vapor extraction points and a vacuum blower. This installation was completed and the last rounds of sub slab pressure/vacuum readings were taken on May 9, 2019 and May 30, 2019. (See Figure 2 & 3)

4.0 SSDS Confirmation Testing

Drawing 1 provides the layout and as-built diagram of the SSDS, including the suction, vacuum monitoring, and compliance points utilized during SSDS installation and start-up.

INTEX determined the effectiveness of the system by creating a negative pressure beneath the office and work areas. On completion of the installation of the third and final system, INTEX confirmed that a negative pressure exists throughout the sub slab by obtaining site-specific pressure measurements at the pressure monitoring points and on the piping manifold(s).

The generally accepted target range for depressurization is 4 to 10 pascals or 0.0161 to 0.04 inches of water column (in.wc) (U.S. EPA 2008) with a nominal continuous operating range of depressurization from 0.025 to 0.035 in.wc for standard permeability sub-slab material. However, differential pressures as low as 0.001 in.wc are sufficient to effectively depressurize a sub-slab (U.S. EPA 1993). If the digital manometer shows a vacuum reading of negative 0.004 in.wc below the slab, then that indicates that the active system is successfully depressurizing the sub-slab area across the footprint of the building.

5.0 SSDS System

a. Blower: INTEX installed three Radonaway High Suction Series Fans Model HS2000. One blower in conjunction with four extraction points was installed to develop the required negative pressure gradient below the basement section of the building and the second and third blowers each in conjunction with three extraction points each area were sufficient to develop the required negative pressure gradient below the office/clean room and the work area.

The manufacturer product performance and efficiency are:

Model	Part #	Watts	Max "WC	CFM at 0" WC	CFM at 10"WC	CFM at 15" WC
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b. Energy Usage: The approximate annual energy cost are $183.96 based on a $0.10 per kwh utility rate for each blower

c. Summary of the installation activities:

1. Blower Installation

The blowers were mounted externally on the sidewall of the masonry building. The blower unit is supported by galvanized angle brackets attached to the wall with toggle anchors. The discharge stack is terminated roughly two feet above the existing eave and greater than ten feet above the ground level. All blowers are installed in a similar manner on the exterior wall of the work area.

The blowers are powered from a dedicated breaker installed and labeled as such in the existing electrical distribution panel. A new 3/8 BX 12/3 AWG armored cable was installed from the sub panel breaker distribution box, through the attic to junction boxes located next to each of the wall penetrations by owner's licensed electrician

who was contracted. A dedicated electrical outlet was mounted on the junction box to provide power for the audible alarm device. The electrical conductors from the junction box to the blower were installed flexible nonmetallic conduit.

2. Extraction Points Installation

Three extraction points, each, were installed in the office clean area and the work area. Four extraction points were installed in the basement area based on the confirmation testing in the office and work area. At each extraction point, the floor was penetrated with a 4-inch diamond core barrel using a hand held core drill. Roughly one gallon of water was used per penetration for dust suppression. The material directly below the floor was hand excavated to create an extraction pit.

Extraction points were constructed by drilling or cutting holes through the building slab, making sure that any vapor barriers are breached and the sub-slab materials are encountered. Wherever practicable, extraction points and piping were placed in the most unobtrusive locations. A 10 to 12-inch diameter pit was excavated at the extraction point(s), to a depth of about 18 inches. Crushed stone was then as backfilled to stabilize the pit. the extraction hole was then patched around the piping using hydraulic cemet grout, to insure a good seal.

As a final note, care was taken to ensure that extraction points/pits intercepted the thin void zone that typically exists directly beneath poured slabs. Specifically, differential settlement over time typically creates a series of interconnected void spaces beneath concrete slabs. While the extent and significance of these voids in transmitting soil gases is highly site-dependent, it makes sense to use every advantage possible.

3. Extraction Manifold Installation

The overhead extraction manifolds consist of 3-inch diameter schedule 40 PVC pipe supported at a minimum of every six feet by a swivel hanger mounted on a 3/8 all thread rod hung from the ceiling. The piping from the blower was sloped back towards the extraction points so that no condensation will accumulate in the piping or impact the blower.

Extraction Riser Installation

The extraction risers consist of 2-inch diameter schedule 40 PVC pipe. A two-inch PVC gate valve was installed, just below the 3" x 2" reducer tee used in the extraction manifold for the transition, so that the flow from each extraction point may be balanced during the initial confirmation testing. To avoid accidental changes to the system that could disrupt its function, the risers were labeled clearly. Each extraction point and associated riser were

equipped with a pressure (u-tube manometer) gauge which will continuously monitor the pressure of the vapor mitigation system and indicate that a negative pressure exists between the sub-slab and indoor air.

4. Blowers and Exhaust Stacks

Each exhaust blower was mounted externally, approximately 10 to 13 feet above adjacent ground level. The PVC piping manifold penetration points through the exterior wall of the building were sealed on the inside of the building. Exhaust stacks are connected to each blower near roof level and are constructed of 2-inch diameter PVC piping that extends approximately 2 feet above the roof line. Details regarding the RadonAway fans are provided in Appendix D.

5. Warning Device

A warning device/indicator was installed to alert building occupants if the active system stops working properly. INTEX used three Radonaway Checkpoint IIa alarms, one for each blower. These units produce both an audible and visual alarm indicator.

6. Vacuum Monitoring Points

During the installation of the SSDS, 12 additional vacuum monitoring points were installed, in addition to the three existing ones, to evaluate the vacuum under the sub-slab.

7. Electrical System Operation

The electrical system is interconnected to building sub electrical distribution panel such that if the building loses power, the SSDS also will lose power and will not require the owner/operator to re-activate once power is restored.

In the event that maintenance or inspection checks require the shutdown of the system, the sub-panel electrical system for the SSDS has a primary disconnect switch to disconnect all of the electrical power supply to the SSDS sub-panel. Each inline blower exhaust fan is electrically connected to an individually secured single circuit breakerswitch. To deactivate a blower exhaust fan, the circuit breaker box is opened and the switch is turned to off, which disconnects the power to the blower fan.

6.0 SSDS Operation, Maintenance, and Monitoring

Routine inspections of the SSDS to be completed by owner's maintenance staff should include:

i. Inspect the blower, including checks for unusual noise or vibration
ii. Collect vacuum measurements from the blower to ensure the system is operating in the design range
iii. Visually inspect the system piping and components for damage
iv. Inspect the floor and wall seals, and seals around system piping penetrations, including checks for any additional areas requiring sealing
v. Document any structural issues, upgrades, or changes to the building
vi. Document the weather conditions on the day of the SSDS inspection
vii. Document the indoor air temperature and heating, ventilation, and air conditioning system (HVAC) settings at the time the system is inspected
viii. Interview the owner or other appropriate personnel at the regarding any system operational issues
ix. Confirm that a copy of O&M Manual is in the building and update as necessary
x. Once annually, routine system monitoring should include collection of the following to ensure the readings fall within the design parameters:
xi. Vacuum measurements from the all monitoring points
xii. Vacuum measurements from all sub-slab extraction points
xiii. Vacuum measurements from the three fans

Prior to completing any significant modifications to the building structure or HVAC, it is important that a representative of owner consult a qualified contractor regarding the potential need to modify or upgrade the SSDS. Significant modifications might include but are not limited to building additions, reconfiguration of the building's interior, and reconfiguration or replacement of the HVAC system. In the event the SSDS is not operating properly, the owners should either notify the Respondents or CRA. Contact information is provided in Section 7.

7.0 Troubleshooting

By design, other than the fans and electrical system, the SSDS has relatively few components that could fail and affect operation. The system fans are designed by the manufacturer for a long operational lifespan. At the end of this lifespan, the fan should be replaced, as necessary, with an equivalent or better performance unit. Warranty information for the system fans is provided in Appendix D. In the event of failure of the SSDS electrical components (breakers, switches, etc.), the component should be repaired or replaced by a licensed electrical contractor. Where necessary, the subcontractor that installed the system could be contacted to discuss the problem. In the event the subcontractor is not able to assist in fixing the problem, a licensed subcontractor should be contacted to correct the problem and return the SSDS to normal operation

An audible and visual alarm (Radonaway Checkpoint IIa) is mounted on the extraction overhead manifold just prior to the exterior wall penatrations leading to each blower. The Green LED light indicates vacuum pressure in the manifold is within normal operation range (System Operating). The Red LED light and audible alarm indicate a loss of vacuum pressure or over pressure (System Malfunction). If the red light appears and the audible alarm sound , unplug the power to the alarm unit and contact Intex for advice on trouble shooting the system.

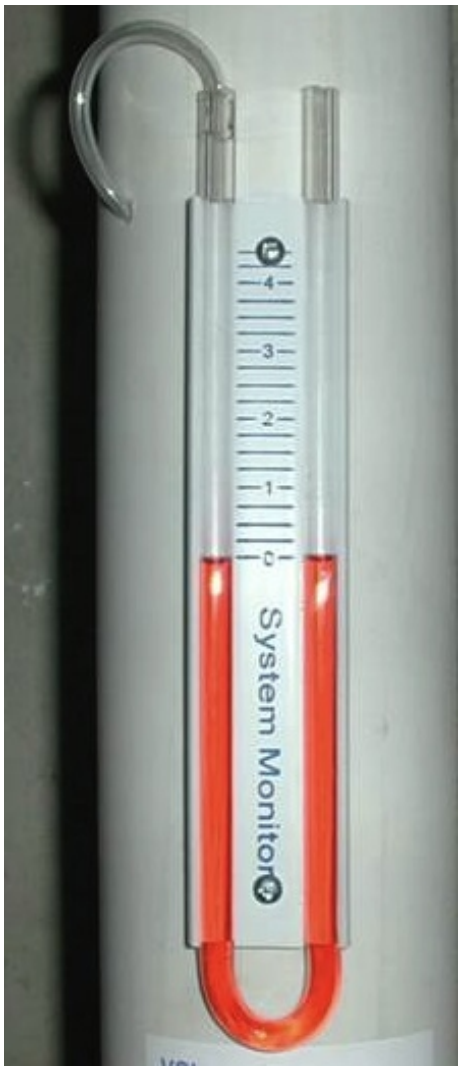
Green and no alarm sound - "Good" System Operating,

Red and alarms sounds- "Bad" System Malfunction

Blue U-tube Manometers are mounted on each extraction point riser. A "zero" reading should not be seen, that means the system has no pressure, and the system is down or damaged

This is what you want to see

This means your system is down



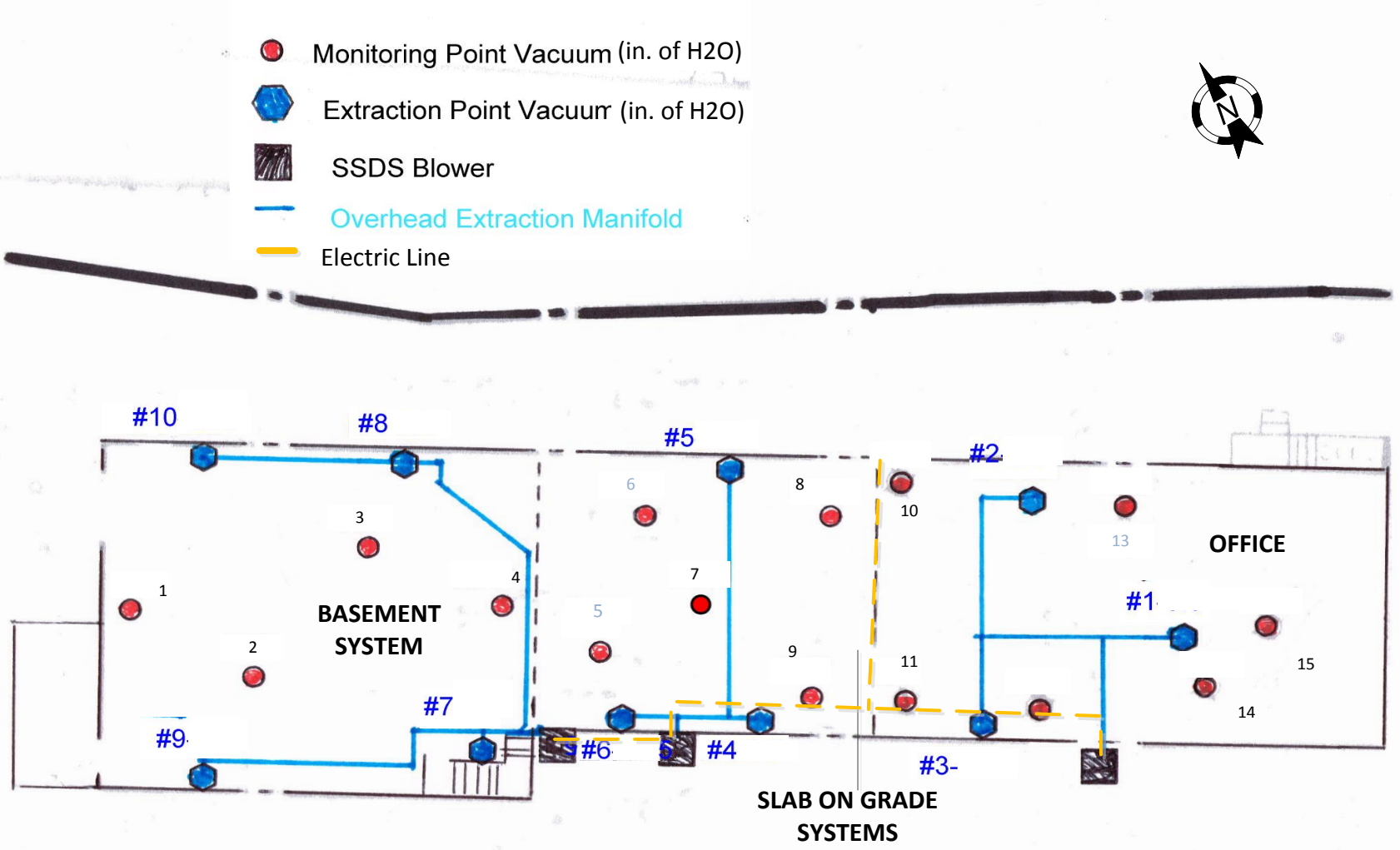
8.0 Contact Information

SSDS Installation Contractor Environmental;

Daniel Fitzgerald: dfitzgerald@intexenv.com
Todd Daniel: tdaniel@intexenv.com

INTEX Environmental Group
33 Appletree Lane
Pipersville, PA 18947
Phone: (215)766-7230

AS-BUILT DRAWING



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Middletown Sub-slab Vapor Mitigation System Expansion at Lubricant Packaging As-Built

Middletown, NY

DRAWN BY: S.B.	June 2019	**Figure 1A**

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FIGURES

Figure 1

- Interior Locations of Extraction Points

- Vacuum Blower Locations

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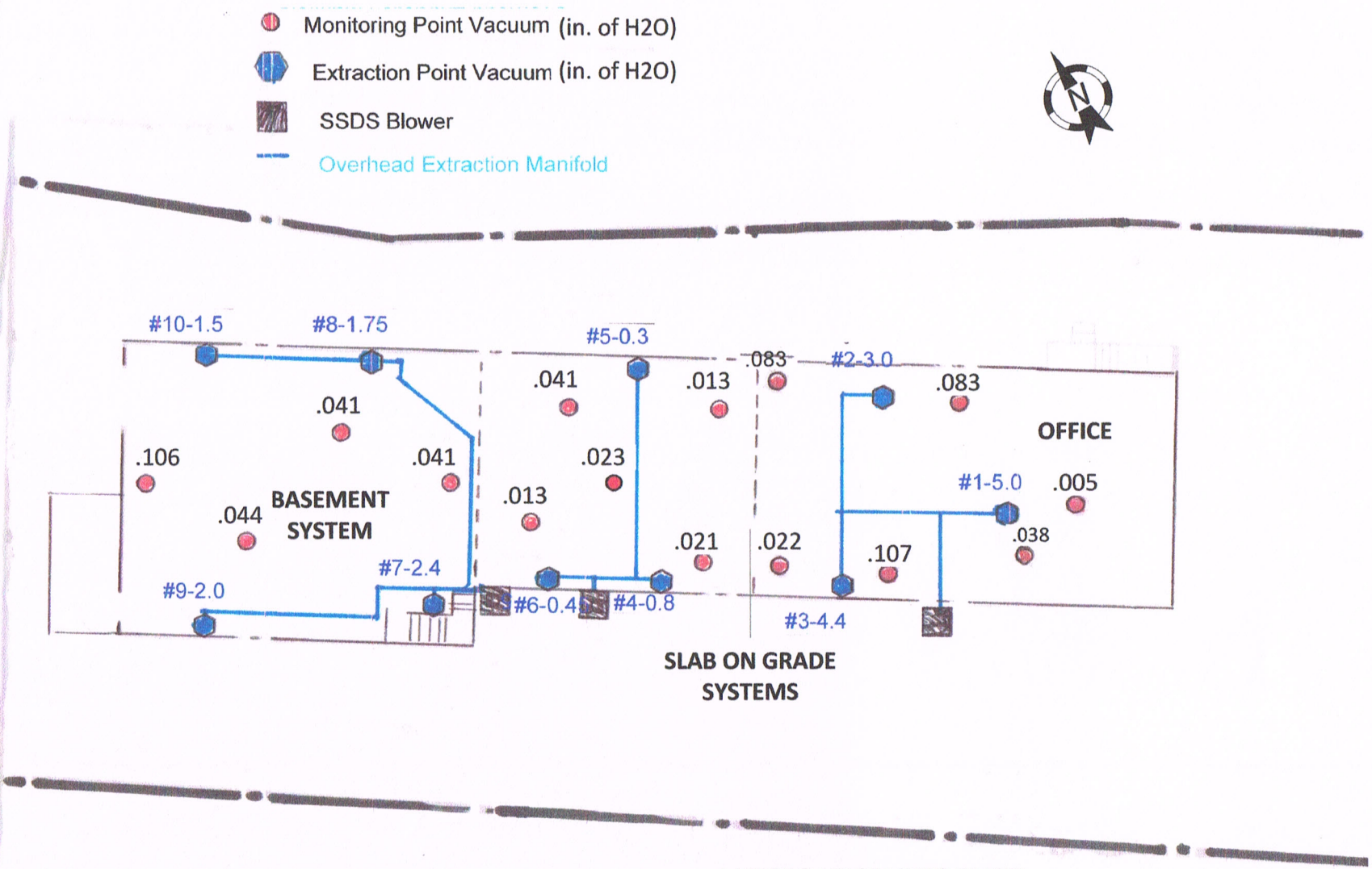
Middletown Sub-slab Vapor Mitigation System Expansion at Lubricant Packaging

Middletown, NY

DRAWN BY: S.B.	June 2019	Draft Locations

Figure 2



LUBRICATION PRODUCT
SSDS SYSTEM READINGS 5-09-2019

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INTEX Environmental Group, Inc 33 Appletree Lane Pipersville, PA 18947 215-766-7230 fax 215-766-9730 info@intexenv.com	Middletown Sub-slab Vapor Mitigation System Expansion at Lubricant Packaging Middletown, NY DRAWN BY: S.B. | June 2019 | System Readings

Figure 3

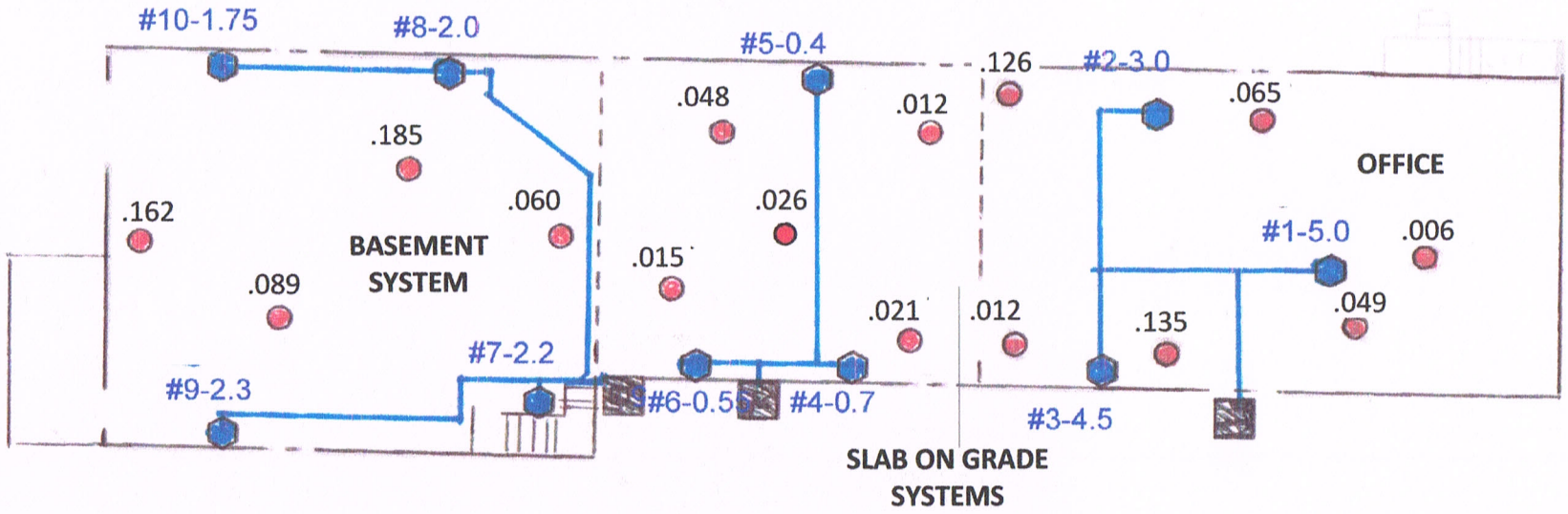
Monitoring Point Vacuum (in. of H2O)

Extraction Point Vacuum (in. of H2O)

SSDS Blower

Overhead Extraction Manifold

Lubrication Product
SSDS System Readings
5-30-2019



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Middletown Sub-slab Vapor Mitigation System Expansion at Lubricant Packaging

Middletown, NY

DRAWN BY: S.B.	June 2019	System Readings

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APPENDIX A

SITE PHOTOGRAPHS

INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Basement - Leg #7** Lubricant Packaging Middletown NY DRAWN: SB — OCTOBER 2019

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INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Basement - Leg #8**	
	Lubricant Packaging Middletown NY	
	DRAWN: SB	OCTOBER 2019

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INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Basement - Leg #9** Lubricant Packaging Middletown NY DRAWN: SB — OCTOBER 2019

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INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Basement - Leg #10**	
	Lubricant Packaging Middletown NY	
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Basement - Manifold #1

Lubricant Packaging
Middletown NY

DRAWN:
SB

OCTOBER 2019

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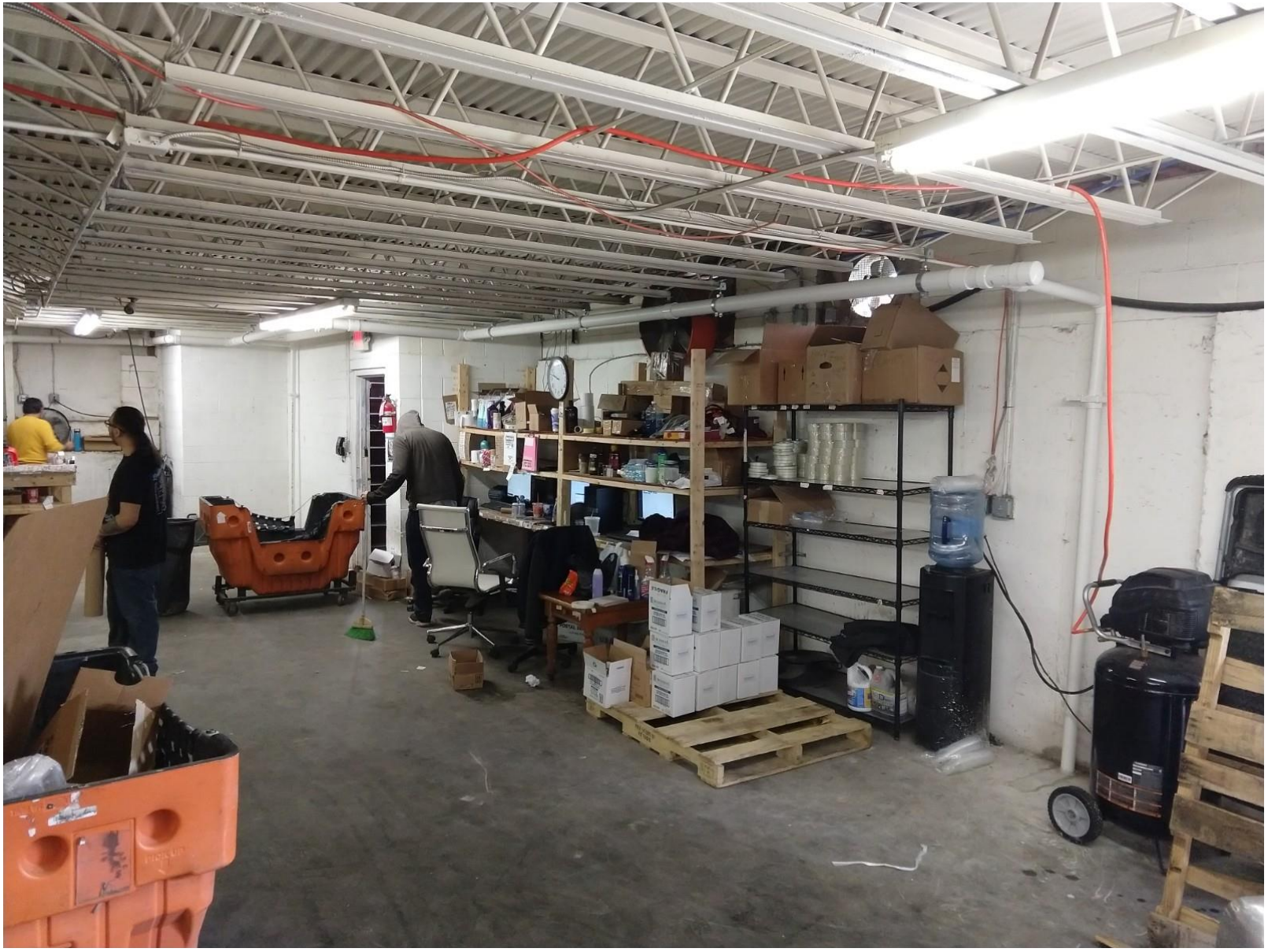

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Environmental Group, Inc
33 Appletree Ln
Pipersville, PA 18947

215-766-7230
fax 215-766-9730
info@intexenv.com

Basement - Manifold #2

Lubricant Packaging
Middletown NY

DRAWN:
SB

OCTOBER 2019

INTEX
Environmental Group, Inc
33 Appletree Ln
Pipersville, PA 18947

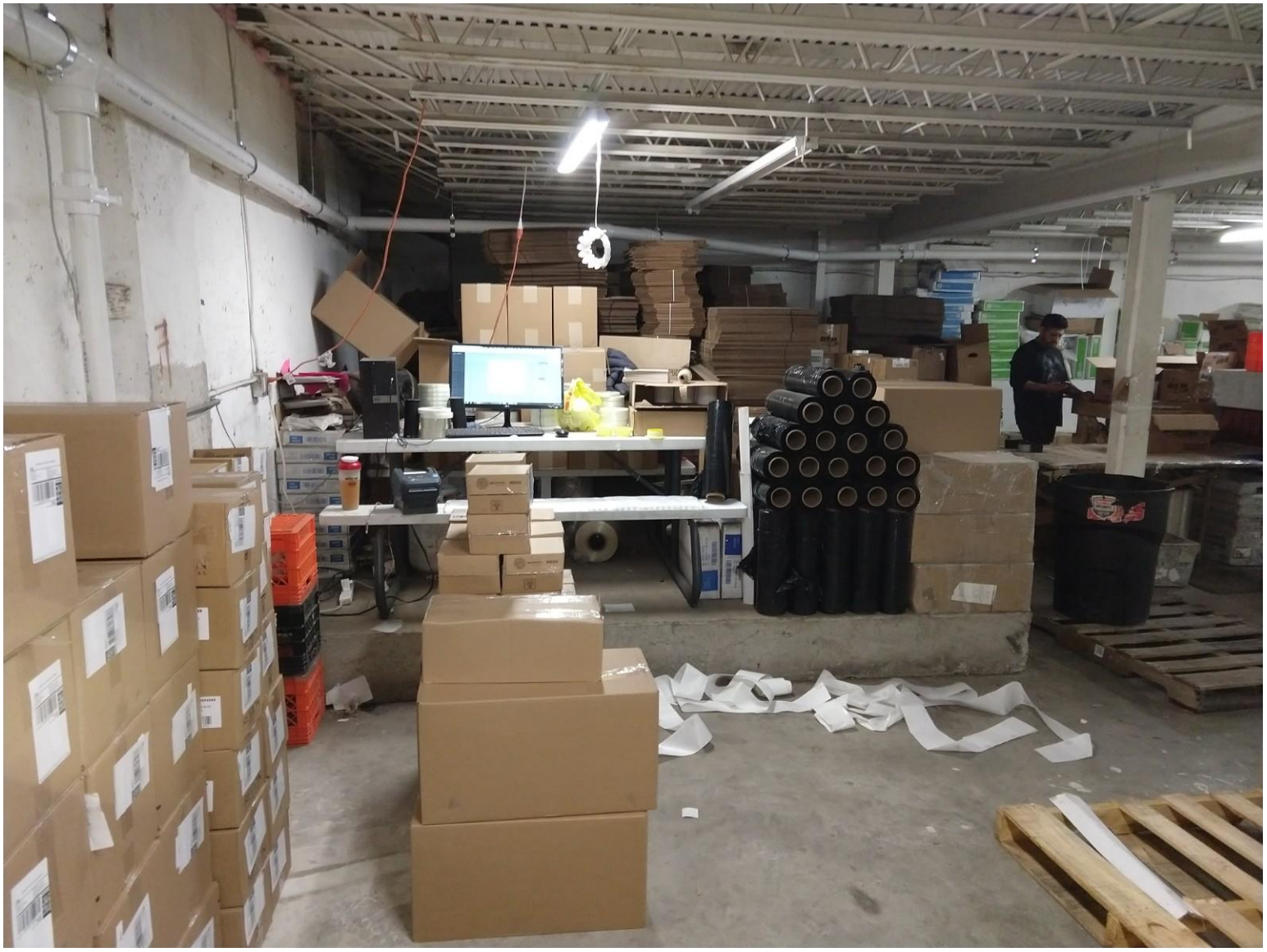
215-766-7230
fax 215-766-9730
info@intexenv.com

Basement - Manifold #3

Lubricant Packaging
Middletown NY

DRAWN:
SB

OCTOBER 2019



INTEX
Environmental Group, Inc
33 Appletree Ln
Pipersville, PA 18947

215-766-7230
fax 215-766-9730
info@intexenv.com

Basement - Manifold #4

Lubricant Packaging
Middletown NY

DRAWN:
SB

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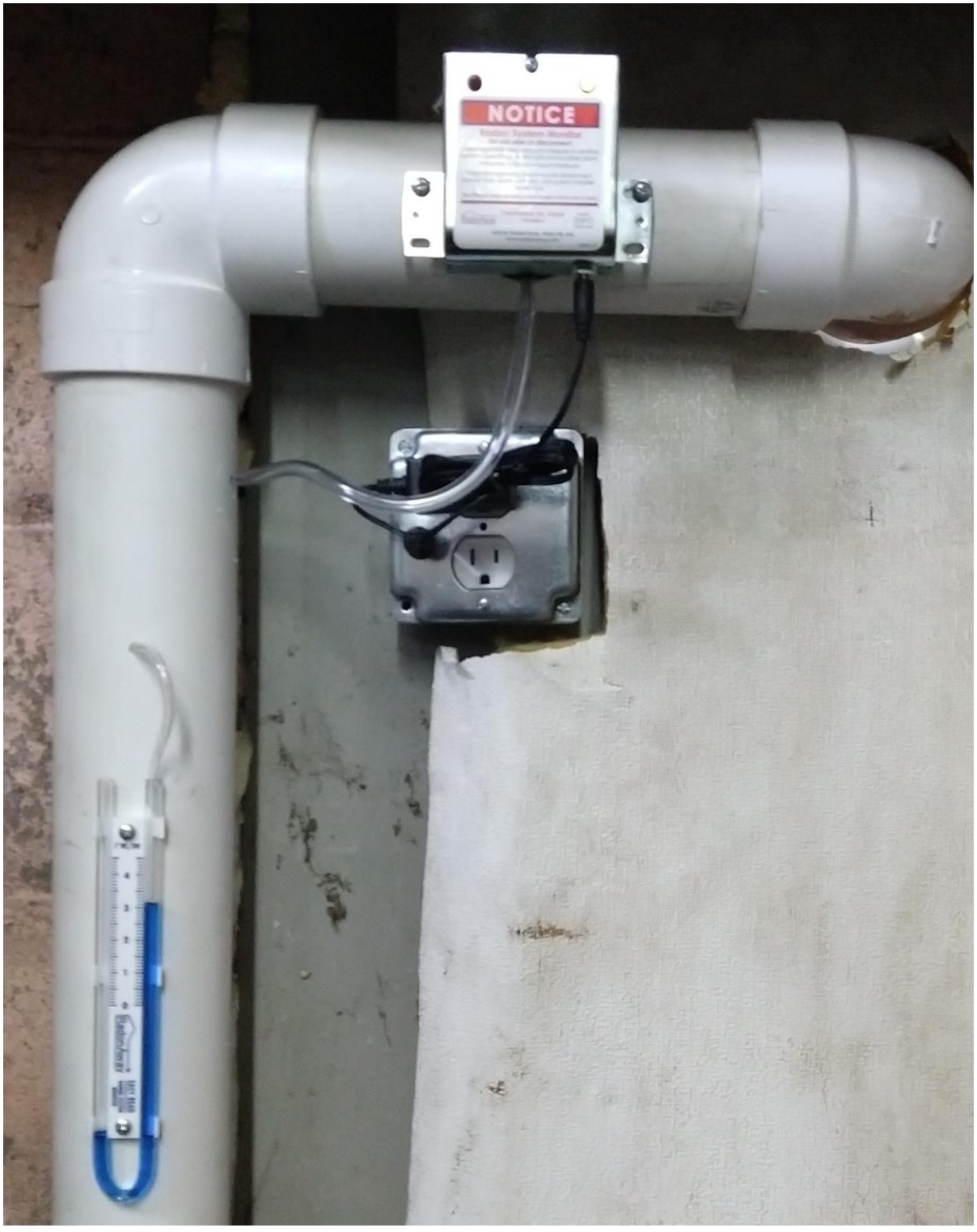

INTEX
Environmental Group, Inc
33 Appletree Ln
Pipersville, PA 18947

215-766-7230
fax 215-766-9730
info@intexenv.com

Basement - Checkpoint Alarm

Lubricant Packaging
Middletown NY

DRAWN:
SB

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INTEX
Environmental Group, Inc
33 Appletree Ln
Pipersville, PA 18947

215-766-7230
fax 215-766-9730
info@intexenv.com

Basement/Middle - Blower

Lubricant Packaging
Middletown NY

DRAWN:
SB

OCTOBER 2019

INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Middle - Leg #4** Lubricant Packaging Middletown NY DRAWN: SB — OCTOBER 2019

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INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Middle - Leg #5**	
	Lubricant Packaging Middletown NY	
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INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Middle - Leg #6** Lubricant Packaging Middletown NY DRAWN: SB — OCTOBER 2019

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INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Middle – Manifold 1**	
	Lubricant Packaging Middletown NY	
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INTEX
Environmental Group, Inc
33 Appletree Ln
Pipersville, PA 18947

215-766-7230
fax 215-766-9730
info@intexenv.com

Middle – Manifold 2

Lubricant Packaging
Middletown NY

DRAWN:
SB

OCTOBER 2019

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INTEX
Environmental Group, Inc
33 Appletree Ln
Pipersville, PA 18947

215-766-7230
fax 215-766-9730
info@intexenv.com

Office - Leg #1

Lubricant Packaging
Middletown NY

DRAWN:
SB

OCTOBER 2019

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	Lubricant Packaging Middletown NY	
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INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Office - Leg #3**	
	Lubricant Packaging Middletown NY	
	DRAWN: SB	OCTOBER 2019

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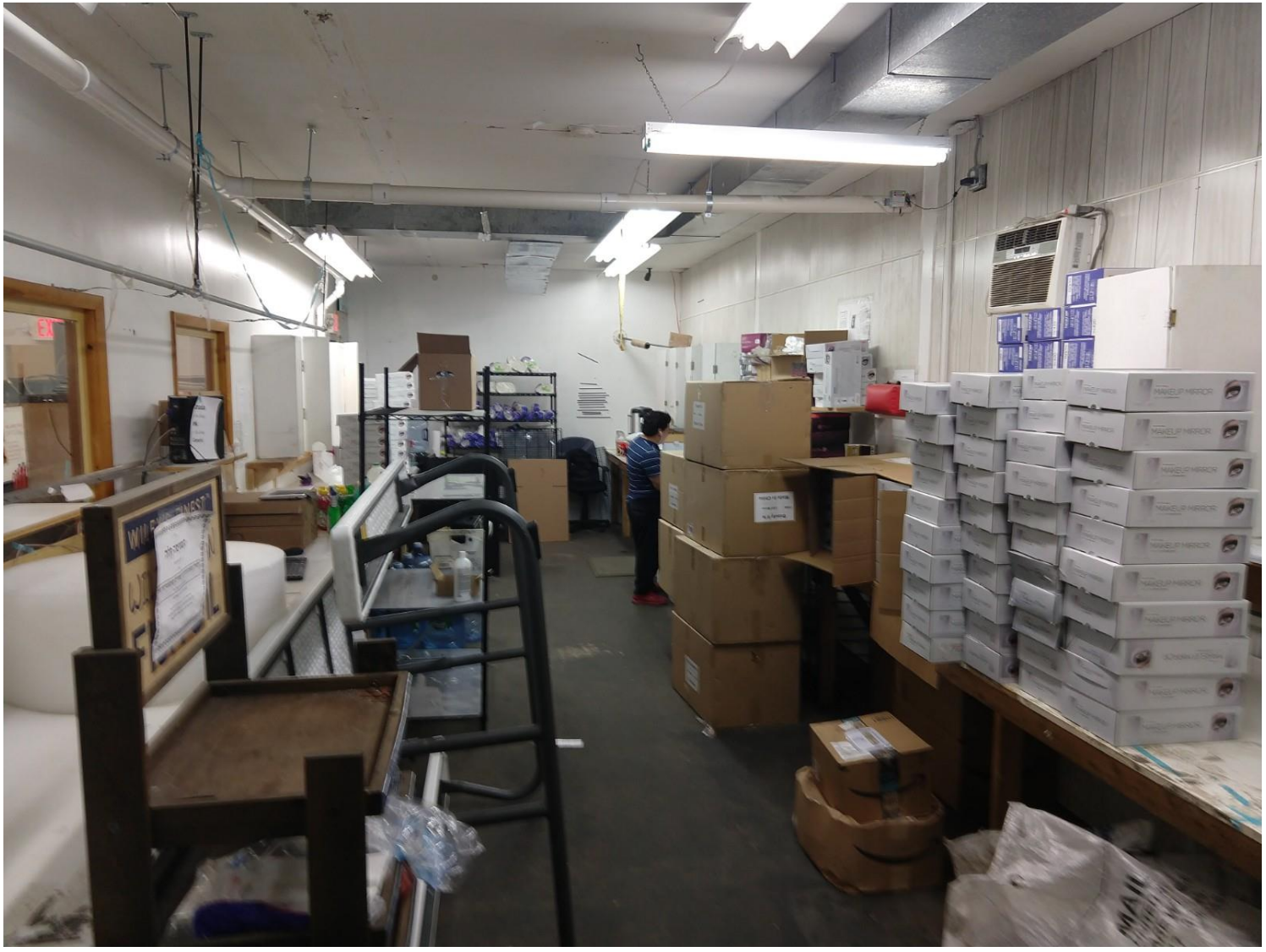

INTEX **Environmental Group, Inc** **33 Appletree Ln** **Pipersville, PA 18947** **215-766-7230** **fax 215-766-9730** **info@intexenv.com**	**Office – Manifold**	
	Lubricant Packaging Middletown NY	
	DRAWN: SB	OCTOBER 2019

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APPENDIX B

EQUIPMENT MANUALS

RadonAway®

The world's leading radon fan manufacturer

HS Series Installation & Operating 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!** Do not use fan in hazardous environments where fan electrical system could provide ignition to combustible or flammable materials.

2. **WARNING!** Check voltage at the fan to ensure it corresponds with nameplate. See Vapor Intrusion Application Note #AN001 for important information on VI Applications. RadonAway.com/vapor-intrusion

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. All wiring must be performed in accordance with the National Fire Protection Association's (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.

6. **WARNING!** In the event that the fan is immersed in water, return unit to factory for service before operating.

7. **WARNING!** Do not twist or torque fan inlet or outlet piping as leakage may result.

8. **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.

9. **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.

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The HS Series Fan is intended for use by trained, certified/licensed, professional radon mitigators. The purpose of this instruction is to provide additional guidance for the most effective use of the HS Series Fan. This instruction should be considered as a supplement to EPA/Radon Industry standard practices, state and local building codes and state regulations. In the event of a conflict, those codes, practices and regulations take precedence over this instruction.

1.2 ENVIRONMENTALS

The HS Series Fan is 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 HS Series Fan should be stored in an area where the temperature is always greater than 32°F or less than 100°F. The HS Series Fan is thermally protected such that it will shut off when the internal temperature is above 194°F +/- 9°F (90°C +/- 5°C). If the HS Series Fan is idle in an area where the ambient temperature exceeds this shut off, it will not restart until the internal temperature falls below 104°F.

1.3 ACOUSTICS

The HS Series Fan, when installed properly, operates with little or no noticeable noise to the building occupants. Recommended system design and installation considerations to minimize noise: When installing the HS Series Fan above sleeping areas, select a location for mounting at the farthest possible distance. Avoid mounting near doors, fold-down stairs or other uninsulated structures which may transmit sound. Ensure a solid mounting for the HS Series Fan to avoid structure-borne vibration or noise.

The velocity of the outgoing air must also be considered in the overall system design. With small diameter piping, the “rushing” sound of the outlet air can be disturbing. The system design should incorporate a means to slow and quiet the outlet air. The use of the RadonAway Exhaust Muffler, p/n 24002, is strongly recommended.

1.4 GROUND WATER

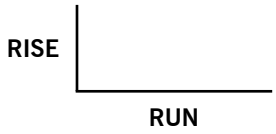
Under no circumstances should water be allowed to be drawn into the inlet of the HS Series Fan as this may result in damage to the unit. The HS Series Fan should be mounted at least 5 feet above the slab penetration to minimize the risk of filling the HS Series Fan with water in installations with occasional high water tables.

In the event that a temporary high water table results in water at or above slab level, water will be drawn into the riser pipes thus blocking air flow to the HS Series Fan. The lack of cooling air will result in the HS Series Fan cycling on and off as the internal temperature rises above the thermal cutoff and falls upon shutoff. Should this condition arise, power down and disconnect the HS Series Fan until the water recedes allowing for return to normal operation; then reconnect and power on to turn the fan back on.

1.5 CONDENSATION & DRAINAGE

WARNING!: Failure to provide adequate drainage for condensation can result in system failure and damage the HS Series Fan.
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 use of small diameter piping in a system increases the speed at which the air moves. The speed of the air can pull water uphill and, at sufficient velocity, it can actually move water vertically up the side walls of the pipe. This has the potential of creating a problem in the negative pressure (inlet) side piping. For HS Series Fan inlet piping, the following table provides the minimum recommended pipe diameters as well as minimum pitch under several system conditions. Use this chart to size piping for a system.



Pipe Diameter	Minimum Rise per 1 Foot of Run*		
	@ 25 CFM	@ 50 CFM	@ 100 CFM
4”	1/32”	3/32”	3/8”
3”	1/8”	3/8”	1 1/2”

*Typical operational flow rates:

HS2000 12 - 63 CFM
HS3000 19 - 39 CFM
HS5000 16 - 44 CFM

All exhaust piping should be 2” PVC.

1.6 SYSTEM MONITOR & LABEL

A properly designed system should incorporate a “System On” indicator for affirmation of system operation. A Magnehelic pressure gauge is recommended for this purpose. The indicator should be mounted at least 5 feet above the slab penetration to minimize the risk of filling the gauge with water in installations with occasional high water tables. A System Label (P/N 15022) with instructions for contacting the installing contractor for service and also identifying the necessity for regular radon tests to be conducted by the building occupants, must be conspicuously placed where the occupants frequent and can see the label.

1.7 SLAB COVERAGE

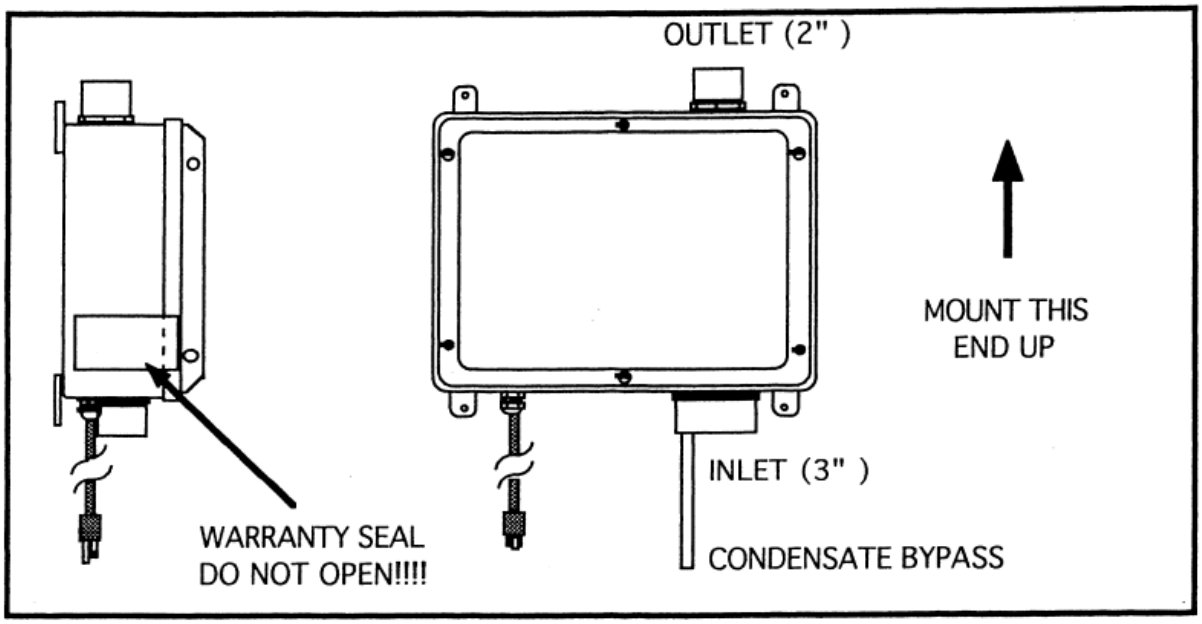
The HS Series Fan can provide coverage of well over 1000 sq. ft. per slab penetration. This will, of course, depend on the sub-slab aggregate in any particular installation and the diagnostic results. In general, sand and gravel are much looser aggregates than dirt and clay. Additional suction points can be added as required. It is recommended that a small pit (5 to 10 gallons in size; larger as needed) be created below the slab at each suction hole. When fine sand or dirt is present it is recommended that the pit be lined with a material such as clean gravel, size 4, 5, 56, or 6 as classified (ASTM C33).

1.8 ELECTRICAL WIRING

For models with a cord, the HS Series Fan plugs into a standard 120V outlet. The switch box models are hardwired. All wiring must be performed in accordance with the National Fire Protection Association’s (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 caulked to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.9 SPEED CONTROLS

Electronic speed controls can **NOT** be used on HS Series units.



2.0 INSTALLATION

2.1 MOUNTING

Mount the HS Series Fan to the wall studs, or similar structure, in the selected location with (4) 1/4" x 1 1/2" lag screws (not provided). Ensure the HS Series Fan is both plumb and level.

2.2 DUCTING CONNECTIONS

Make final ducting connection to HS Series Fan with flexible couplings. Ensure all connections are tight. Do not twist or torque inlet and outlet piping on HS Series Fan or leaks may result.

NOTE: Do NOT solvent weld fittings to unit hubs.

2.3 VENT MUFFLER INSTALLATION

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

2.4 OPERATION CHECKS & ANNUAL SYSTEM MAINTENANCE

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

_____ **Ensure** the HS Series Fan and all ducting is secure and vibration-free.

_____ **Verify** system vacuum pressure with Magnehelic. **Ensure** vacuum pressure is within normal operating range and **less than** the maximum recommended as shown below:

HS2000 14" WC
HS3000 21" WC
HS5000 35" WC

(Above are based on sea-level operation, at higher altitudes reduce above by about 4% per 1000 Feet.)
If these are exceeded, increase number of suction points.

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

Addendum

Product Specifications

Model	Maximum Static Suction	Recommended Maximum Static Suction	Typical CFM vs Static Suction WC (Recommended Operating Range)						Power* Watts @ 115VAC
			0"	10"	15"	20"	25"	35"	
HS2000	16"	14"	62	40	23	-	-	-	153-314
HS3000	24"	21"	39	30	25	19	-	-	120-250
HS5000	41"	35"	43	35	32	28	24	18	349-381
HS2000E	16"	14"	62	40	23	-	-	-	153-314
HS3000E	24"	21"	39	30	25	19	-	-	120-250
HS5000E	41"	35"	43	35	32	28	24	18	349-381

**Power consumption varies with actual load conditions*

Inlet: 3.0" PVC

Outlet: 2.0" PVC

Mounting: Brackets for vertical mount

Weight: Approximately 18 lbs

Size: Approximately 15"W x 13"H x 8"D

Minimum recommended inlet ducting (greater diameter may always be used):

HS3000, HS5000 --- 2.0" PVC Pipe

HS2000 --- Main feeder line of 3.0" or greater PVC Pipe

Branch lines (if 3 or more) may be 2.0" PVC Pipe

Outlet ducting: 2.0" PVC

Storage Temperature Range: 32°F-100°F

Thermal Cutout: 194°F +/- 9°F (90°C +/- 5°C)

Locked rotor protection

Internal condensate bypass

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the RadonAway® HS 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.

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

Install the HS Series Fan in accordance with all EPA standard practices, and state and local building codes and state 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 HS Series Fan (the "Fan") will be free from defects in materials and workmanship for a period of 90 days from the date of purchase (the "Warranty Term").

RadonAway® will repair or replace any Fan which fails due to defects in materials or workmanship during the Warranty Term. 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.

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®.

1 YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION

RadonAway® will extend the Warranty Term of the fan to twelve (12) months from date of installation or fifteen (15) months from the date of manufacture, whichever is sooner, if the Fan is installed in a professionally designed and professionally installed active soil depressurization system or installed as a replacement fan in a professionally designed and professionally installed active soil depressurization system. Proof of purchase and/or proof of professional installation may be required for service under this warranty. RadonAway® is not responsible for installation, removal or delivery costs associated with this Warranty.

EXCEPT AS STATED ABOVE, THE HS SERIES FAN IS 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 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 No. _____

Purchase Date: _____

INSTALLATION & OPERATING INSTRUCTIONS
Instruction P/N IN015 Rev E
FOR *CHECKPOINT IIa*™ P/N 28001-2 & 28001-3
RADON SYSTEM ALARM

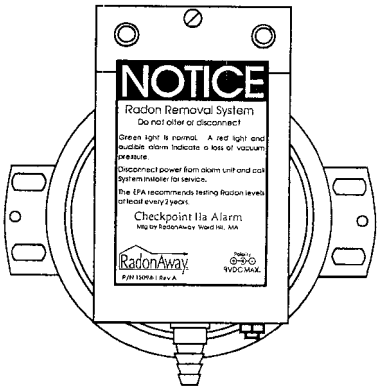
INSTALLATION INSTRUCTIONS
(WALL MOUNTING)

Select a suitable wall location near a vertical section of the suction pipe. The unit should be mounted about four or five feet above the floor and as close to the suction pipe as possible. Keep in mind that with the plug-in transformer provided, the unit must also be within six feet of a 120V receptacle. **NOTE: The Checkpoint IIa is calibrated for vertical mounting, horizontal mounting will affect switchpoint calibration.**

Drill two ¼" holes 4" apart horizontally where the unit is to be mounted.

Install the two ¼" wall anchors provided.

Hang the CHECKPOINT IIa from the two mouting holes located on the mounting bracket. Tighten the mounting screws so the unit fits snugly and securely against the wall.



Drill a 5/16" hole into the side of the vent pipe about 6" higher than the top of the unit.

Insert the vinyl tubing provided about 1" inside the suction pipe.

Cut a suitable length of vinyl tubing and attach it to the pressure switch connector on the CHECKPOINT IIa.

CALIBRATION AND OPERATION.

The CHECKPOINT IIa units are calibrated and sealed at the factory to alarm when the vacuum pressure falls below the factory setting and should not normally require field calibration. Factory Settings are:
28001-2 -.25" WC Vacuum
28001-3 -.10" WC Vacuum

To Verify Operation:

With the exhaust fan off or the pressure tubing disconnected and the CHECKPOINT IIa plugged in, both the red indicator light and the audible alarm should be on.

Turn the fan system on or connect the pressure tubing to the fan piping. The red light and the audible alarm should go off. The green light should come on.

Now turn the fan off. The red light and audible alarm should come on in about two or three seconds and the green light should go out.

WARRANTY INFORMATION

Subject to applicable consumer protection legislation, RadonAway warrants that the CHECKPOINT IIa will be free from defective material and workmanship for a period of (1) year from the date of purchase. Warranty is contingent on installation in accordance with the instructions provided. This warranty does not apply where repairs or alterations have been made or attempted by others; or the unit has been abused or misused. Warranty does not include damage in shipment unless the damage is due to the negligence of RadonAway. All other warranties, expressed or written, are not valid. To make a claim under these limited warranties, you must return the defective item to RadonAway with a copy of the purchase receipt. RadonAway is not responsible for installation or removal cost associated with this warranty. In no case is RadonAway liable beyond the repair or replacement of the defective product FOB RadonAway.

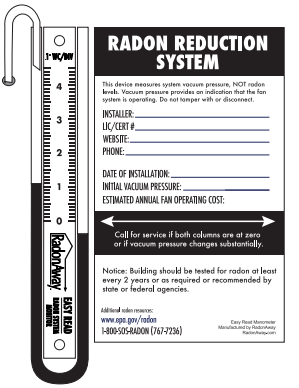
THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THERE IS NO WARRANTY OF MERCHANTIBILITY. ALL OTHER WARRANTIES, EXPRESSED OR WRITTEN, ARE NOT VALID.

For service under these warranties, 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 to and from factory.

Manufactured by:
RadonAway
Ward Hill, MA
(978)-521-3703

Easy Read Manometer Vacuum Gauge Installation Instructions

1. Select location on the vertical suction pipe where the vacuum gauge is to be mounted. Fix the gauge vertically to the pipe using the screws provided.
2. Remove end caps from both tube ends.
   Warning: Do not ingest gauge fluid.
   Caution: Gauge fluid will stain if spilled.
3. Allow fluid to settle in gauge for several minutes and then zero the gauge by sliding the tube until the tops of both columns align with the zero mark on the pressure scale.
4. Drill a 3/16" hole in piping 2 inches below the top of the gauge.
   Positioning the hole below the top of the gauge will prevent condensation from potentially collecting in the u-tube gauge.



5. Insert vinyl tubing into either opening in gauge tube and push firmly.
6. Install end of the tubing into drilled hole. Apply caulking for airtight connection.
7. Fill in label using an indelible marker.
8. Remove backing and position label next to vacuum gauge ensuring the arrow is lined up with the gauge zero.

WARRANTY

Subject to any applicable consumer protection legislation, RadonAway warrants that the Easy Read Vacuum Gauge (the "Gauge") will be free from defects in materials and workmanship for a period of five (5) years from the date of manufacture (the "Warranty Term"). Outside the Continental United States and Canada the Warranty Term is one (1) year from the date of manufacture.

RadonAway will replace any Gauge which fails due to defects in materials or workmanship. The Gauge must be returned (at owner's cost) to the RadonAway factory. Proof of purchase must be supplied upon request for service under this Warranty.

This Warranty is contingent on installation of the Gauge 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 include damage in shipment unless the damage is due to the negligence of RadonAway.

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

EXCEPT AS STATED ABOVE, THE GAUGE IS 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 GAUGE 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 cost to and from factory.

RadonAway
3 Saber Way
Ward Hill, MA 01835
TEL. (978) 521-3703
FAX (978) 521-3964

Record the following information for your records:

Purchase Date _____

Installation Date _____

11/13 RevB

APPENDIX C

FIELD INSPECTION REPORT FORM

INTEX Environmental Group, Inc.

ROUTINE INSPECTION CHECKLIST
LUBRICANT PACKAGING

Inspection Date _____

Inspector's Name _____

Inspector's Affiliation _____

PART 1 - ROUTINE QUARTERLY INSPECTIONS General System Operation		
SSDS Exterior Fan Operation (circle the appropriate observed condition)		
Office	Operating	Not Operating
Middle Warehouse	Operating	Not Operating
Lower Warehouse	Operating	Not Operating
Discharge Vent Piping	Intact	Damaged
Interior Vent Piping	Intact	Damaged

SSDS Interior System Components (circle the observed condition for each system component)		
Discharge Sampling Ports - General	Intact	Damaged
Audible Vacuum Leaks Near/From Extraction Points	Yes	No
Water Present/Water Damage Observed Near Extraction Points	Yes	No
Electrical System Components	Intact	Damaged
Observable Caulking	Intact	Damaged
Inspection of Vacuum Gauges	Intact	Damaged
Floor Conditions near Extraction Points (i.e. Cracking, etc.)	Intact	Damaged
Labeling of SSDS System and Electrical Components	Intact	Damaged

SSDS System Monitoring and Sample Point Inspection (record vacuum measurements and note whether its operating within acceptable range)		
Component Identification	Vacuum Measurements	Vacuum Outside of Range*
VP-1		Yes No
VP-2		Yes No
VP-3		Yes No
VP-4		Yes No
VP-5		Yes No
VP-6		Yes No
VP-7		Yes No
VP- 8		Yes No
VP-9		Yes No
VP-10		Yes No

* Note: The acceptable vacuum range for each EP Fan is 0.5 to 4 inches of water. If vacuum is outside the range, call for service.

Please include any comments or observations here. At a minimum, if you answered 'damaged' or 'not operating' to any of the checklist items above, please provide further information.

Have any modifications or upgrades been made to the heating, ventilation, or air conditioning (HVAC) system since the last inspection?	Yes	No

If yes, please explain the changes made to the HVAC system.

Have any changes or upgrades been made to the building or has any new construction occurred since the last inspection?	Yes	No

If so, please explain the changes made to the building system.

Note: Stop here if this is a quarterly inspection. If completing an Annual Inspection, please complete the following Table.

PART 2 - ANNUAL INSPECTION SSDS System Monitoring and Sample Point Inspection		
Sub-Slab/Monitoring Point Identification	Vacuum Measurement (inches of water)	Damaged, Leaking, or Vacuum Outside of Range*
SS-1		Yes No
SS-2		Yes No
SS-3		Yes No
SS-4		Yes No
SS-5		Yes No
SS-6		Yes No
SS-7		Yes No
SS-8		Yes No
SS-9		Yes No
SS-10		Yes No
SS-11		Yes No
SS-12		Yes No
SS-13		Yes No
SS-14		Yes No
SS-15		Yes No

*Note: Vacuum should exceed 0.004 inches water column at each location. The optimal range is 0.0161 to 1.2 inches of water column.

If vacuum is below 0.001 inches water column, call for service.

Please include any comments or observations here. If you answer 'yes' to any of the checklist items above, please provide further explanation.