Vapor Intrusion Management Plan

Jackson Steel Superfund Site

U.S. Environmental Protection Agency

June 2016

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1 INTRODUCTION

Volatile organic compounds (VOCs) present in soil and groundwater, even at low levels, can migrate into buildings. This process, which is called vapor intrusion, can result in unacceptable human exposures to VOCs inside occupied buildings.

This document describes the vapor intrusion management program associated with the Jackson Steel Company Superfund Site (hereinafter, referred to as the "Site").

The Site is bordered to the north by commercial and single-family dwellings, to the east by a two-story apartment complex, to the south by a daycare center and a vacant former retail store and to the west by an office building and restaurant.

The property was used from the mid-1970s until 1991 as a "roll form metal shapes" manufacturing facility. Degreasers, including tetrachloroethylene (PCE), trichloroethylene and 1,1,1-trichloroethane, were used at the facility until 1985. Sludges from degreasing equipment were stored in drums and in an on-property 275-gallon tank.

The analytical results from samples collected by the Nassau County Department of Health (NCHD) in the early 1990s from within, around, and below three on-property dry wells indicated the presence of VOCs at depths down to 40 feet below the ground surface. VOCs were also detected in groundwater samples collected from monitoring wells located downgradient of the dry wells.

Dumping of wastes into the dry wells and spills and leaks from drums storing various chemicals during the facility's operations are the likely sources of the contamination found at the Site.

The Site was listed on EPA's Superfund National Priorities List on February 4, 2000.

Following the commencement of remedial investigation (RI)-related field work in October 2001, because of concerns about the proximity of the Site to the daycare center, NCHD performed air sampling inside the daycare center's building. The air samples detected PCE at levels below the New York State Department of Health's (NYSDOH's) guideline for indoor PCE exposure. Given the sensitivity of the population exposed (preschool children), NCHD collected additional samples in December 2001. At that time, indoor testing was also conducted inside the Jackson Steel building and the restaurant located adjacent to the Site. The results indicated that PCE levels in the indoor air of

several rooms in the daycare center were above NYSDOH's guideline for PCE.[1] As a result, in January 2002, four subslab depressurization system (SDSs) were installed by EPA. In addition, a ventilation system was installed by the daycare center's contractor. Samples collected to assess the effectiveness of the implemented measures showed that the PCE levels in the air were significantly below NYSDOH's guideline and below EPA's acceptable noncancer risk levels. Because elevated PCE levels were also detected in a billiards club that shared common walls with the Site building and the daycare center, EPA installed a vapor intrusion mitigation system under the concrete slab of this building, as well. The billiards club was subsequently occupied as a retail store, and recently the daycare center (the Learn and Play Daycare Center) expanded to occupy this space, as well.[2] The vapor intrusion mitigation systems were replaced by the property owner's contractor in May 2016.

The results of the RI, which was completed in 2002, indicated that VOCs, semi-volatile organic compounds, pesticides and metals contamination were present in the surface soil and VOC contamination was present at several subsurface soil locations. In addition, contamination was found in a trench and sumps located inside the building and dry wells located under the parking lot at the Site.

Groundwater from the three hydrogeologic units underlying the site—the Upper Glacial Aquifer (upper aquifer); Magothy Confining Bed (a low permeability, clay layer separating the upper and deep aquifers); and the Magothy Aquifer (deep aquifer)—were also sampled. VOC contamination above state and federal standards was detected both in the Upper Glacial Aquifer and Magothy Aquifer.

Based upon the results of the RI, in September 2004, EPA selected a remedy for the site in a ROD, which included the following actions:

- decontamination of the Jackson Steel building floor;
- in-situ soil vapor extraction (ISVE)[3] to treat the contaminated subsurface soil;

[1] NYSDOH's guideline at that time was 100 micrograms per cubic meter (ug/m^3); the current guideline is 30 ug/m^3.

[2] While separate vapor intrusion mitigation systems were installed at the daycare center and billiards club buildings, because the daycare center now encompasses both buildings, the two vapor intrusion mitigation systems are referred to as a single system in this ESD.

[3] ISVE involves drawing air through a series of wells to volatilize the solvents in the soils. The extracted vapors are then treated.

- excavation and off-Site disposal of the contaminated surface soil and contaminated material in on-Site sumps, a trench, and dry wells;
- in-situ chemical oxidation[4] to treat the contaminated groundwater in the Upper Glacial Aquifer;
- extraction and treatment of the contaminated groundwater in the deep aquifer if confirmatory groundwater sampling indicates that the Site is a principal source of the groundwater contamination to the aquifer underlying the Site;
- if it is determined that the Site is a principal source of the groundwater contamination to the deep aquifer underlying the Site, the selected remedy would be expanded, as necessary, to include off-property groundwater contamination; and
- long-term groundwater monitoring;[5]

The soil cleanup objectives were established pursuant to New York State Technical and Administrative Guidance Memorandum No. 94-HWR-4046 objectives (Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, Division of Hazardous Waste Remediation, January 24, 1994). These levels were the more stringent cleanup level between a human-health protection value and a value based on protection of groundwater. The groundwater cleanup goals were the more stringent of the state or federal promulgated standards. EPA and New York State Department of Health promulgated health-based protective Maximum Contaminant Levels (MCLs) that are enforceable standards for various drinking water contaminants. MCLs ensure that drinking water does not pose either a short- or long-term health risk.

The building decontamination and the excavation of the contaminated surface soil and the contaminated material in the building sumps and trench and in the dry wells and their disposal were performed from 2005 to 2006. A total of 170 cubic yards of material was excavated and disposed of at an EPA-approved off-Site facility.

For about six months in 2005, approximately, 15,000 gallons of iron-catalyzed sodium persulfate (with small amounts of buffering agents) and 600 gallons of hydrogen peroxide were injected in the aquifer through a network of 20 injection wells to treat the contamination in the Upper Glacial Aquifer.

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[4] Under this technology, an oxidizing agent is injected into the contaminated groundwater. An oxidizing agent uses oxygen to degrade VOCs.

[5] Because the groundwater standards in the Upper Glacial Aquifer were met and because it was concluded that the Site was no longer a source of contamination in the Magothy Aquifer, groundwater monitoring was suspended.

After a successful pilot test, an ISVE system consisting of nine ISVE wells and 11 vapor monitoring probes began operating in 2005.

While the cleanup objectives for the groundwater and soil were met in 2006 and 2008, respectively, EPA continued to operate the ISVE system until 2013, because VOC vapors were still being recovered from underneath the Jackson Steel building's floor. The operation of the ISVE system was discontinued when the levels of vapor removal became too low for the system to continue to be efficient. The ISVE system was decommissioned in April 2016.

A supplemental groundwater investigation was conducted from 2005 to 2006 to determine the source of the Magothy Aquifer contamination underneath the Site and to establish whether there was a relationship between the contamination at the Site and the VOC contamination detected in nearby Village of Mineola Supply Well #4. Based on the results of the investigation, it was concluded that the Site was not a current source of contamination in the Magothy Aquifer. Therefore, EPA decided not to implement the Magothy Aquifer groundwater remedy. An ESD was issued in 2007, documenting this decision.

EPA issued an ESD on June 20, 2016 to document its determination to incorporate into the remedy ICs to prevent exposure through vapor intrusion, to remain in place until the residual VOCs fully dissipate in the subsurface. The ESD noted that a Vapor Intrusion Management Plan and Institutional Control Implementation and Assurance Plan would be prepared to ensure that the ICs are appropriately implemented and maintained.

2 INSTITUTIONAL CONTROLS

While EPA has successfully remediated the soil and groundwater contamination associated with the Site to the cleanup goals selected in the ROD, low levels of VOCs remain. Residual VOCs, even at low levels, can migrate as vapors through the soil into buildings, resulting in unacceptable human exposures to VOCs if the buildings are occupied. This pathway is currently incomplete at the Site, because a subslab vapor intrusion mitigation system installed at the daycare center facility prevents the migration of vapors into this building and because the former Jackson Steel building is currently unoccupied.

To ensure the protectiveness of the remedy, the subslab vapor intrusion mitigation systems installed at the daycare center must continue to operate as long as elevated levels of vapors remain under the building and the building is occupied. EPA has determined that an IC is needed to require that the subslab vapor intrusion mitigation systems continue to operate as long as elevated levels of vapors remain under the building and the building is occupied. Accordingly, a notice will be placed on the deed of the two parcels occupied by the daycare center (both parcels are covered by the same deed). The notice on the deed constitutes an IC.

Furthermore, the daycare center is regulated by the New York State Office of Children and Family Services (OCFS). On September 8, 2009, the facility entered into an agreement with OCFS such that it would continue to address vapor intrusion as a condition of maintaining its daycare center license.

While not currently occupied, an IC is also necessary for the Jackson Steel property itself to ensure the protectiveness of the remedy while the residual VOC levels remain. The IC would require actions when human occupancy is anticipated by a future user of this property. The actions required by the IC include vapor intrusion sampling and, if called for by the sampling results, mitigative measures (such as a vapor intrusion barrier and/or subslab vapor extraction system). The actions will be required for the existing former Jackson Steel building is occupied or replaced with another structure in the future.

A notice will be placed on the deed of the Jackson Steel property to alert any potential purchaser, lessee or other user of the property that EPA and NYSDEC must be notified if and when a determination is made that the existing building will be refurbished and used for human occupancy or demolished and a new structure constructed. The notice on the deed constitutes an IC.

Furthermore, EPA will communicate directly with the Village of Mineola Superintendent of Buildings, requesting that EPA and NYSDEC be notified if the existing building is to be refurbished and used for human occupancy or

demolished and a new structure constructed. EPA will request that the Village not issue a Certificate of Occupancy until necessary vapor intrusion-related actions identified by EPA and NYSDEC are carried out. EPA plans to issue periodic reminders to the Village (*e.g.,* annual reminders) to help ensure the effectiveness of this measure.

EPA will effect an environmental easement on the Jackson Steel property in the future once a new owner takes control of the property. An easement constitutes an IC.

3 VAPOR INTRUSION MANAGEMENT

3.1 VAPOR INTRUSION MONITORING

Vapor intrusion monitoring at the Jackson Steel building and daycare center is performed annually during the heating season. This monitoring will continue as long as elevated levels of vapors remain under the noted buildings and at least one of the buildings are occupied. Appendix A provides a Quality Assurance Project Plan for the vapor intrusion sampling. Appendix B identifies the vapor intrusion sampling locations.

3.2 VAPOR INTRUSION MAINTENANCE AND ENHANCEMENTS

The vapor intrusion mitigation systems were replaced by the property owner's contractor in May 2016. Appendix C provides details, including as-built drawings, related to the installation.

Certain repairs, maintenance and/or enhancements may be necessary in the future for the mitigation systems to perform effectively. Five-year reviews will assess the efficacy of the mitigation systems.

3.2 FUTURE VAPOR INTRUSION MEASURES

Because the residual levels of VOCs are expected to dissipate slowly, EPA has concluded that preventing human exposure to VOCs at the occupied building will be needed for a number of years to ensure the protectiveness of the remedy. Therefore, the existing vapor mitigation systems will need to continue to operate.

If it is determined that the existing Jackson Steel building will be refurbished and used for human occupancy, subslab and indoor air vapor intrusion sampling will be performed during the next heating season following such a determination. Depending upon the results of this investigation, there are three possible options—no action; continued monitoring or mitigation, such as a vapor intrusion mitigation system.

If it is determined that the existing building will be demolished and a new structure constructed, either mitigation measures will be incorporated into the building during construction of the building (*e.g.,* installation of a vapor barrier or installation of piping for a mitigation system) and subslab and indoor air vapor intrusion sampling will be performed during the next heating season or following construction, subslab and indoor air vapor intrusion sampling will be performed during the next heating season and mitigation measures will be taken, if necessary.

3.3 ASSURANCE MONITORING

Assurance monitoring of the vapor intrusion program and the ICs will be conducted by EPA until NYSDEC assumes responsibility for operation and maintenance, at which time NYSDEC will conduct the assurance monitoring. Monitoring may include visual inspection of parcels subject to ICs for any evidence of non-conformance with the ICs, periodic record reviews to determine if requests for building permits or Certificates of Occupancy for the Jackson Steel property have been made.

EPA will assess the protectiveness of the vapor intrusion program and the ICs during its five-year reviews.

UNIFORM FEDERAL POLICY
QUALITY ASSURANCE PROJECT PLAN
FOR

Jackson Steel Superfund Site

March 2015

REVISION 0

Document Control Number: JacksonSteel_UFPQAPP_04-2015.doc

Prepared by:		Approved by:	
RACHAEL GRAHAM	3/18/2015		3/30/15
Rachael Graham Project Manager EPA/DESA/HWSB/SST	Date	Sergio Lopez QA Officer EPA/DESA/HWSB/HWSS	Date

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APPENDIX D: U.S. EPA Region 2 DESA HWSB Superfund Support Team Standard Operating Procedure: *SST-8: Indoor Air Sampling with SUMMA™ Canisters,* Rev. 3.1, March 2013

APPENDIX E: U.S. EPA Region 2 DESA HWSB Hazardous Waste Support Section Standard Operating Procedure: *HW-31: Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15*, Rev.6, June 2014

APPENDIX F: Data Sheet, Field and Sample Documentation Examples

REFERENCES

REFERENCE 1: US Environmental Protection Agency (US EPA). *Regional Screening Levels for Chemical Contaminants at Superfund Sites, Residential Air*. Nov 2014. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/docs/resair_sl_table_run_NOV2014.pdf

REFERENCE 2: New York State Department of Health (NYSDOH). *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. Oct 2006. https://www.health.ny.gov/environmental/investigations/soil_gas/svi_guidance/docs/svi_main.pdf

QAPP APPENDIX A
QAPP WORKSHEETS

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QAPP Worksheet #1
Title and Approval Page

Title: Quality Assurance Project Plan
Site Name/Project Name: Jackson Steel Superfund Site
Site Location: Mineola, Nassau County, New York
CERCLIS ID: NYD001344456
Revision Number: 0
Revision Date: March 2015

Lead Organization

U.S. Environmental Protection Agency, Region II

Preparer's Name and Organizational Affiliation
Preparer's Address, Telephone Number, and E-mail Address

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Preparation Date (Day/Month/Year)

March 23, 2015

Project Officer: Rachael Graham

Signature

US EPA/DESA/HWSB/SST

Date

QA Officer: Sergio Lopez

Signature

US EPA/DESA/HWSB/HWSS

Date

Document Control Number: JacksonSteel_UFPQAPP_04-2015.doc

QAPP Worksheet #2
QAPP Identifying Information

Site Name/Project Name: Jackson Steel Superfund Site
Site Location: Mineola, Nassau County, New York
Operable Unit: 01
Title: Quality Assurance Project Plan
Revision Number: 0
Revision Date: March 2015

1. Identify guidance used to prepare QAPP: Uniform Federal Policy for Quality Assurance Project Plans

2. Identify regulatory program: EPA Region 2

3. Identify approval entity: EPA Region 2

4. Indicate whether the QAPP is a generic or a *project-specific* QAPP. (circle one)

5. List dates of scoping sessions that were held: N/A

6. List dates and titles of QAPP documents written for previous site work, if applicable: N/A

7. List organizational partners (stakeholders) and connection with lead organization: N/A

8. List data users: EPA Region 2 (see Wkst #4 for individuals)

9. If any required QAPP elements and required information are not applicable to the project, then provide an explanation for their exclusion below: N/A

10. Document Control Number: JacksonSteel_UFPQAPP_04-2015.doc

QAPP Worksheet #3
Distribution List

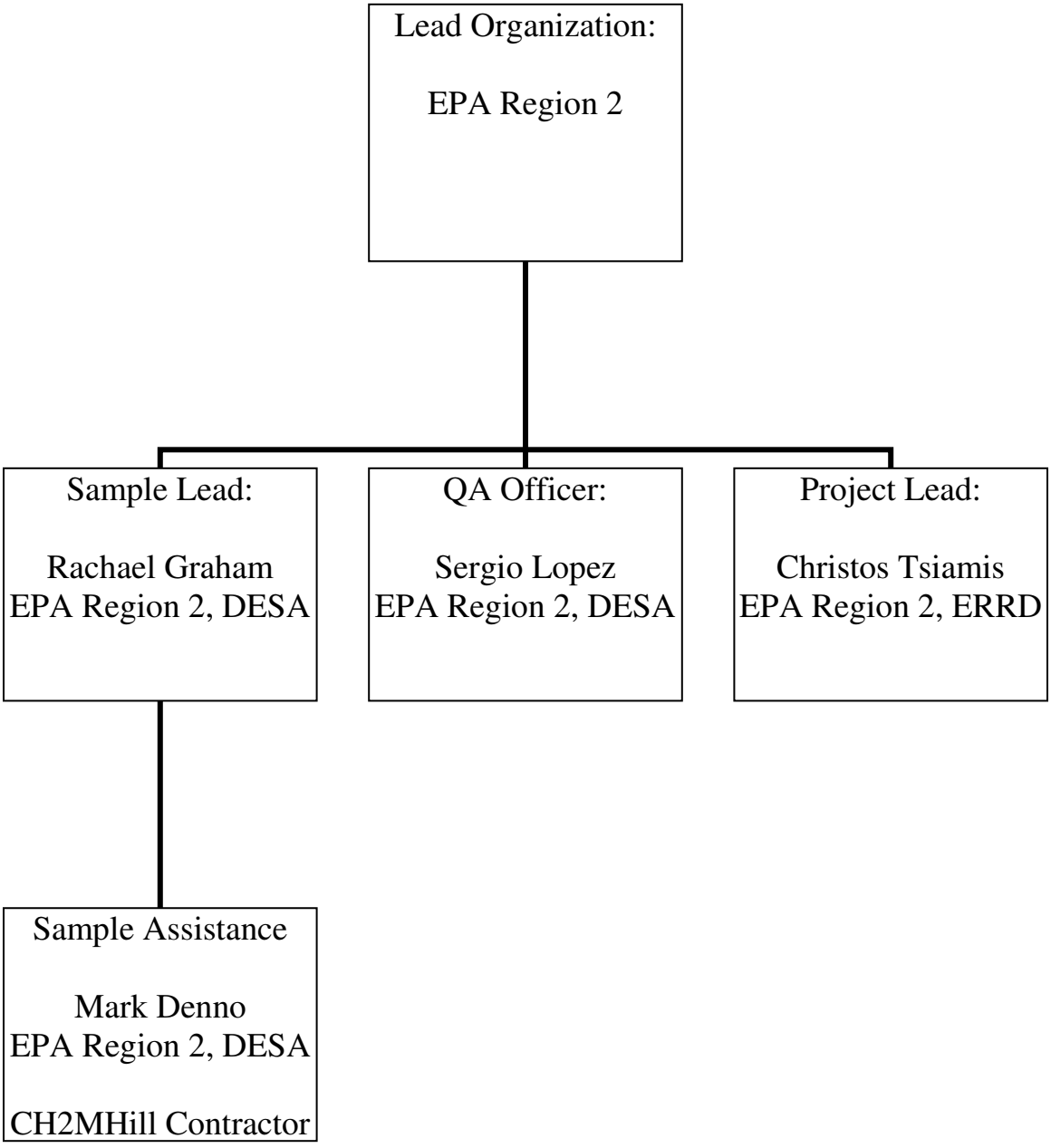
QAPP Recipient	Title	Organization	Telephone Number	E-mail Address
Christos Tsiamis	Remedial Project Manager	EPA, Region 2	(212) 637-4257	Tsiamis.christos@epa.gov
Sergio Lopez	QA Officer	EPA, Region 2	(732) 321-6778	Lopez.Sergio@epa.gov
Rachael Graham	Project Manager	EPA, Region 2	(732) 321-4438	Graham.Rachael@epa.gov

QAPP Worksheet #4
Project Personnel Sign-Off Sheet

Organization: EPA Region 2

Project Personnel	Title	Telephone Number	Organization	Signature & Date
Christos Tsiamis	Remedial Project Manager	(212) 637-4257	EPA Region 2	
Sergio Lopez	QA Officer	(732) 321-6778	EPA Region 2	
Rachael Graham	Project Manager	(732) 321-4438	EPA Region 2	
Mark Denno	Field Support	(732) 321-6708	EPA Region 2	

QAPP Worksheet #5
Project Organizational Chart



QAPP Worksheet #6
Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Sampling request	EPA RPM	Christos Tsiamis	(212) 637-4257	All technical, QA and decision-making matters in regard to the project (verbal, written or electronic)
Point of Contact with RPM	Sampling Project Manager	Rachael Graham	(732) 321-4438	All technical, QA and decision-making matters in regard to the project (verbal, written or electronic) while in the field – communication with the RPM who ultimately makes decisions regarding the project.
Laboratory request	Non-RAS RSCC	Jennifer Feranda	(732) 321-6687	Completes Task Order and requests laboratory
Adjustments to QAPP	Quality Assurance Officer	Sergio Lopez	(732) 321-6778	QAPP approval dialogue

QAPP Worksheet #7
Personnel Responsibilities and Qualifications Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Rachael Graham	Sampling Project Manager	EPA/DESA/HWSB/SST	Implementing and executing the technical, QA and health and safety during sampling event	B.S. Degree in Environmental Sciences, Rutgers University, 5 years experience with oversight, field investigations, and project management
Mark Denno	Sampling Assistance	EPA/DESA/HWSB/SST	Sample activities and management	B.S. Degree, 20+ years experience with oversight, field investigations, and project management
Christos Tsiamis	Remedial Project Manager	EPA/ERRD/NYRB/CNYRS	Overall project coordination	Project Management and coordination expert

QAPP Worksheet #8
Special Personnel Training Requirements Table

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
All Field Activities	40-hour OSHA Annual 8-hour refresher	40-hour EPA; 8-hour training and on-site safety briefings	Various	All field team members	HWSB/SST staff CH2MHill staff	On-site and office records
Sample Collection	Trained in EPA CERCLA QA, sampling methods, sample shipping procedures	Office and on-site training	Various	All field team members	HWSB/SST staff	EPA Region 2 in Edison, NJ and on-site
Sample Analysis	Trained in EPA SOPs TO-15 and various methods	On-site training	Various	BPA Laboratory Personnel	BPA Laboratory Staff	BPA Laboratory Records
Data Validation	CLP and non-RAS data validation	EPA	Various	EPA reviewers	Data Validators	EPA Region 2 in Edison, NJ
Data Review and Assessment	None- review performed by experienced analytical personnel	BPA Laboratory	Various	Laboratory Data Management	Section Chief; Laboratory QAO; Respective Section leaders	BPA Laboratory

QAPP Worksheet #9
Project Scoping Session Participants Sheet

Site Name/Project Name: Jackson Steel Superfund Site
Site Location: Mineola, Nassau County, New York
Operable Unit: 01

Date of Session: N/A
Scoping Session Purpose:

Name	Title	Affiliation	Phone #	E-mail Address

Comments/Decisions:

Action Items:

Consensus Decisions:

QAPP Worksheet #10
Problem Definition

SITE NAME, LOCATION DESCRIPTION

The Jackson Steel site (site) is located in Mineola, Town of North Hempstead, Nassau County, New York. The 1.5-acre property contains a one-story 43,000-square-foot building formerly used as a metal-forming facility and an approximately 10,000-square-foot paved parking area. The building consists of two sections – the original building, constructed in 1959, is located closer to First Street, and the newer section, which was added in 1963, is at the rear. The former office space is located along the north wall, and a loading dock is located in the southwest corner of the front section of the building. The building is currently inactive and contains an active in-situ soil vapor extraction (ISVE) system. An old vertical above-ground storage tank – possibly used to store degreasing substances – is situated in the front section of the building next to the former offices. A trench is located in the floor along the inside western wall of the building extension, above which a degreasing station is suspected to have been located. Two sumps are located in the front section of the building behind the former office space. One sump is located under the heater and other one is located along the eastern wall of the main building. A third sump is located outside the building, near the main entrance. See Appendix B for site map.

The local topography surrounding the site consists of relatively flat terrain, with gentle changes in elevation that typically do not exceed twenty feet of vertical relief. The siteitself is flat with no discernible change in topography, and has an elevation of about 96 feet above mean sea level.

There are three hydrogeologic units underlying the site – the Upper Glacial Aquifer, Magothy Confining Bed, and the Magothy Aquifer.

The site is bordered to the north by commercial and single-family dwellings, to the east by multiple-family dwellings in a two-story apartment complex, to the south by a retail store (Dollar Experience) and the Learn and Play Daycare Center, and to the west by an office building a restaurant. Herricks Road to the west has predominantly commercial properties on both sides of the heavily-traveled road.

Village of Mineola supply well #4 and Garden City Village supply wells #8 and #12 are located within a half-mile radius of the site. There are no private wells in the area – all residents utilize municipal water.

The site includes a parcel of property located at 435 First Street in Mineola in a residential/commercial area. The property is zoned B-1 for business use and retail or office space.

QAPP Worksheet #10
Problem Definition

SITE HISTORY

The property was used from the mid-1970s until 1991 as a "roll form metal shapes" manufacturing facility. Degreasers, including tetrachloroethylene (PCE), trichloroethylene (TCE), and 1,1,1-trichloroethane (1,1,1-TCA), were used at the facility until 1985. Sludge from degreasing equipment were stored in drums and in an on-property 275-gallon tank.

The analytical results from the samples collected by the Nassau County Department of Health (NCHD) in the early 1990s form within, around, and below three on-property dry wells indicated the presence of PCE, TCE, 1,1,1-TCA, 1,2-dichloroethylene (1,2-DCE), and 1,1-dichloroethane (1,1-DCA) at depths down to 40 feet below the ground surface. PCE, TCE, 1,1,1-TCA, 1,2-DCE and 1,1-DCA were also detected in groundwater samples collected from monitoring wells located down gradient of the dry wells.

Dumping of wastes into the dry wells and spills and leaks from drums storing various chemicals during the facility's operations are also likely sources of the contamination found on site.

In October 1999, the site was proposed for placement on EPA's Superfund National Priorities List (NPL). In February 2000, the site was listed on the NPL.

Following commencement of remedial investigation (RI)-related work in October 2001, because of concerns about the proximity of the site to a daycare center, NCHD performed air sampling inside the daycare center's building. The air samples detected PCE at levels below the New York State Department of Health's (NYSDOH's) guideline for indoor PCE exposure. Given the sensitivity of the population exposed (preschool children), NCHD collected additional samples in December 2001. At that time, indoor testing was also conducted inside the Jackson Steel building and a restaurant located adjacent to the site. The results indicated that PCE levels in the indoor air of several rooms in the daycare center were above NYSDOH's guideline for indoor PCE exposure. As a result, in January 2002, four sub-slab depressurization systems (SDSs) were installed by EPA. In addition, a ventilation system was installed by the daycare center's contractor. Samples taken to assess the effectiveness of the measure implemented showed that the PCE levels in the air were significantly below NYSDOH's guideline and below EPA's acceptable non-cancer risk levels. Because elevated PCE levels were also detected in a former billiards club, which shared common walls with the site building and the former daycare center, EPA installed an SDS system under the concrete slab of this building as well.

The RI, which was completed in 2003, indicated the presence of elevated levels of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides and metals in site soils. In addition, elevated levels of VOCs were found in soil gas and the building was found to be contaminated. VOC contamination above state and federal standards was also detected both in the Upper Glacial Aquifer and Magothy Aquifer underlying the site.

Folowing the completion of the RI/feasibility study (FS), a Record of Decision (ROD) for the site was issued in September 2004. Building decontamination and soil excavation and disposal were completed in October 2005. In-Situ Soil Vapor Extraction was performed in 2005 and confirmed to be working in 2008. Remediation of the Upper Glacial Aquifer by injection was completed in September 2006. In August 2007 after attempts at remediation, the contamination in the Magothy Aquifer was confirmed to be from another source than the site. On-site monitoring continues to be performed annually for vapor intrusion.

In February 2015, due to contractor lack of funds, the EPA Region 2 Hazardous Waste Support Branch Superfund Support Team (HWSB SST) was asked to perform the 2015 vapor intrusion sampling at the site in April 2015.

PROJECT DECISION STATEMENTS

- One vapor intrusion sampling event is scheduled at the Jackson Steel site for the analysis of the following VOC compounds: Trichloroethylene, Tetrachloroethylene, 1,1-Dichloroethane, cis-1,2-Dichloroethylene, 1,2-Dichloroethane and 1,1,1-Trichloroethane.

- If the vapor intrusion sampling of the locations reveals contamination, then the EPA will have to determine if further action is required.

QAPP Worksheet #11
Project Quality Objectives/Systematic Planning Process Statements

Overall project objectives include:

- Assess if there is presence of contaminants in on-site buildings.
- Install one soil-gas port in Jackson Steel building
- Analysis of the following abbreviated list of TO-15 VOC compounds in sub-slab, indoor, and ambient air: Trichloroethylene, Tetrachloroethylene, 1,1-Dichloroethane, cis-1,2-Dichloroethylene, 1,2-Dichloroethane and 1,1,1-Trichloroethane
- Protect health of residences and commercial properties in the vicinity of the site

Who will use the data?

- Data will be used by EPA Region 2 ERRD.

What will the data be used for?

- To determine if volatile organic compounds are present above the state and federal standards in the on-site buildings. If so, further action may be required.

What types of data are needed?

- EPA will sample for the abbreviated list of TO-15 VOC compounds.
- EPA will collect samples from the following:
    - Jackson Steel Building – 10 sub-slab samples, 2 indoor air samples, 4 system vent samples
    - Daycare Building – 6 sub-slab samples, 10 indoor air samples
    - Apartment Complex – 1 indoor air sample
    - Dollar Store Building – 2 indoor air samples
    - 1 ambient air sample
    - 1 trip blank sample

How "good" do the data need to be in order to support the environmental decision?

Precision for air duplicate must be $\leq$ 20 % RPD, laboratory replicate precision must be ±25%, and laboratory accuracy must be between 70 and 130% or the Laboratory Audit Standard which is ± 30%. The trip blank and method blank require no analyte to be greater than the quantitation limit. See Worksheet #12. All data analyzed by the BPA Laboratory will be validated by DESA HWSB Staff.

How much data are needed?

A total of 16 sub-slab samples, 15 indoor air samples and 4 system vent samples will be taken from the buildings on the Jackson Steel property. One ambient air sample will be collected. One field duplicate sample will be collected per 20 samples. The trip blank sample will be collected by keeping an unopened canister with the other samples during each shipment.

QAPP Worksheet #11
Project Quality Objectives/Systematic Planning Process Statements

Where, when, and how should the data be collected/generated?

All air samples will be collected in 6-liter SUMMA canisters over twenty four hours during the week of April 6, 2015. One port will be installed in the on-site building according to the sampling portion of REAC standard operating procedure (SOP) *2082: Construction and Installation of Permanent Sub-slab Soil Gas Wells*, March 2004 which can be found as Appendix C. There are 15 previously installed ports on the property. Two field duplicate air samples will be collected with two indoor air samples. Trip blank samples will accompany each shipment of the air samples. The indoor air and ambient air samples will be collected according to EPA/DESA/HWSB/SST SOP: *SST-8 Indoor Air Sampling with SUMMA Canisters* Rev 3.1, October 2010 which can be found as Appendix D. See Appendix B for the site map with sample locations.

Who will collect and generate the data?

EPA Region II DESA/HWSB/SST

How will the data be reported?

The laboratory will submit both a hard copy and electronic copy of analytical results. Data packages shall be submitted, per the CLP DC-2 form, with data grouped together per sample (i.e., related forms, raw data, etc), with additional information, such as canister certifications, included toward the end of the package. Electronic data shall be submitted in the Modified Region 2 Electronic Data Deliverables (EDD) format.

How will the data be archived?

A copy of the complete data package will be maintained with the project files at the Federal Records Center in Kansas City, Missouri for a period of thirty years.

QAPP Worksheet #12
Measurement Performance Criteria Table

Matrix	Air
Analytical Group	Volatile Organics
Concentration Level	Low (ppbv)

Sampling Procedure[1]	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SST-8 and 2082	TO-15 SCAN & SIM	Precision (field)	± 25% RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL	Trip Blank	S & A
		Precision (laboratory)	± 25% RPD	Laboratory Replicate Sample	A
		Accuracy (laboratory)	70-130 %R	Laboratory Audit Standard	A
		Accuracy (laboratory)	No analyte > CRQL	Laboratory Method Blank	A

QAPP Worksheet #14
Summary of Project Tasks

Sampling Tasks: All air samples will be collected in 6-liter SUMMA canisters over twenty four hours during the week of April 6, 2015. One port will be installed in the on-site building according to the sampling portion of REAC standard operating procedure (SOP) *2082: Construction and Installation of Permanent Sub-slab Soil Gas Wells*, March 2004 which can be found as Appendix C. There are 15 previously installed ports on the property. Two field duplicate air samples will be collected with two indoor air samples. Trip blank samples will accompany each shipment of the air samples. The indoor air and ambient air samples will be collected according to EPA/DESA/HWSB/SST SOP: *SST-8 Indoor Air Sampling with SUMMA Canisters* Rev 3.1, October 2010 which can be found as Appendix D. See Appendix B for the site map with sample locations.

Analysis Tasks: All samples will be analyzed for the abbreviated TO-15 list of analytes: Trichloroethylene, Tetrachloroethylene, 1,1-Dichloroethane, cis-1,2-Dichloroethylene, 1,2-Dichloroethane and 1,1,1-Trichloroethane

Quality Control Tasks: One field duplicate air sample per twenty samples, one ambient air sample per day and one trip blank sample per shipment will be collected for QC. See worksheet #20 for the field quality control sample summary table.

Data Management Tasks: The data collected for the sampling activities will be organized, analyzed, and summarized in a final project report that will be submitted to the RPM according to the Project Schedule. The report will be prepared by the project officer and include appropriate data quality assessment. Standard methods and references will be used as guidelines for data reduction and reporting. The software, Scribe™ will be used to complete the Chain of Custody Records, organize the sampling information and incorporate the data into usable tables.

Assessment/Audit Tasks: No performance audit of field operations is anticipated at this time. If conducted, performance and systems audits will be in accordance with the U.S. EPA Region 2, SST SOP #1: *Performing Oversight of CERCLA Field Operations*, Revision 0, April 2000.

Data Review Tasks: All CLP data will be validated by USEPA Region 2 DESA/HWSB/HWSS in accordance with U.S. EPA Region II SOP *HW-31: Volatile Organic Analysis of Ambient Air in Canister by Method TO-15,* April 2006, which can be found as Appendix E.

QAPP Worksheet #15
Reference Limits and Evaluation Table

Matrix: Air
Analytical Group: Volatile Organic Compounds
Concentration Level: Low (Trace)

Analyte	CAS Number	U.S. EPA Reg. 9 Regional Screening Levels (RSLs), Residential Air* (ug/m^3)		2006 NYSDOH Air Guideline Values (ug/m^3)		Laboratory Required Reporting Limit via Analytical Method TO-15[1]		Laboratory Achievable MDLs	Laboratory Achievable Reporting Limit via Analytical Method TO-15	
		Indoor Air	Sub-Slab	Indoor Air	Sub-Slab	ppbv	ug/m^3	ppbv	ppbv	$\mu g/m^3$
1,1-Dichloroethane	75-34-3	1.8	18	---	---		0.162	0.019	0.025	0.10
1,2-Dichloroethane	107-06-2	0.11	1.1	---	---		0.162	0.020	0.025	0.10
cis-1,2-Dichloroethylene	156-59-2	---	---	---	---		0.158	0.023	0.025	0.10
Tetrachloroethylene	127-18-4	11	110	30	30		0.271	0.012	0.015	0.10
1,1,1-Trichloroethane	71-55-6	5200	52000	---	---		0.218	0.017	0.018	0.10
Trichloroethylene	79-01-6	0.48	4.8	5	5		0.215	0.013	0.019	0.10

* EPA Region 9 RSLs dated November 2014 which can be found as Reference 1, is used as 10^{-6} risk numbers for indoor air. Sub-slab risk numbers are multiplied by an attenuation factor of 10.
1 – U.S. EPA Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* MDL for SCAN is 0.5 ppbv (Section 1.2), but laboratories are able to achieve lower MDLs through SCAN method (Table 4)

QAPP Worksheet #16
Project Schedule/Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Preparation of QAPP	EPA/DESA/SST	3/23/2015	4/6/2015	QAPP	4/6/2015
Preparation of Health and Safety Plan	Weston Solutions, Inc.	3/23/2015	3/26/2015	HASP	3/26/2015
Procurement of Equipment	EPA/DESA/SST	N/A	N/A	N/A	
Laboratory Request	EPA/DESA/SST	3/11/2015	3/31/2015	Analytical Request Form	N/A
Field Reconnaissance/Access	EPA/DESA/SST	4/6/2015	4/8/2015	N/A	N/A
Collection of Field Samples	EPA/DESA/SST	4/6/2015	4/8/2015	N/A	N/A
Electronic Laboratory Package Received	BPA Laboratory	4/29/2015	N/A	Preliminary data packages	5/6/2015
Validation of Laboratory Results	EPA/DESA/HWSS	5/6/2015	N/A	Validated data Packages	5/20/2015
Data Evaluation/ Preparation of Final Report	EPA/DESA/SST	5/26/2015	6/9/2015	Final Report	6/9/2015

QAPP Worksheet #17
Sampling Design and Rationale

Site Access
The EPA RPM and the contractor who performed the previous sampling events, CH2MHill will be responsible for providing site access to the Sampling Team and scheduling with businesses where appropriate.

Field Planning
Prior to each field mobilization, each team member will review all project plans and participate in a field planning meeting. The meeting will be conducted by the EPA HWSB/SST Project Lead and attended by all field staff. The meeting objective is to allow team members to become familiar with the site history, special project requirements, and other items listed below.

-Objectives of field work
-Equipment and training needs
-Health and safety requirements
-Field operating procedures, schedules of events, communications, and individual assignments
-Required QC measures
-Documents governing field work that must be on site

Describe and provide a rationale for choosing the approach:

All locations for vapor intrusion were selected during previous events. HWSB SST is tasked with sampling the previously installed ports as well as indoor air in the previously chosen locations. One location will be added in the original building as per the RPM's request.

One field duplicate sample will be collected per 20 samples. One ambient air sample will be collected for each day of sampling.

See Appendix B for the site map with sample locations.

QAPP Worksheet #18
Sampling Locations and Methods/SOP Requirements Table

Matrix	Sampling Location(s)	Analytical Group(s)	Concentration Level	No. of Samples (identify field duplicates)	Sampling SOP Reference	Rationale for Sampling Location
Sub-slab Soil Gas	Mineola, NY (SG-JS01, SG-JS02, SG-JS03, SG-JS04, SG-JS05, SG-JS06, SG-JS07, SG-JS-08, SG-JS10, SG-TT02, SG-TT04, SG-TT07, SG-TT08, SG-TT09, SG-TT10, & New Location) See Appendix B for Locations	Abbreviated list of TO-15 VOCs*	Low - TRACE	16	2082	Monitor sub-slab
Indoor Air	Mineola, NY (BP01, BP02, AP, TT01, TT02, TT03, TT04, TT05, TT06, TT07, TT09, TT10, TT11, JS01, JS02 & vent samples SVBP, SVTT, SVTT02, SVTT03) See Appendix B for Locations	Abbreviated list of TO-15 VOCs	Low- TRACE	19 + 2 duplicates	SST-08	Monitor indoor air
Ambient Air	Mineola, NY (AA) On property, outside building	Abbreviated list of TO-15 VOCs	Low - TRACE	1	SST-8	Quality control
Trip Blank	Mineola, NY (FB)	Abbreviated list of TO-15 VOCs	Low - TRACE	1	SST-8	Quality Control

* Abbreviated list of TO-15 VOCs includes Trichloroethylene, Tetrachloroethylene, 1,1-Dichloroethane, cis-1,2-Dichloroethylene, 1,2-Dichloroethane, and 1,1,1-Trichloroethane.

QAPP Worksheet #19
Analytical SOP Requirements Table

Matrix	No. of Samples	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/ analysis)
Sub-slab Air	16	BPA laboratory	Low - TRACE	TO-15 SCAN	6 L	SUMMA™ canister	NA	30 days
Indoor Air	19 + 2 duplicates	BPA laboratory	Low - TRACE	TO-15 SIM	6 L	SUMMA™ canister	NA	30 days
Ambient Air	1	BPA laboratory	Low - TRACE	TO-15 SIM	6 L	SUMMA™ canister	NA	30 days
Trip blank	1	BPA laboratory	Low - TRACE	TO-15 SIM	6 L	SUMMA™ canister	NA	30 days

QAPP Worksheet #20
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of Extra Volume Laboratory QC	No. of Equipment Blanks	No. of Trip Blanks	No of PE Samples
Air	Sub-slab Air	Low	TO-15 SCAN	16	---	N/A	N/A	N/A	N/A
	Indoor Air	Low	TO-15 SIM	19	2	N/A	N/A	1*	N/A
	Ambient Air	Low	TO-15 SIM	1	---	N/A	N/A	N/A	N/A

* One trip blank sample will accompany all field samples.

QAPP Worksheet #21
Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
2082	Construction and Installation of Permanent Sub-slab Soil Gas Wells	EPA/ERT Contract: REAC	SUMMA Canisters with pressure gauge, wrench, Teflon tubing, drill	N	
SST-08	Indoor Air Sampling with SUMMA Canisters Rev 3.1 October 201	EPA/DESA/HWSB/SST	SUMMA Canisters with pressure gauge, wrench, Teflon tubing	N	

QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing/ Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference

Not applicable for this event.

QAPP Worksheet #23
Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
TO-15	Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS)	Definitive	Gases	GC/MS	BPA Laboratory	N

QAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS	See TO-15	Initial calibration: upon award of the contract, whenever the laboratory takes corrective action which may change or affect the initial calibration criteria (e.g., ion source cleaning or repair, column replacement, etc.), or if the continuing calibration acceptance criteria have not been met. Continuing calibration: Following initial calibration verification, once every 24 hours, end of run. GC/MS Tuning with 4-Bromoflurobenzene (BFB): Beginning of each 24 hour period during which standards and samples are analyzed. Retention Time Evaluation: each analysis.	Initial calibration/ Continuing calibration: relative response factor (RRF) greater than or equal to minimum acceptable response factor listed in Table 5 of procedure; %RSD must be less than or equal to value listed in Table 5 of procedure. GC/MS Tuning: See ion abundance table in TO-15. Retention Time Evaluation: +/- 0.50 minute of the internal standard retention time in the associated calibration check verification	Initial calibration: inspect system for problems (e.g., clean ion source, change the column, service the purge and trap device), correct problem, re-calibrate. Continuing calibration: inspect system, recalibrate the instrument, reanalyze samples. GC/MS Tuning: inspect the system, identify problem. MS tune criteria must be met before calibration Retention time evaluation: re-calibrate and verify, re-analyze samples back to the last good calibration check verification	GC/MS Analyst/BPA Laboratory	TO-15

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing/Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC/MS	See TO-15; as per instrument manufacturer's recommendations	See TO-15; as per instrument manufacturer's recommendations	See TO-15; as per instrument manufacturer's recommendations	Acceptable re-calibration; see TO-15	Inspect the system, correct problem, re-calibrate and/or reanalyze samples.	GC/MS Analyst/BPA Laboratory	TO-15

QAPP Worksheet #26
Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): EPA DESA HWSB SST
Sample Packaging (Personnel/Organization): EPA DESA HWSB SST
Coordination of Shipment (Personnel/Organization): EPA DESA HWSB SST
Type of Shipment/Carrier: UPS
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Custodian, BPA Laboratory
Sample Custody and Storage (Personnel/Organization): Sample Custodian, BPA Laboratory
Sample Preparation (Personnel/Organization): Sample Technicians, BPA Laboratory
Sample Determinative Analysis (Personnel/Organization): Sample Technicians, BPA Laboratory
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples to be shipped within 24 hours of collection and arrive at laboratory within 24 hours (1 day) of sample shipment
Sample Extract/Digestate Storage (No. of days from extraction/digestion): As per analytical methodology; see Worksheet #19
SAMPLE DISPOSAL
Personnel/Organization: Sample Technicians, BPA Laboratory
Number of Days from Analysis: Until analysis and QA/QC checks are completed; as per analytical methodology; see Worksheet #19.

QAPP Worksheet #27
Sample Custody Requirements

Sample Identification Procedures: Each sample will be labeled with an assigned CLP number. Each sample will be named with the same nomenclature used in CH2MHill's previous sampling events (i.e. soil gas sample = SG-JS-01; indoor air sample = JS01; ambient air sample = AA). Additional information such as date, time, analysis, preservatives, etc. will be added. Time and date will not be on label, but only on the chain of custody provided. Example of label and name provided below.

Case # 15-0012
Sample ID: B5DF0
TO-15 SIM

Sample Name: JS02

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): Each sample will be individually identified and labeled after collection, then sealed with custody seals and enclosed in a box. The sample information will be recorded on chain-of-custody (COC) forms, and the samples shipped to the appropriate laboratory via UPS overnight delivery service. Scribe™ will be used for field documentation. Refer to the U.S. EPA OSWER 9240.0-44, EPA 540-R-07-06 *Contract Laboratory Program Guidance for Field Samplers*, dated July 2007.

Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal): A sample custodian at the laboratory will accept custody of the shipped samples, and check them for discrepancies, proper preservation, integrity, etc. If noted, issues will be forwarded to the laboratory manager for corrective action. The sample custodian will relinquish custody to the appropriate department for analysis. At this time, no samples will be archived at the laboratory. Disposal of the samples will occur only after analyses and QA/QC checks are completed.

QAPP Worksheet #28
QC Samples Table

Matrix	Air
Analytical Group	Volatile Compounds
Concentration Level	Low (ppbv)
Sampling SOP(s)	SST-08
Analytical Method/SOP Reference	TO-15, Region 2 TO-15 SOW
Sampler's Name	Rachael Graham
Field Sampling Organization	US EPA/DESA/HWSB/SST
Analytical Organization	BPA Laboratory
No. of Sample Locations	16 soil gas, 19 indoor air + 2 duplicates, 1 ambient, 1 trip blank

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Method Blank	Once every 24 hours	No analyte >CRQL	Flag outliers	BPA Laboratory Technician	Accuracy	No analyte > CRQL
Laboratory Replicate Sample		± 25%D		BPA Laboratory Technician	Precision	± 25%RPD
Laboratory Control Sample	Once every 24 hours	± 30% R		BPA Laboratory Technician	Accuracy	±30% R
Trip Blank	1 per shipment	NA	Document in final report	EPA R2 Personnel	Accuracy/Bias (Contamination)	No analyte > RL
Field Duplicate	1 per day	NA	Document in final report	EPA R2 Personnel	Precision	RPD ±20%

QAPP Worksheet #29
Project Documents and Records Table (FIELD)

Sample Collection Documents and Records	Analysis Documents and Records	Data Assessment Documents and Records	Other
• Sample location map • Sample location spreadsheet • SUMMA™ Sampling Work Sheet • COC forms • SCRIBE records • Signed QAPP • HASP • Project Data Evaluation Report	• Sample receipt logs • Internal and external COC forms • Equipment calibration logs • Sample preparation worksheets/logs • Sample analysis worksheets/run logs • Telephone/email logs • Corrective action documentation	• Data validation reports • Field inspection checklist(s) • Laboratory Audit checklist (if performed) • Review forms for electronic entry of data into database • Corrective action documentation	Analytical Report

QAPP Worksheet #30
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Soil Gas	TO-15 SCAN VOCs	Low	TO-15	28 days unvalidated, 42 days validated	BPA Laboratory	NA
Indoor Air Gas	TO-15 SIM VOCs	Low	TO-15	28 days unvalidated, 42 days validated	BPA Laboratory	NA

QAPP Worksheet #31
Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Actions	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions
Laboratory Technical Systems/ Performance Audits	Annual	External	Regulatory Agency	Regulatory Agency	BPA Laboratory	BPA Laboratory	EPA or other Regulatory Agency
Performance Evaluation Samples	N/A	External	Regulatory Agency	Regulatory Agency	BPA Laboratory	BPA Laboratory	EPA or other Regulatory Agency
On-Site Field Inspection	Annual	Internal	EPA	EPA/DESA/HWSS	EPA/DESA/HWSS	EPA/DESA/HWSS	EPA/DESA/HWSS

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response	Timeframe for Response
Project Readiness Review	Checklist or logbook entry	Project leader, Rachael Graham, EPA	Immediately to within 24 hours of review	Checklist or logbook entry	Project leader, Rachael Graham, EPA	Immediately to within 24 hours of review
Field Observations/ Deviations from Work Plan	Logbook	Project leader, Rachael Graham, EPA	Immediately to within 24 hours of deviation	Logbook	Project leader, Rachael Graham, EPA	Immediately to within 24 hours of deviation
Laboratory Technical Systems/ Performance Audits	Written Report	BPA Laboratory	30 days	Letter	BPA Laboratory	30 days
On-Site Field Inspection	Written Report	EPA OSC, Christos Tsiamis	7 calendar days after completion of the audit	Letter/Internal Memorandum	EPA OSC, Christos Tsiamis	To be identified in the cover letter of the report

QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency (daily, weekly, monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation	Report Recipient(s)
BPA Laboratory (validated)	As performed	42 days	EPA Region 2	Project leader, Rachael Graham, EPA
On-Site Field Inspection	Annual	7 calendar days after completion of the inspection	EPA/DESA/HWSB/HWSS	Project leader, Rachael Graham, EPA
Corrective Action Request	As required per field change	Three days after identification of need for field change	Project leader, Rachael Graham, EPA	EPA OSC, Christos Tsiamis
Final Report	As performed	2 weeks after receipt of EPA approval of data package	Project leader, Rachael Graham, EPA	EPA OSC, Christos Tsiamis

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Site/field logs	Field notes will be prepared daily by the EPA Sample Leader and will be complete, appropriate, legible and pertinent. These will be completed within SCRIBE and upon completion of field work, will be uploaded.	I	Project leader, Rachael Graham, EPA
Chains of custody	COC forms will be reviewed against the samples packed in the specific cooler prior to shipment. The reviewer will initial the form. An original COC will be sent with the samples to the laboratory, while copies are retained for (1) the Sampling Trip Report and (2) the project files.	I	Project leader, Rachael Graham, EPA
Sampling Trip Reports	Trip Reports will be prepared upon completion of field sampling. Information in the report will be reviewed against the COC forms, and potential discrepancies will be discussed with field personnel to verify locations, dates, etc.	I	Project leader, Rachael Graham, EPA
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal and by HWSB HWSS personnel during the validation process	E/I	BPA Laboratory and HWSB Data Validators
Laboratory analytical data package	Data packages will be reviewed as to content and sample information upon receipt by EPA.	I	Project leader, Rachael Graham, EPA
Final Sample Report	The project data results will be compiled in a sample report for the project. Entries will be reviewed/verified against hardcopy information.	I	Project leader, Rachael Graham, EPA

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	Project leader, Rachael Graham, EPA
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	Project leader, Rachael Graham, EPA
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	HWSB HWSS Data Validators
IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	HWSB HWSS Data Validators
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	HWSB HWSS Data Validators Project leader, Rachael Graham, EPA
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	Project leader, Rachael Graham, EPA

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa / IIb	Air	VOCs	Low	Validating Volatile Organic Analysis of Ambient Air in canister by Method TO-15 October 2006 (SOP #HW-31)	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel

QAPP Worksheet #37
Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:

-Precision: Results of laboratory duplicates will be assessed during data validation and data will be qualified according to the data validation procedures cited in worksheet# 36. Field duplicates will be assessed during by matrix using the RPD for each pair of results above the QL for the performed analyses. RPD acceptance criteria, presented in worksheet #12, will be used to access field sampling precision. Absolute difference will be used for low results as described in worksheet # #28. A discussion summarizing the results of laboratory and field precision and any limitations on the use of the data will be described.

-Accuracy/Bias Contamination: Results for all laboratory blanks will be assessed as part of the data validation. During the data validation process, the validating personnel will qualify the data following the procedures described on worksheet #36. A discussion summarizing the results of the laboratory accuracy and bias based on contamination will be presented and any limitations on the use of the data will be described.

-**Overall Accuracy/Bias**: The results of instrument calibration and matrix spike recoveries will be reviewed and data will be qualified according to the data validation procedures cited on worksheet #36. A discussion summarizing the results of laboratory accuracy and any limitations on the use of the data will be described.

-Sensitivity: Data results will be compared to criteria provided in worksheet #15. A discussion summarizing any conclusions about the sensitivity of the analyses will be presented and any limitations on the use of the data will be described.

-Representativeness: Data representativeness will be assessed by collecting field replicate samples. The field replicates are by definition equally representative of a given point and space and time. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. Therefore, data representativeness will be satisfied by ensuring that:

The sampling program is followed according to:

U.S. EPA (Environmental Protection Agency). October 1989. *Region II CERCLA Quality Assurance Manual.* Final Copy, Revision 1. Division of Environmental Services and Assessment, Edison, NJ; and

QAPP Worksheet #37
Usability Assessment

U.S. EPA (Environmental Protection Agency). December 1995. *Superfund Program Representative Sampling Guidance.* OSWER Directive 9360.4 10. Interim Final. EPA/540/R-95/141. Office of Emergency and Remedial Response (OERR). Washington, D.C.

U.S. EPA DESA Region 2 SOP, *SST-7 Ground Water Sampling Procedure - Low Stress (Low Flow) Purging and Sampling* which can be found as Appendix E

-Comparability: To ensure data comparability, sampling and analysis for all samples will be performed using standardized analytical methods and adherence to the quality control procedures outlined in the methods and this QAPP. Therefore, the data will be comparable.

-**Reconciliation:** The PQOs presented in worksheet #11 will be examined against the data quality to determine if the objectives were met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of major impacts observed from data validation, data quality indicators, and measurement performance criteria assessments. Based on the results of these assessments, the quality of the data will be determined. Based on the quality determined, the usability of the data for each analysis will be determined. Based on the combined usability of the data from all analyses for an objective, it will be determined if the PQOs were met and whether project goals are being achieved. Conclusions will be drawn and any limitations on the usability of the data will be described.

-Completeness: 1. To calculate field precision: $RPD = 100 \times \left(\frac{|X_1 - X_2|}{(X_1 + X_2)/2} \right)$ where X1 and X2 are the reported concentrations for each duplicate or replicate.

2. Calculate completeness: Data completeness will be expressed as the percentage of valid data obtained from measurement system. In other words, every well or location that was initially intended to be sampled, was sampled. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria specified by the analytical method used. Therefore, all data points critical to the sampling program in terms of completeness will be 100% validated by USEPA Region II DESA/LB according to the appropriate and current US EPA Region 2 Data Validation SOPs G-26. With 100% validation, the rationale for considering data points non-critical is not required.

Describe the evaluative procedures used to assess overall measurement error associated with the project:

EPA CLP RAS Laboratory and ESAT validators will determine if quality control data is within specification through validation process IIb.

QAPP Worksheet #37
Usability Assessment

Identify the personnel responsible for performing the usability assessment:

Rachael Graham, Project Leader, EPA/DESA/HWSB/SST

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

A Data Evaluation Report will describe the rationale for the data used and present any data limitations. The report will include a discussion of the accuracy, precision, representativeness, completeness and comparability of the data set and deviations from planned procedures and analysis. Tables will be prepared, including: a summary of samples collected and parameters analyzed; detections in field and trip blanks; and comparison of field duplicates. The report will be given to the RPM so he may examine the current extent of contamination within the Jackson Steel site and decide if further remediation should take place or to continue annual monitoring as is.

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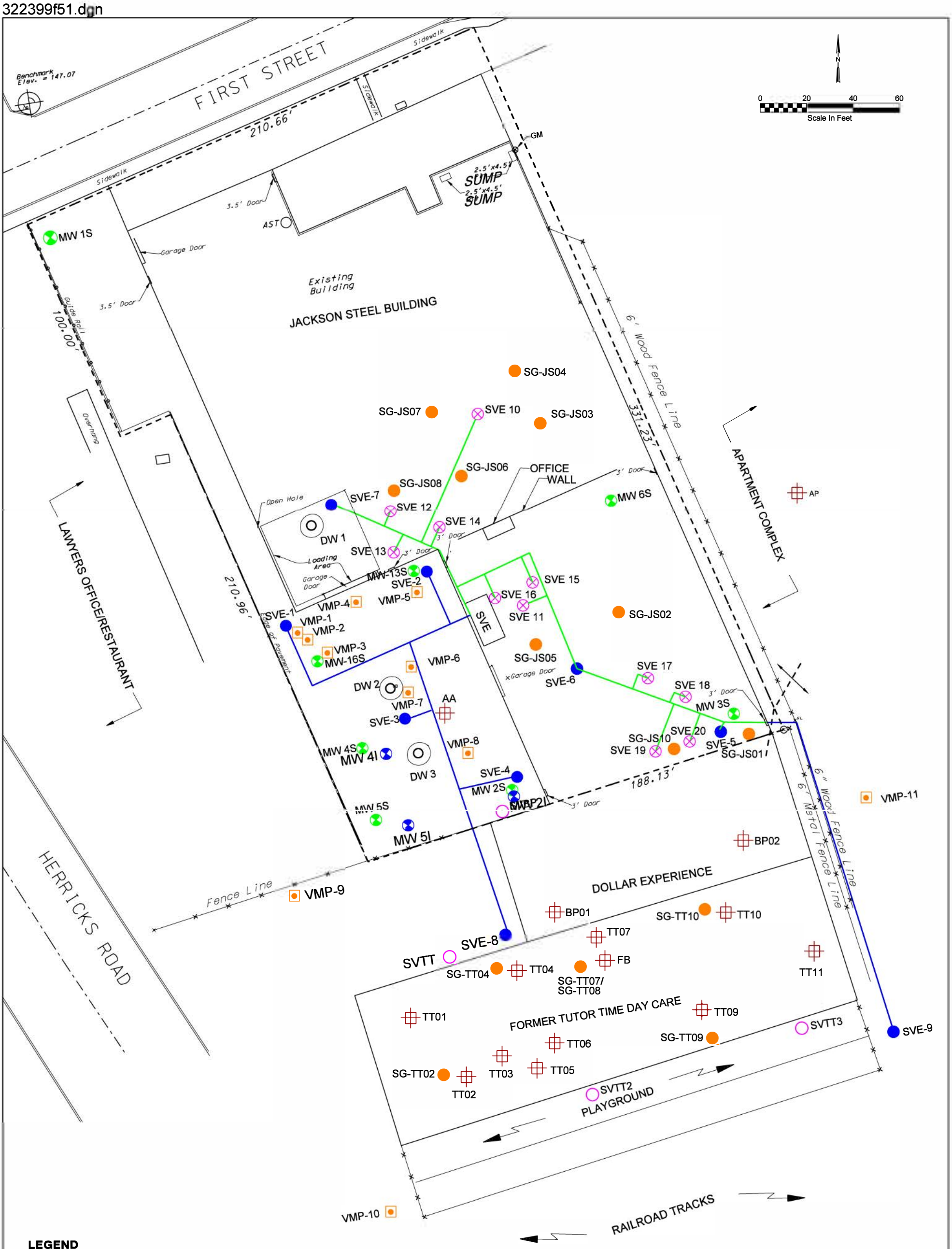

LEGEND

- GROUNDWATER MONITORING WELL
- INTERMEDIATE ZONE SVE WELL
- VAPOR MONITORING POINT (NESTED)
- BUILDING SUB-SLAB VENT
- SOIL GAS SAMPLE PORT
- SHALLOW ZONE SVE WELL
- INDOOR AIR SAMPLE LOCATION (APPROXIMATE)
- DRY WELL
- JACKSON STEEL PROPERTY BOUNDARY
- BELOW GROUND PIPING
- ABOVE GROUND PIPING

Figure 1-1
Site Layout, SVE and Sample Points
Jackson Steel Superfund Site
Mi neo la, NY

SOURCE: BASE DRAWING PROVIDED BY RETTEW ASSOCIATES, INC.; JUNE 5, 2002

CH2MHILL

REPORT OF VAPOR MITIGATION SYSTEM INSTALLATION, OPERATIONS, AND MAINTENANCE

Learn & Play Day Care Center
80 Herricks Road, Mineola, New York

Prepared by:

438 New Karner Road
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June 2016

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Appendix A - Figures

Figure V-101: Vapor Mitigation System As-Built & Post Install Test Results: Learn & Play Day Care Center
Figure V-102: Vapor Mitigation System As-Built & Post Install Test Results: Former Dollar Experience Store

Appendix B - Manufacturer's Equipment Specifications

Attachment 1: System Fans

- RadonAway GP501

Attachment 2: Gauges and Switches

- Dwyer Series 2000 Maghehelic Pressure Gauge
- Dwyer ADPS Differential Pressure Switch

Appendix C - Photo Description

- Radon Mitigation System Photo Description

Appendix D - System Monitoring Logs

- Inspection Procedures
- Operating Pressure Spreadsheet
- Repair / Modification Log

1.0 INTRODUCTION

This report describes the vapor mitigation system installed at the Learn & Play Day Care Center (the "Subject Property" or the "SP") in May 2016. Operations & Maintenance procedures and schedules are also addressed in section 6, along with a troubleshooting guide in section 6.3.4. Appendices include as-built drawings (Appendix A), manufacturer information for equipment installed (Appendix B), photographs of installed components (Appendix C), and inspection procedures and logs (Appendix D).

1.1 Background

An adjoining property, known as Jackson Steel, has been listed on the United State Environmental Protection Agency (EPA) "Superfund" Hazardous Wastes Sites. The Jackson Steel site is an inactive manufacturing facility in Mineola and North Hempstead, New York. Facility operations contaminated soil and groundwater with hazardous chemicals, including tetrachloroethylene (PCE), trichloroethylene (TCE) and 1,1,1-trichloroethane (TCA). A vapor mitigation system was installed in the SP in approximately 2001/2002. In 2015, sub slab vacuum testing at the SP demonstrated significant degradation of the effectiveness of the original vapor mitigation system.

Alpine Environmental Services, Inc. (Alpine) was hired in April 2016 to perform pilot testing and design of a new vapor mitigation system. Alpine was hired May 2016 to install the new vapor mitigation system. This report documents the installation and maintenance for the newly installed vapor mitigation system.

The vapor mitigation installed in 2001/2002 was removed as part of this installation and sub grade pipes were capped.

1.2 Abbreviations

AOI - Area of Influence
EP - Extraction Point
SP - Subject Property
SSD - Sub Slab Depressurization
VM - Vapor Mitigation
"WC - Inches of Water Column

2.0 SYSTEM DESCRIPTION

The vapor mitigation system extracts vapor and air from below the concrete floor slab within the building and discharges the vapor and air into the atmosphere above the roof of the building. Extracted vapor and air travel through sealed, negatively pressurized, piping and through fans located in the attic, or mounted on an exterior sidewall, of the building to a positively pressurized exhaust above the roof line of the building.

3.0 SYSTEM DESIGN

3.1 Vapor Mitigation System Design

Sub slab depressurization was selected as the mitigation methodology as it is the most effective and predictable vapor mitigation technique and generally requires very little maintenance or adjustment once the system is running.

Alpine Environmental Services, Inc. performed pilot testing and onsite data collection in April 2016 to facilitate the design of the VM System. The final VM System design was comprised of six sub-systems. Each sub-system has a fan, PVC piping connecting the fan, three or four extraction points through the concrete floor, valves for the control of the air flow, and system monitoring and low pressure indicators.

3.2 Design Changes During construction

During the installation of the VM system, sub slab vacuum extension measured in the center of the former Dollar Experience building was sufficient to eliminate a planned seventh sub-system down the middle line of the building. Minor adjustments were made to the location of extraction points, lateral piping, and pressure monitoring equipment.

3.3 Area of Influence

The area to be covered by the vapor mitigation system is defined as the Area of Influence (AOI). The AOI has been identified as the entire footprint of the building, comprised of the Learn & Play Day Care and the former Dollar Experience Store. See Figure 3.3.

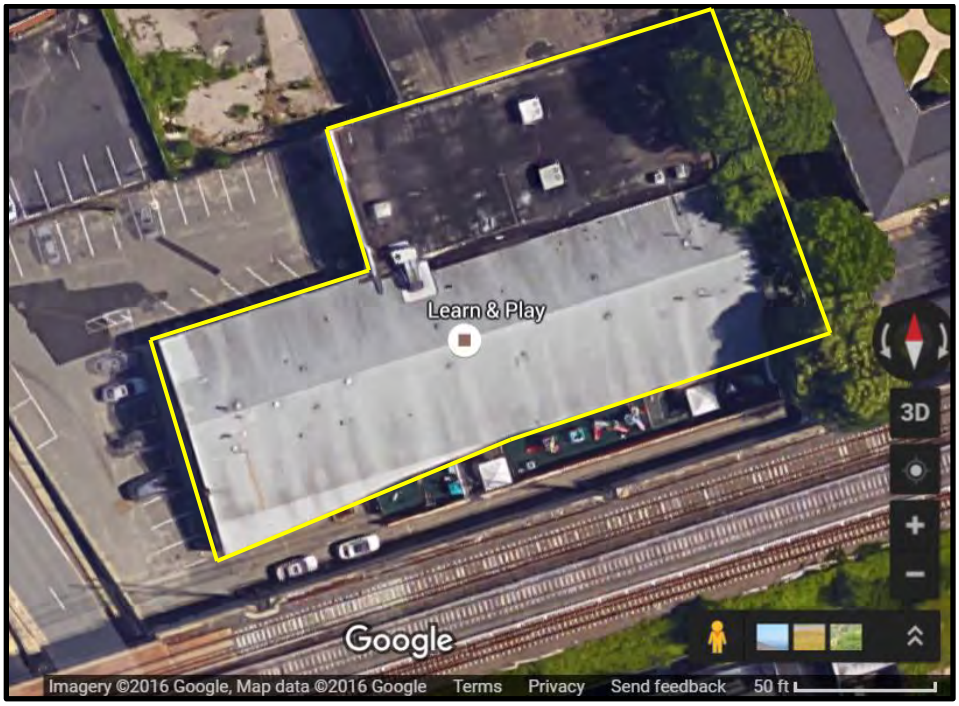


Figure 3.3: Area of Influence covered by the Vapor Mitigation System: Building Footprint

3.4 Performance Criteria

Achieving the Performance Criteria is the goal of the VM system and a successful VM System shall meet or exceed the Performance Criteria. The Performance Criteria for the VM system is to maintain a sub slab to room vacuum pressure of -0.004"WC or greater, within the footprint of the building.

4.0 INSTALLED CONDITIONS & MATERIALS

4.1 General

The VM System installation was accomplished between May 8, 2016 and May 20, 2016.

4.2 Piping and Extraction Points

4.2.1 Piping

Schedule 40 PVC pipe and fittings were used at all interior and exterior locations, with the exception of fan connections which were flexible PVC

couplings. All hard PVC joined pipes were solvent welded with heavy duty PVC cement. All system pipes were installed to allow in-pipe condensation to run back into an extraction point. A hanger was installed to secure horizontal pipe runs at least every six feet and vertical pipe runs at least every eight feet.

4.2.2 Extraction Points

Extraction points were installed by coring the concrete floors and removing a portion of the sub-slab material. The vertical PVC pipe at all extraction point locations where the PVC pipe penetrates through the concrete floor slab were sealed airtight with polyurethane caulk.

Ball valves were installed in each extraction point pipe to allow for system balancing. Post balancing valve positions were all full open.

4.2.3 Exhaust Location

All installed exhaust pipes terminated above the roof, were fitted with a protective cover, and were away from any intakes or openings.

4.3 System Fans

All fans in the Learn & Play Day Care Center were mounted in the attic. Fans serving the former Dollar Experience Store were mounted on the exterior of the rear wall with exhaust stacks mounted above the fans on the rear wall. A listing of the fan sub-system numbers with the fan make/model, initial sub-system operating pressures, and acceptable operating pressure range is located in Tables 4.3.

TABLE 4.3

Sub System ID	Fan Model	Operating Pressure at Start Up	Acceptable Operating Pressure Range
1A	Radonaway GP501	-3.5"WC	-0.25 to -3.8"WC
2A	Radonaway GP501	-2.85"WC	-0.25 to -3.8"WC
3A	Radonaway GP501	-1.45"WC	-0.25 to -3.8"WC
4A	Radonaway GP501	-2.95"WC	-0.25 to -3.8"WC

1B	Radonaway GP501	-3.3"WC	-0.25 to -3.8"WC
2B	Radonaway GP501	-2.1"WC	-0.25 to -3.8"WC

"WC - inches of water column
*Gauges read the vacuum pressure in the sub system on a positive scale.

4.4 System Monitoring

Each sub-system is connected to a monitoring panel inside the building. The monitoring panel consists of mechanical pressure gauge to monitor the real time operating pressure in each sub-system and an adjustable pressure switch for each sub system for connection to the building security system in the future by the Owner, if desired. See as-built drawing in Appendix A for monitoring panel location. Each gauge is labeled on the panel, corresponding to the sub-system identification used on as-built drawings. See Figure 4.4 for monitoring panel configuration.

Figure 4.4; Monitoring Panel in the electrical room of the Learn & Play Day Care Center. See Figure V-101 in Appendix A for location. Adjustable pressure switches are located on the top row and mechanical pressure gauges for each sub system in the bottom panels.

4.5 System Labeling

VM system piping, pressure meters, and electrical circuit breakers were labeled with identification, corresponding to as-built drawing labels.

5.0 POST INSTALLATION BALANCING & TESTING

5.1 System Balancing

The vapor mitigation system was balanced by adjusting the extraction point valves while simultaneously measuring the sub slab floor pressures with a micro manometer through 1/2-inch holes through the concrete floor slab. Results of the final sub slab pressures are located on Figures V-101 and V-102 in Appendix A.

5.2 Post Installation Testing

Following the installation of the RMS, the post installation testing included the following:

5.2.1 Verification that sub-system fan is operating within manufacturer's specifications (i.e. not exceeding maximum operating pressure, etc.).

5.2.2 Verification that System gauges and switches are operating correctly by turning off system fans observing results.

5.2.3 Performance of sub-slab to room differential pressure testing with a digital micro manometer to verify PFE. The sub slab to room differential pressure test results demonstrated a measurable vacuum in excess of the Performance Criteria at all boundary test locations. Test results are located on as-built drawings in Appendix A.

6.0 OPERATIONS & MAINTENANCE

6.1 Operating Procedures

6.1.1 System Startup

6.1.1.01 Review the manufacturer's information for individual System components.

6.1.1.02 Notify Building Representative of intent to start the VM system.

6.1.1.03 Confirm the fan is unplugged from the adjacent electrical outlet or for sidewall mounted fans that the adjacent switch is in the off position.

6.1.1.04 Check the sub-system pressure monitoring gauge for a notification that the exhaust stack is not functional due to a sealed cover being in place.

6.1.1.05 Check exhaust discharge pipe for potential blockage (i.e. air tight cap or plastic cover from "moth balling", ice accumulation, etc.).

6.1.1.06 Inspect the sub-system piping and extraction points for breeches or deficiencies. Repair any observed deficiencies.

6.1.1.07 Turn on or verify the electrical breaker serving the sub-System fan is on.

6.1.1.08 Plug the fan into the adjacent electrical receptacle for attic mounted fans. Turn on exterior switch for side wall mounted fans

6.1.1.09 Observe the fan. If unusual noise or no operation is observed, unplug the fan and proceed to Section 6.3 Maintenance.

6.1.1.10 If fan appears to operate normally, compare System pressures with previously recorded operating pressures and evaluate. If unacceptable difference in pressures is observed, turn unplug fan and proceed to Section 6.3 Maintenance.

6.1.2 Balancing and Optimization

During the initial start up of the VM System, the system was balanced to optimize the sub slab pressure field. Balancing was performed by adjusting inline valves located at each extraction point. Any adjustments to the balancing should be undertaken with consideration of the system as a whole.

6.1.2.01 Review the O&M procedures including the manufacturer information for individual System components.

6.1.2.02 Open the sub slab pressure monitoring points (remove caulk plug).

6.1.2.03 With the sub-system fan operating, use a digital manometer to measure the sub-slab pressure with respect to the room.

6.1.2.04 Adjust extraction point valves as needed to distribute the sub slab pressure field.

6.1.2.05 Re-test sub slab pressure.

6.1.3 Shutdown

6.1.3.01 Review the O&M procedures including the manufacturer information for individual System components.

6.1.3.02 Notify Building Representative of intent to shutdown the RMS. **Please note: In the event of an emergency or immediate concern, disconnect power from the sub-system at the electric breaker or the exterior disconnect prior to notification.

6.1.3.03 Unplug the fan from the adjacent electrical receptacle.

6.1.3.04 If System is to be off for an extended amount of time, turn off the electrical breaker serving the sub-System fan, if not connected to any other circuits.

6.1.3.05 If System is to be off for an extended amount of time, consider covering the exhaust pipe with a screw on flexible PVC cover. If the cover is applied over the exhaust stack, place a notification covering the entire sub-system pressure monitoring gauge for that sub-system. The notification should clearly identify the exhaust stack is not functional due to a sealed cover that is in place.

6.1.4 Operation

Following the start up (Section 6.1.1) of the VM system, no operational control or adjustments are needed. System monitoring and periodic inspection during the system operation are performed to identify system problems and deficiencies.

6.2 System Monitoring

6.2.1 Pressure Gauges

Each sub-system is connected to a monitoring panel inside the building. The monitoring panel contains a mechanical pressure gauge to monitor the operating pressure in each sub-system. The gauges are read in a positive scale, however, they are connected in a manner which indicates the vacuum (negative differential pressure) in each sub-system.

The pressure readings can be compared to "acceptable" operating range in Table 4.3, above. See as-built drawing in Appendix A for monitoring panel location. See manufacturer's equipment specifications for gauges, in Appendix B.

6.2.2 Pressure Switches

Each sub system is connected to an adjustable pressure switch at the monitoring panel. The switch is available for connection to the building security system in the future, if desired. The switches are connected to sub system pressure tubing but the dry contacts are not currently connected.

6.3 Maintenance

This section presents procedures and schedules for the maintenance of the equipment and instrumentation, troubleshooting information, and periodic inspection procedure and documentation.

6.3.1 System Fan

Each VM System fan is factory sealed. No maintenance is required and the fan casing should not be opened. Any attempt to open the fan casing shall void the manufacturer's warranty on the fan.

The Radonaway GP501 fans carries a five year manufacturer's warranty. Fan Manufacturer's specifications are located in Appendix B.

6.3.2 System Monitoring Devices

No maintenance is required for the installed monitoring devices. For monitoring devices functioning abnormally, consult the troubleshooting guide in the user manuals for the specific equipment (located in Appendix B).

6.3.3 Periodic Inspection

A periodic inspection is recommended to verify the VM system is operating as designed. At a minimum, an annual inspection should be performed. Inspection Procedures:

6.3.3.01 System Fan: Observe the fan during operation. Pay special attention to any abnormal noises coming from the fan, buzzing or scraping, or no sound at all. If abnormal noises (i.e. scraping, buzzing, cyclical pointed sounds, or no operational sound at all, etc.) are observed, refer to the Troubleshooting Guide (Section 6.3.4). Observe the exhaust stack for possible obstructions (i.e. ice, etc.).

Please Note: The VM system fans are designed to be maintenance free, for the life of the fans. All moving parts of the System are sealed in the fan-housing unit. The fan-housing unit on all fan units should only be opened by the fan manufacturer. Any attempt to open these fan-housing units will destroy the factory-installed seals and void any warranty on the fan.

6.3.3.02 System Piping and Connections: Inspect the exposed System piping and connections for any breach or damage.
Repair or replace any observed damage effecting System operation.

6.3.3.03 Slab/System Interface Seals: Inspect the caulk seal at each of the extraction points (a breach in the seal should produce an air leak noise when the System is in operation). If breech is observed, caulk with polyurethane caulk.

6.3.3.04 Pressure Differential:

6.3.3.04a Test System differential pressure gauges for functionality. Remove input line or shut down sub-System to verify differential pressure gauges return to a zero reading.
Replace any dysfunctional differential pressure gauges and restore sub-System operation.

6.3.3.04b Observe the pressure differential readings on the monitoring panel for each sub-System. Record the differential pressure in the table provided (Appendix D). Compare the differential pressure to the "Acceptable" Operating Pressure Range, Table 4.3, above. If operating pressure varies greatly from the initial operating pressure, evaluate the fan for problems. If no problems are identified with the fan, collect pressure readings from sub slab pressure monitoring points to verify the sub-slab pressure is sufficient under the “new” operating pressure. Adjust System valves as needed to redistribute PFE. If acceptable pressure cannot be achieved, replace the System fan.

6.3.3.05 Electrical:

6.3.3.05a Observe electrical components for damage.
Repair damaged components.

6.3.3.05b Test System electrical disconnects / switches / circuit breakers for functionality by turning them to the "off" position, verifying System fan de-energizes. Restore disconnect / switch / circuit breaker to the "on" position, verifying System fan re-energizes. Repair any dysfunctional components.

6.3.3.06 Inspection Documentation: Complete an inspection documentation form (Appendix D) for each periodic inspection and maintain a logbook of the periodic inspections for the life of the RMS.

6.3.4 Troubleshooting Chart

Problem	Evaluation		Repair
1. Low Pressure Switch is disengaged.	a. Is the System fan running?	Y - Go to 1b N - Go to Repair	Replace Fan
	b. Check the System pressure on the pipe barb just below the fan with a digital manometer. Is the operating pressure in the range of the initial operating range?	Y - Go to 1c N - Go to Repair	Replace Fan
	c. Is the system pressure gauge reading within the acceptable operating pressure range?	Y - Go to 1d N - Go to 1e	
	d. Is tubing between tube splitter and alarm connection kinked?	Y - Go to Repair 1 N - Go to Repair 2	1. Cut out kink. 2. Replace Switch
	e. Smoke test extraction point seals, valve connections, fan connections, floor drains (ground floor), foundation to wall gaps, etc.	Y - Go to Repair N - Go to 1f	Repair/Seal Breaches
	f. Inspect for blockage in or over exhaust stack (ie ice, etc). Blockage found?	Y - Go to Repair	Clear Blockage or replace exhaust stack.
		N - Go to Repair	Replace Fan
Problem	Evaluation		Repair
2. Low System Pressure (greater than 50% drop from initial operating pressure).	a. Check the System pressure on the pipe barb just below the fan with a digital manometer. Does the reading match the gauge pressure?	Y - Go to 2b N - Go to Repair	Replace Pressure Gauge and/or tubing serving the gauge.
	b. Smoke test fan seal (use fog generator. Do not use real smoke which will set off smoke detector). Is fan seal leaking?	Y - Go to Repair N - Go to 2c	Replace Fan
	c Smoke test extraction point seals, valve connections, fan connections, floor drains (ground floor), foundation to wall gaps, etc. Breeches found?	Y - Go to Repair N - Go to 2d	Repair/Seal Breach
	d. Inspect for blockage in or over exhaust stack. Blockage found?	Y - Go to Repair N - Go to 2e	Clear Blockage or replace exhaust stack.
	e. Check sub slab vacuum levels and compare to initial sub slab vacuum levels. Are sub slab vacuum levels close to the start up vacuum levels?	Y - Go to Repair 1 N - Go to Repair 2	1. Test Vapor in area served by the sub system. 2. Re-balance the sub-system(s) with valves and re-test vapor.
Problem	Evaluation		Repair
3. Water "gurgling" in extraction point pipe.	1. This is an indication of elevated groundwater table (seasonal or event related). Monitor the condition for 1 month. Did condition persist after 1 month?	Y - Go to Repair N - Likely a temporary condition. Monitor for additional high water events and evaluate if water removal is needed.	Install sump and sump pump in the area of the extraction point to reduce the groundwater level. Seal a cover over the sump.

Problem	Evaluation		Repair
4. Electric *Electric evaluation and repair should be performed by a qualified electrician.	a. Is electric breaker serving the System is on?	N - Go to Repair Y - Go to 2	Turn on electric breaker.
	b. Is electrical disconnect switch in attic (serving fan) receiving power?	Y - Go to Repair N - Go to c.	Check for defective disconnect switch and replace, otherwise replace fan.
	c. Are any circuit junctions receiving power?	Y - Go to Repair	Replace circuit from junction to fan.
		N - Go to Repair	Replace entire electrical circuit.

6.4 Safety

This section presents an outline of major safety concerns related to inspecting and repair work on the RMS.

6.4.1 General

Prior to performing any inspection or repair work at the site, familiarize yourself with the type of operations performed at the site, and assess any hazards associated with the operations at the site. Formulate a plan to mitigate the site-specific hazard and implement the plan prior to performing the VM system inspection or repair.

6.4.2 Utility Hazards

Use extreme caution when drilling/penetrating the slab or outside ground within the Subject Property. Known utilities are present under the floor slabs and outside the building. Call appropriate utility notification organization, review existing utility drawings, and contract private utility locators as appropriate, prior to any subsurface penetrations.

6.4.3 Fan Hazards

The VM system fan rotor continues to spin for some time following the removal of power to the fan. No object or body part should ever be inserted into the fan openings unless it can be verified that the fan rotor blades have stopped spinning.

6.4.4 Electrical Hazards

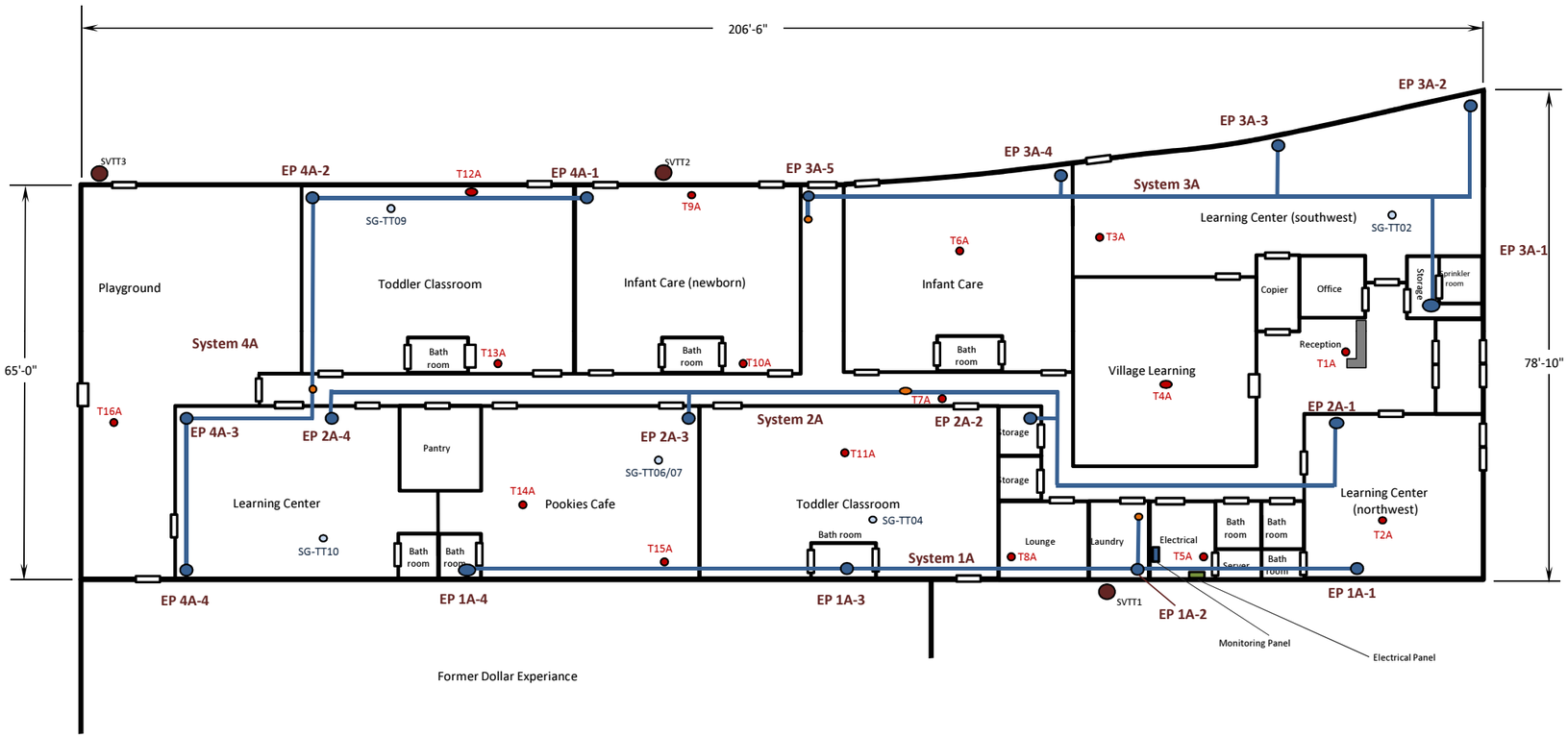
The VM system fans are connected to 110 volt electrical System of the building. Standard safety precautions and procedures for working with electricity should be employed for any work on the vapor mitigation system electrical system repair/modification.

Appendix A
Figures

Figures:

Figure V-101: Vapor Mitigation System As-Built & Post Install Test Results: Learn & Play Day Care Center

Figure V-102: Vapor Mitigation System As-Built & Post Install Test Results: Former Dollar Experience Store



LEGEND

- 3" SCH40 PVC Extraction Point Piping w/Balancing Valve
- 4" SCH40 PVC Piping
- System monitoring panel
- 4" SCH40 PVC Piping to attic/roof
- Electrical Panel
- Existing SSD System - 6" SCH40 PVC piping/fan
- Test Point
- Vapor Pin

drawing not to scale

System	Fan	Pressure
1A	GP501	3.5" WC
2A	GP501	2.85" WC
3A	GP501	1.45" WC
4A	GP501	2.95" WC

Test Point	T1A	T2A	T3A	T4A	T5A	T6A	T7A	T8A	T9A	T10A	T11A	T12A	T13A	T14A	T15A	T16A
In W.C.	-0.094	-0.027	-0.020	-0.068	-0.080	-0.088	-0.076	-0.022	-0.079	-0.113	-0.050	-0.028	-0.087	-0.055	-0.014	-0.182

Vapor Pin	SG-TT02	SG-TT04	SG-TT06/07	SG-TT09	SG-TT10
In W.C.	-0.049	-0.024	-0.070	-0.018	-0.049

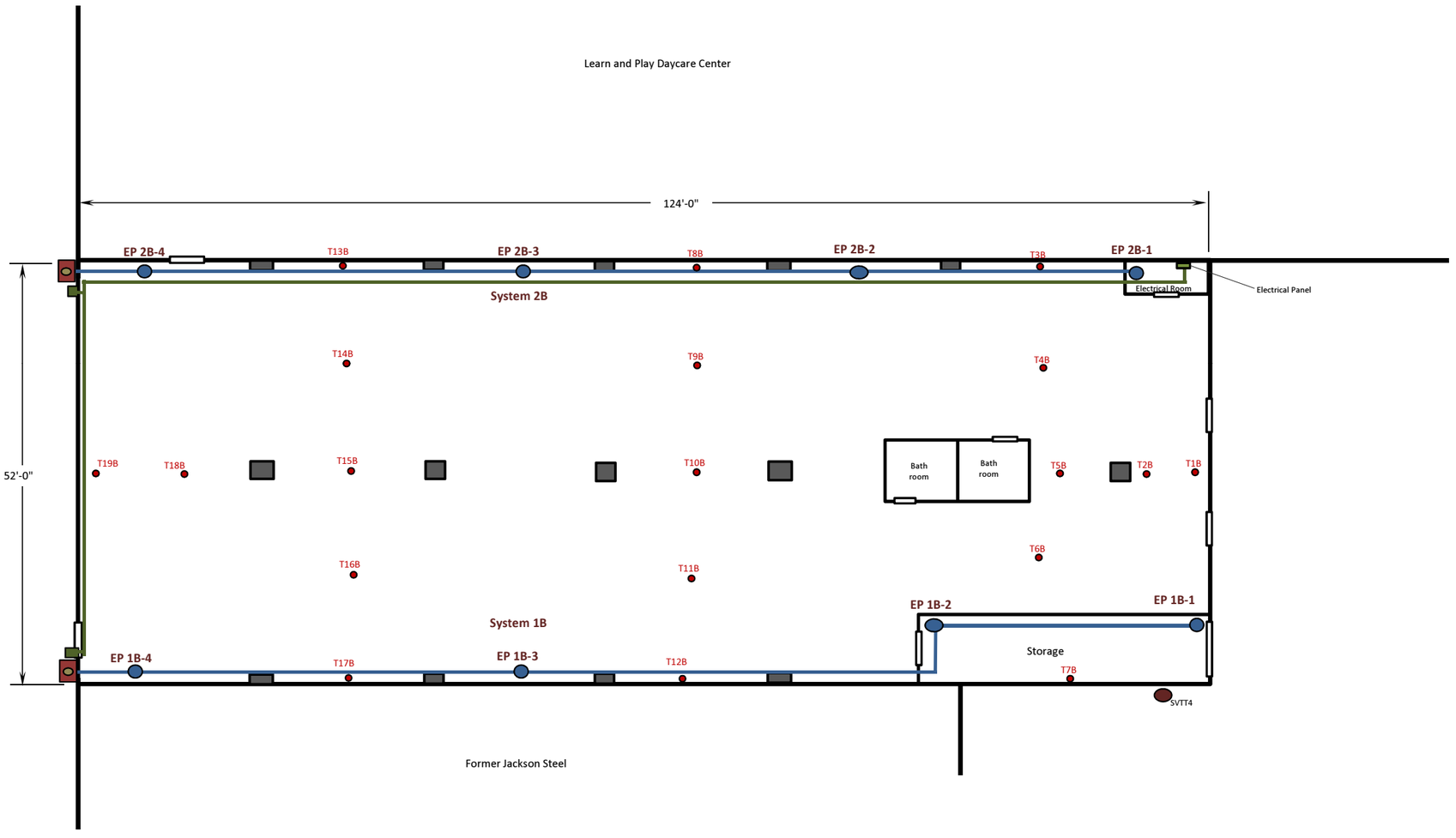
Figure V-101

Alpine Environmental Services, Inc.
438 New Karner Road
Albany, NY 12205
(518)250-4047

May 2016 | Revision 0

Vapor Mitigation As Built
Learn and Play Daycare Center
80 Herricks Road
Mineola, NY 11501

Test Point	T1B	T2B	T3B	T4B	T5B	T6B	T7B	T8B	T9B	T10B	T11B	T12B	T13B	T14B	T15B	T16B	T17B	T18B	T19B
In W.C.	-0.040	-0.080	-0.090	-0.113	-0.072	-0.068	-0.008	-0.088	-0.098	-0.077	-0.063	-0.045	-0.015	-0.059	-0.062	-0.064	-0.037	-0.036	-0.008



LEGEND

- 3" SCH40 PVC Extraction Point Piping w/Balancing Valve
- 4" SCH40 PVC Piping
- System monitoring panel
- 4" SCH40 PVC Piping to attic/roof
- Electrical Panel
- Existing SSD System - 6" SCH40 PVC piping/fan
- Trenched 3" SCH40 Piping
- System Blower
- System Discharge Piping - 4" SCH40 PVC
- Blower Disconnect
- Electrical wiring per code
- Test Point

System Number

EP 1B-2

Extraction Point | Extraction Point Number

drawing not to scale

System	Fan	Pressure
1B	GP501	3.3" WC
2B	GP501	2.1" WC

Figure V-102

Alpine Environmental Services, Inc.
438 New Karner Road
Albany, NY 12205
(518)250-4047

May 2016 | Revision 0

Vapor Mitigation As-Built
(Former Dollar Experience: Ground Floor)

Former Dollar Experiance
80 Herricks Road
Mineola, NY 11501

Appendix B

Manufacturer Specifications/Information

Attachment 1: VIMS Fans

- RadonAway GP501

Attachment 2: Gauges and Switches

- Dwyer Series 2000 Maghehelic Pressure Gauge
- Dwyer ADPS Differential Pressure Switch

RadonAway Ward Hill, MA IN014 Rev F

XP/GP/XR Series Fan Installation 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!** Do not use fan in hazardous environments where fan electrical system could provide ignition to combustible of flammable materials.

2. **WARNING!** Do not use fan to pump explosive or corrosive gases.

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

4. **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.

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

6. 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.

7. **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.

DynaVac - XP/XR Series		DynaVac - GP Series	
XP101	p/n 23008-1,-2	GP201	p/n 23007-1
XP151	p/n 23010-1,-2	GP301	p/n 23006-1,-2
XP201	p/n 23011-1,-2	GP401	p/n 23009-1
XR161	p/n 23018-1,-2	GP501	p/n 23005-1,-2
XR261	p/n 23019-1,-2		

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The DynaVac GP/XP/XR Series Radon Fans are intended for use by trained, professional Radon mitigators. The purpose of this instruction is to provide additional guidance for the most effective use of a DynaVac Fan. This instruction should be considered as a supplement to EPA 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 GP/XP/XR 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.

1.3 ACOUSTICS

The GP/XP/XR Series Fan, when installed properly, operates 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.

1.4 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 GP/XP/XR 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.

1.5 SLAB COVERAGE

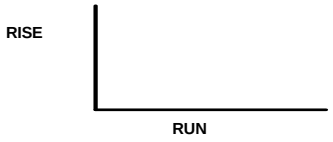
The GP/XP/XR Series Fan can provide coverage up to 2000+ sq. ft. per slab penetration. This will primarily depend on the sub-slab material in any particular installation. In general, the tighter the material, the smaller the area covered per penetration. Appropriate selection of the GP/XP/XR Series Fan best suited for the sub-slab material can improve the slab coverage. The GP & XP series have a wide range of models to choose from to cover a wide range of subslab material. The higher static suction fans are generally used for tighter subslab materials. The XR Series is specifically designed for high flow applications such as stone/gravel and drain tile. 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.

1.6 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 GP/XP/XR 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 GP/XP/XR Series Fans are **NOT** suitable for underground burial.

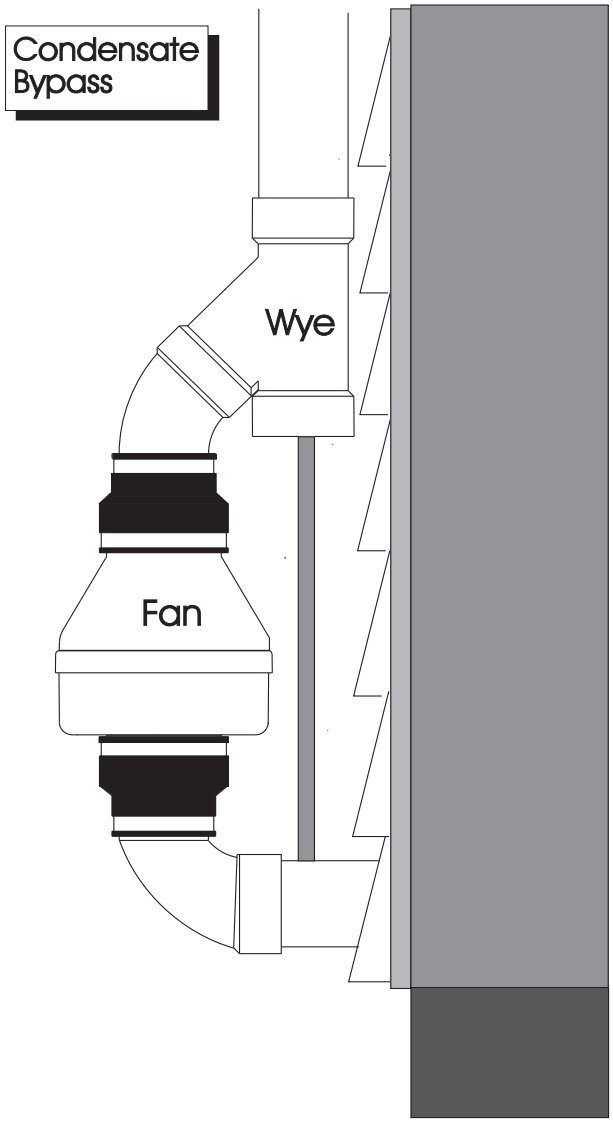
For GP/XP/XR Series Fan piping, the following table provides the minimum recommended pipe diameter and pitch under several system conditions.

Pipe Dia.	Minimum Rise per Foot of Run* @25 CFM	@50 CFM	@100 CFM
4″	1/8″	1/4″	3/8″
3"	1/4"	3/8"	1 1/2"



*Typical GP/XP/XR Series Fan operational flow rate is 25 - 90 CFM.
(For more precision, determine flow rate by using the chart in the addendum.)

Under some circumstances in an outdoor installation a condensate bypass should be installed in the outlet ducting as shown. This may be particularly true in cold climate installations which require long lengths of outlet ducting or where the outlet ducting is likely to produce large amounts of condensation because of high soil moisture or outlet duct material. Schedule 20 piping and other thin-walled plastic ducting and Aluminum downspout will normally produce much more condensation than Schedule 40 piping.



The bypass is constructed with a 45 degree Wye fitting at the bottom of the outlet stack. The bottom of the Wye is capped and fitted with a tube that connects to the inlet piping or other drain. The condensation produced in the outlet stack is collected in the Wye fitting and drained through the bypass tube. The bypass tubing may be insulated to prevent freezing.

1.7 "SYSTEM ON" INDICATOR

A properly designed system should incorporate a "System On" Indicator for affirmation of system operation. A manometer, such as a U-Tube, or a vacuum alarm is recommended for this purpose.

1.8 ELECTRICAL WIRING

The GP/XP/XR Series Fans operate on standard 120V 60 Hz. AC. All wiring must be performed in accordance with the National Fire Protection

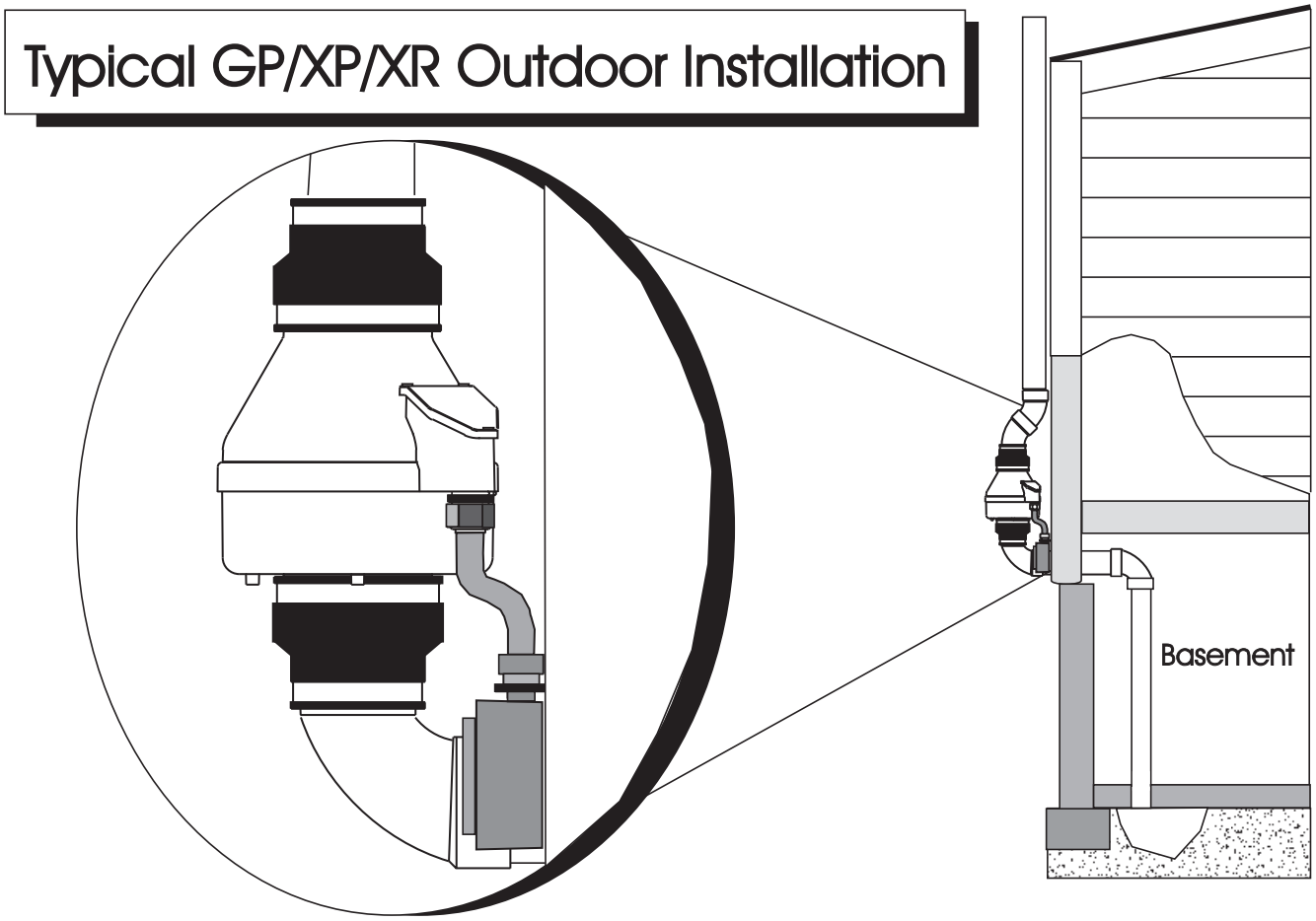
Association's (NFPA)"National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a U.L. listed watertight conduit.

1.9 SPEED CONTROLS

The GP/XP/XR Series Fans are rated for use with electronic speed controls ,however, they are generally not recommended.

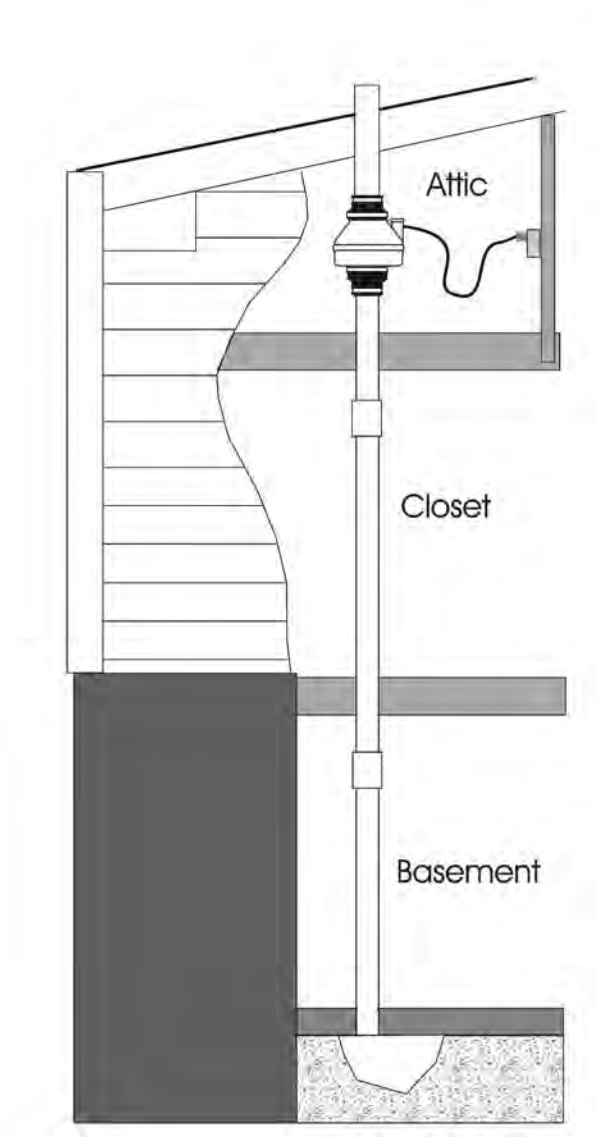
2.0 INSTALLATION

The GP/XP/XR Series Fan can be mounted indoors or outdoors. (It is suggested that EPA recommendations be followed in choosing the fan location.) The GP/XP/XR Series Fan may be mounted directly on the system piping or fastened to a supporting structure by means of optional mounting bracket.



2.1 MOUNTING

Mount the GP/XP/XR Series Fan vertically with outlet up. Insure 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 GP/XP/XR Series fan may be optionally secured with the integral mounting bracket on the GP Series fan or with RadonAway P/N 25007-2 mounting bracket for an XP/XR Series fan. Foam or rubber grommets may also be used between the bracket and mounting surface for vibration isolation.

2.3 SYSTEM PIPING

Complete piping run, using flexible couplings as means of disconnect for servicing the unit and vibration isolation.

2.4 ELECTRICAL CONNECTION

Connect wiring with wire nuts provided, observing proper connections:

Fan Wire	Connection
Green	Ground
Black	AC Hot
White	AC Common

2.5 VENT MUFFLER (optional)

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

2.6 OPERATION CHECKS

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

_____ **Insure** the GP/XP/XR Series Fan and all ducting is secure and vibration-free.

_____ **Verify** system vacuum pressure with manometer. **Insure** vacuum pressure is **less than** 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.**

XP/XR SERIES PRODUCT SPECIFICATIONS

The following chart shows fan performance for the XP & XR Series Fan:

Typical CFM Vs Static Suction "WC									
	0"	.25"	.5"	.75"	1.0"	1.25"	1.5"	1.75"	2.0"
XP101	125	118	90	56	5	-	-	-	-
XP151	180	162	140	117	78	46	10	-	-
XP201	150	130	110	93	74	57	38	20	-
XR161	215	175	145	105	75	45	15	-	-
XR261	250	215	185	150	115	80	50	20	-

Maximum Recommended Operating Pressure*		
XP101	0.9" W.C.	(Sea Level Operation)**
XP151	1.3" W.C.	(Sea Level Operation)**
XP201	1.7" W.C.	(Sea Level Operation)**
XR161	1.3" W.C.	(Sea Level Operation)**
XR261	1.6" W.C.	(Sea Level Operation)**

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

Power Consumption @ 120 VAC	
XP101	40 - 49 watts
XP151	45 - 60 watts
XP201	45 - 66 watts
XR161	48 - 75 watts
XR261	65 - 105 watts

XP Series Inlet/Outlet: 4.5" OD (4.0" PVC Sched 40 size compatible)

XR Series Inlet/Outlet: 5.875" OD

Mounting: Mount on the duct pipe or with optional mounting bracket.

Recommended ducting: 3" or 4" Schedule 20/40 PVC Pipe

Storage temperature range: 32 - 100 degrees F.

Normal operating temperature range: -20 - 120 degrees F.

Maximum inlet air temperature: 80 degrees F.

Size: 9.5H" x 8.5" Dia.

Weight: 6 lbs. (XR261 - 7 lbs)

Continuous Duty

Thermally protected

Class B Insulation

3000 RPM

Residential Use Only

Rated for Indoor or Outdoor use

LISTED Electric Fan ETL® Tested to UL Std. 507

77728

GP SERIES PRODUCT SPECIFICATIONS

The following chart shows fan performance for the GPx01 Series Fan:

Typical CFM Vs Static Suction "WC	1.0"	1.5"	2.0"	2.5"	3.0"	3.5"	4.0"
GP501	95	87	80	70	57	30	5
GP401	93	82	60	38	12	-	-
GP301	92	77	45	10	-	-	-
GP201	82	58	5	-	-	-	-

Maximum Recommended Operating Pressure*		
GP501	3.8" W.C.	(Sea Level Operation)**
GP401	3.0" W.C.	(Sea Level Operation)**
GP301	2.4" W.C.	(Sea Level Operation)**
GP201	1.8" W.C.	(Sea Level Operation)**

**Reduce by 10% for High Temperature Operation*

***Reduce by 4% per 1000 feet of altitude*

Power Consumption @ 120 VAC	
GP501	70 - 140 watts
GP401	60 - 110 watts
GP301	55 - 90 watts
GP201	40 - 60 watts

Inlet/Outlet: 3.5" OD (3.0" PVC Sched 40 size compatible)

Mounting: Fan may be mounted on the duct pipe or with integral flanges.

Weight: 12 lbs.

Size: 13H" x 12.5" x 12.5"

Recommended ducting: 3" or 4" Schedule 20/40 PVC Pipe

Storage temperature range: 32 - 100 degrees F.

Normal operating temperature range: -20 - 120 degrees F.

Maximum inlet air temperature: 80 degrees F.

Continuous Duty

Class B Insulation

3000 RPM

Thermally protected

Rated for Indoor or Outdoor Use

GP301C / GP501C Rated for Commercial Use

LISTED Electric Fan ETL® Tested to UL Std. 507

77728

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the GPx01/XP/XR 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.** Return unit to factory for service.

Install the GPx01/XP/XR Series Fan in accordance with all EPA standard practices, and state and local building codes and state regulations.

WARRANTY

Subject to any applicable consumer protection legislation, RadonAway warrants that the GPX01/XP/XR/RP 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 replace any Fan which fails due to defects in materials or workmanship. 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.

5 YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION.

RadonAway will extend the Warranty Term of the fan to 5 years from date of manufacture if the Fan is installed in a professionally designed and professionally installed radon system or installed as a replacement fan in a professionally designed and professionally installed radon system. Proof of purchase and/or proof of professional installation may be required for service under this warranty. Outside the Continental United States and Canada the extended Warranty Term is limited to one (1) year from the date of manufacture.

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

EXCEPT AS STATED ABOVE, THE GPx01/XP/XR/RP 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 cost to and from factory.

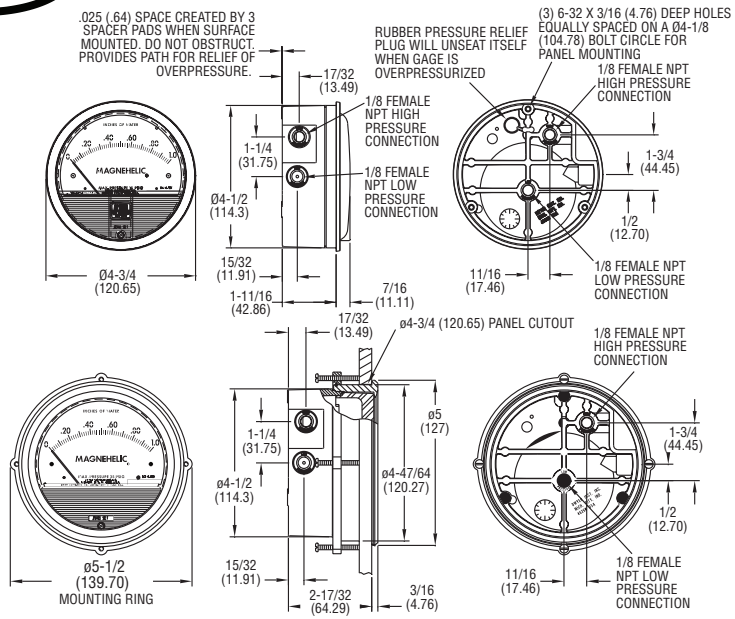
RadonAway
3 Saber Way
Ward Hill, MA 01835
TEL. (978) 521-3703
FAX (978) 521-3964

Record the following information for your records:

Serial No._____
Purchase Date_____

Bulletin A-27

Magnehelic® Differential Pressure Gage



**The blowout plug is not used on models above 180 inches of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm.*

STANDARD GAGE ACCESSORIES: Two 1/8″ NPT plugs for duplicate pressure taps, two 1/8″ pipe thread to rubber tubing adapters and three flush mounting adapters with screws.

MP AND HP GAGE ACCESSORIES: Mounting ring and snap ring retainer substituted for 3 adaptors, 1/4" compression fittings replace 1/8" pipe thread to rubber tubing adaptors.

OVERPRESSURE PROTECTION: Standard Magnehelic® Differential Pressure Gages are rated for a maximum pressure of 15 psig and should not be used where that limit could be exceeded. Models employ a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (excludes MP and HP models). To provide a free path for pressure relief, there are four spacer pads which maintain .023″ clearance when gage is surface mounted. Do not obstruct the gap created by these pads.

SPECIFICATIONS

Service: Air and non-combustible, compatible gases. (Natural Gas option available.)
Wetted Materials: Consult factory.
Housing: Die cast aluminum case and bezel, with acrylic cover. (MP model has polycarbonate cover).
Accuracy: ±2% of full scale (±3% on - 0, -100 Pa, -125 Pa, 10MM and ±4% on -00, - 00N, -60 Pa, -6MM ranges), throughout range at 70°F (21.1°C).
Pressure Limits: -20″ Hg to 15 psig.† (-0.677 bar to 1.034 bar); MP option: 35 psig (2.41 bar), HP option: 80 psig (5.52 bar).
Overpressure: Relief plug opens at approximately 25 psig (1.72 bar), standard gages only. The blowout plug is not used on models above 180 inches of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm.
Temperature Limits: 20 to 140°F (-6.67 to 60°C). *Low temperature models available as special option.
Size: 4″ (101.6 mm) diameter dial face.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Process Connections: 1/8″ female NPT duplicate high and low pressure taps - one pair side and one pair back.
Weight: 1 lb 2 oz (510 g), MP & HP 2 lb 2 oz (963 g).
Agency Approvals: RoHS.

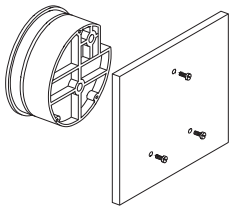
†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options.

Note: May be used with hydrogen when ordering Buna-N diaphragm. Pressure must be less than 35 psi.

INSTALLATION

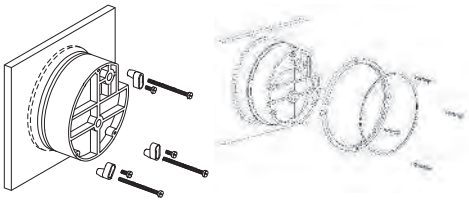
Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F (60°C). Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines may be run any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping.
All standard Magnehelic® Differential Pressure Gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions with only rezeroing. Low range models of 0.5" w.c. plus 0.25" w.c. and metric equivalents must be used in the vertical position only.

SURFACE MOUNTING



Locate mounting holes, 120° apart on a 4-1/8" dia. circle. Use No. 6-32 machine screws of appropriate length.

FLUSH MOUNTING



Provide a 4-9/16" dia. (116 mm) opening in panel. Provide a 4-3/4" dia. (120 mm) opening for MP and HP models. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with adapters, firmly secured in place.

PIPE MOUNTING

To mount gage on 1-1/4" - 2" pipe, order optional A-610 pipe mounting kit.

TO ZERO GAGE AFTER INSTALLATION

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

OPERATION

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.
Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.
Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.
When one side of the gage is vented in dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

A. For portable use of temporary installation use 1/8" pipe thread to rubber tubing adapter and connect to source of pressure with flexible rubber or vinyl tubing.
B. For permanent installation, 1/4" O.D., or larger, copper or aluminum tubing is recommended.

MAINTENANCE

No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves should be used in permanent installations. The Series 2000 is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

WARNING

Attempted field repair may void your warranty. Recalibration or repair by the user is not recommended.

TROUBLE SHOOTING TIPS

Gage won't indicate or is sluggish.

1. Duplicate pressure port not plugged.
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O"ring damaged, missing.
5. Pressure sensor, (static tips, Pitot tube, etc.) improperly located.
6. Ambient temperature too low. For operation below 20°F (-7°C), order gage with low temperature, (LT) option.

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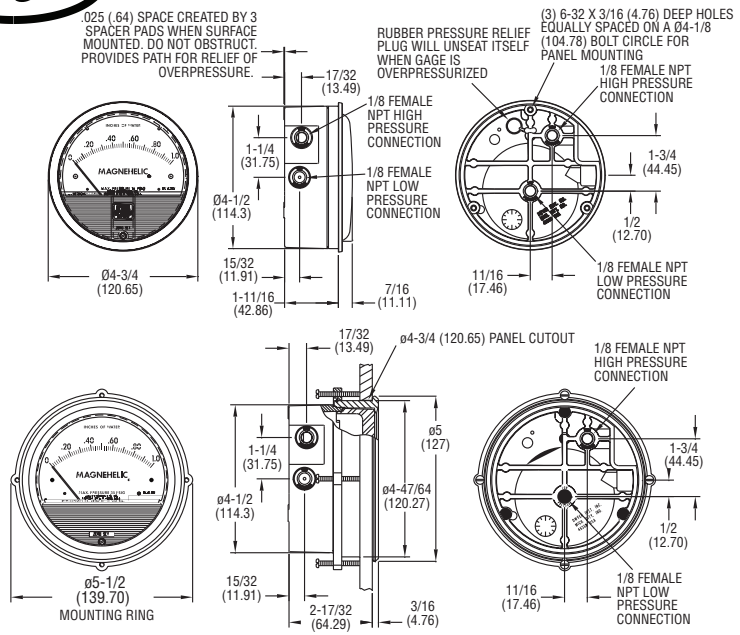
Magnehelic® Differential Pressure Gage
INSTRUCCIONES Y LISTA DE PARTES



(El tapón de goma no es usado en los modelos sobre 180 pulgadas de presión de agua, modelos de presión media o alta, o en instrumentos que requieren un elastizado en cualquier otro material que no sea silicona para el diafragma.)

Accesorios: Tapones 1/8" NPT para las conexiones duplicadas, dos adaptadores de rosca 1/8" NPT a tubo de goma; y tres adaptadores para montaje al ras y tornillos.

Accesorios para Los Modelos MP y HP: El anillo de montaje y el retensor del anillo de presión son substituidos por 3 adaptadores, accesorios de compresión de 1/4" remplazan a los adaptadores de rosca 1/8" a tubo de goma.

Protección Para Sobrepresión: Los Manómetros Diferenciales Magnehelic Estándar están clasificados para una presión máxima de 15 psi y no se deberían de usar donde el límite puede excederse. Los modelos emplean un tapón de goma en el trasero que funciona como una válvula de alivio desmontándose y ventilando el interior del instrumento cuando la sobrepresión alcanza aproximadamente 25 psig. (Los modelos MP y HP son excluidos) Para proveer un camino libre para el alivio de presión, el instrumento viene con rodilleras que mantienen un espacio de .023" cuando el instrumento es montado en superficie. No bloque el espacio creado por estas rodilleras.

† Para aplicaciones con alto ciclo de velocidad dentro de la clasificación de presión total del instrumento, la próxima clasificación mas alta es recomendada. Vea las opciones de media y alta presión.

El instrumento puede ser usado con hidrogeno cuando se ordena con diafragma de Buna-N. La presion tiene que ser menos de 35 psi.

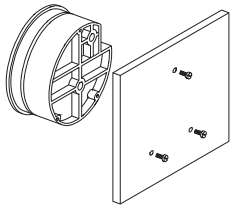
ESPECIFICACIONES

Servicio: aire y gases no combustibles, gases compatibles. (ópcion disponible para uso con gas natural).
Materiales Mojados: Consulte con la fábrica.
Carcasa: Caja y anillo de retención de aluminio fundido a presión con tapadera de acrílico. (El modelo MP tiene la tapadera de policarbonato.)
Exactitud: ±2% de fondo de escala a 21 °C
Mod. 2000-0 ±3%; Mod. 2000-00 ±4%
Límite de Presión: -20 Hg. a 15 psig. † (-0.677 bar a 1,034 bar); opción MP: 35 psig (2.41 bar), opción HP: 80 psig (5.52 bar).
Sobrepresión: El tapón de alivio se abre aproximadamente a los 25 psig, modelos estandard únicamente. El tapón de goma no es usado en los modelos sobre 180 pulgadas de presión de agua, modelos de presión media o alta, o en instrumentos que requieren un elastizado en cualquier otro material que no sea silicio para el diafragma.
Límite de Temperatura: -6.67 a 60ºC. * Modelos de baja temperatura disponibles como opción especial.
Dimensiones: diám. 120,65 mm x 55,6 prof.
Orientación de Montaje: El diafragma debe ser usado solo en posición vertical. Consulte con la fábrica para otras orientaciones de posición.
Conexiones: 1/8" NPT para alta y baja presión, duplicadas (atrás, a los lados).
Peso: 510 g, MP y HP 963 g.
Aprobación de la agencia: RoHS.

Instalacion

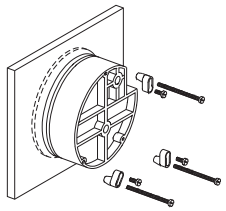
Seleccione un lugar libe de exceso de vibraciones, y donde la temperatura ambiente no supere los 60°C. Evite luz solar directa, para evitar decoloración de la cubierta plástica. Las conexiones de proceso pueden tener cualquier longitud sin afectar la exactitud, pero pueden extender el tiempo de respuesta del instrumento. Si hay pulsación de presión o vibración, consulte a fábrica sobre medios de amortiguación.
Los MAGNEHELIC han sido calibrados con el diafragma vertical, y deben ser usados en esas condiciones. Para otras posiciones, se debe especificar en la orden de provisión. Los de rango elevado pueden ser usados en diversas posiciones, pero se debe reajustar el cero. Los modelos de la serie 2000-00 y equivalentes métricos deben ser usados solo verticalmente.

Montaje en Superficie



Perfore tres orificios separados 120° sobre una circunferencia de 105 mm de diám. y sostenga el instrumento con tres tornillos 6-32 de long. apropiada.

Montaje alineado



Perfore un circulo de 115 mm de diám. en el panel, y sostenga el instrumento mediante los.

Montaje Sobre Pipa

Para montar el instrumento sobre pipas de 32 a 50 mm de diám., ordene el adaptador opcional A-610.

Puesta a Cero Después de Instalar

Deje las conexiones de presión abiertas a atmósfera y ajuste a cero desde tornillo del panel frontal.

Operacion

Presión Positiva: Conecte la tubería desde la fuente de presión a cualquiera de las dos conexiones de alta presión (HIGH), bloqueando la no usada; Las conexiones de baja (LOW) presión pueden dejarse uno o los dos abiertos a la atmósfera.
Presión Negativa: Repita el procedimiento anterior, conectado en este caso las conexiones de baja presión (LOW). Deje las otras conexiones abiertas.
Presión diferencial: Conecte el tubo correspondiente a la presión más positiva al cualquiera de los conectores de alta presión (HIGH) bloqueando el no usado, y la más baja presión o presión negativa (vacío) al conector de baja presión (LOW). Puede usarse cualquier conector de cada par, dejando siempre uno bloqueado. Si se deja una conexión abierta a la atmósfera, se recomienda el uso de un filtro tipo A-331 en el lugar correspondiente para mantener limpio el interior del instrumento. Para uso portable, o instalación temporaria, uso adapta dores para rosca de tubo de 1/89 a tubo flexible, y conecte a proceso mediante una tubería de goma, o equivalente. Para instalación permanente, se recomienda el uso de tubo de cobre o aluminio de por lo menos 1/4" de diám. exterior.

No se requiere mantenimiento específico alguno, ni lubricación. Periódicamente, desconecte el instrumento, ventee la presión acumulada, y reajuste el cero. Para instalaciones permanentes, se debe usar un juego de válvulas de montaje permanente para el venteo.
El instrumento de Serie 2000 no puede ser re parado en el campo y debería de ser regresado si reparos son necesarios (Reparos en el campo no deben de ser intentados y pueden cancelar la garantía.). Asegurarse de incluir una descripción breve del problema más cualquier notas pertinentes a la aplicación para devolución de productos antes de enviar el instrumento.

Cuidado! : La recalibración en campo puede invalidar la garantía. No se recomienda la recalibracion por parte del usuario. En caso necesario envie el instrumento con transporte pago a:

Localización De Fallas

• *El instrumento no indica, o es lento en reacción.*
1. Conexión duplicada abierta.
2. Diafragma roto por sobrepresión.
3. Tubería de conexión perforada, con pérdidas o pinchazos.
4. Anillo de retención flojo, u "O " ring dañado.
5. Conexión a proceso indebida o inadecuada.
6. Temperatura muy baja. Para este caso ordene tipos LT (baja temperatura).

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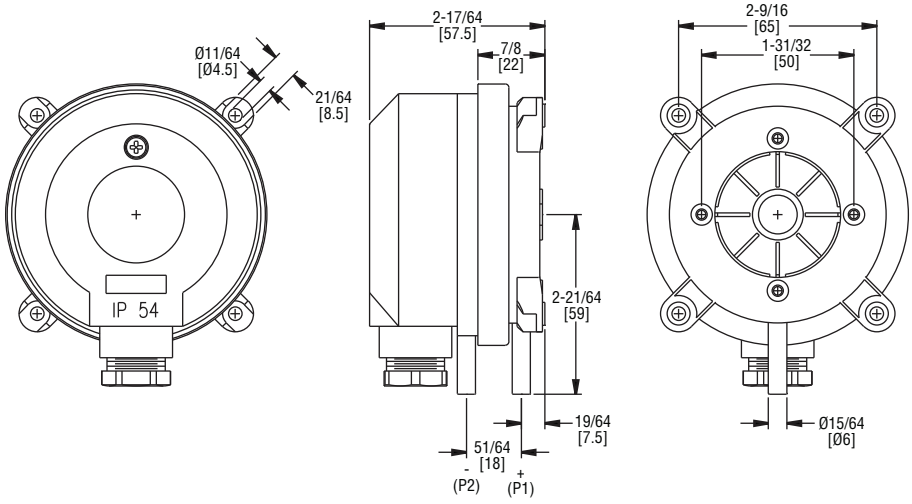
Series ADPS Differential Pressure Switch

Specifications - Installation and Operating Instructions



The Series ADPS Adjustable Differential Pressure Switch is designed for overpressure, vacuum, and differential pressure applications. The scaled adjustment knob allows changes to the switching pressure to be made without a pressure gage. The ADPS is available with settings from 0.08˝ w.c. (20 Pa) to 20˝ w.c. (5000 Pa). The silicone diaphragm and PA 6.6 body make the Series ADPS perfect for use with air and other noncombustible gases. The Series ADPS can be used in monitoring air filters, ventilators, and industrial cooling-air circuits along with controlling air and fire-protection flaps and many other applications.

Use only with mediums such as air, or other noncombustible or non-aggressive gases. Otherwise operating faults or accidents may occur.

Mounting Switch

First check the pressure switch to ascertain whether any damage is visible on the housing. If the housing is leaky because of damage, the pressure switch must not be used.

Switching pressure specifications apply to vertical installation which is also the recommended position with pressure connections pointing downwards.

Only if there is no potential for condensate forming can you mount the pressure switch horizontally. In this case, however, the switching values are approximately 0.08 in w.c. (20 Pa) higher as indicated on the scale. In the horizontal position, the pressure switch should be mounted 'lying down' only (that is to say with the electrical connections pointing upwards). Do not mount the pressure switch in a hanging position (that is to say, not 'overhead' with the electrical connections pointing downwards). Otherwise the device will function inaccurately.

a) Mounting with screws or brackets

1. To mount the pressure switch, L-shaped A-288 and S-shaped A-289 mounting brackets can be ordered separately. To secure the device on the rear side of the housing, only use the sheet metal screws (3.5 x 8 mm) which are supplied together with the mounting brackets. Under no circumstances must you use longer screws. Otherwise, the base of the housing could be punctured resulting in the pressure switch leaking.

2. You can also mount the pressure switch directly on a wall. To do this use screws with a maximum diameter of 0.315˝ (8.0 mm), if you use the outer mounting lugs to screw the device in place. Do not tighten the screws so much that the base of the device is deformed. Otherwise, the pressure switch can be shifted out of position, or leak.

SPECIFICATIONS

Service: Air and noncombustible, compatible gases.
Wetted Materials: Diaphragm material: Silicone; Housing material & switch body: POM and PA 6.6; Cover: Polystyrene.
Temperature Limits: Process ambient temperature from -4 to 185˚F (-20 to 85˚C).
Pressure Limits: Max. Operating Pressure: 40" W.C. (10 kPa) for all pressure ranges.
Switch Type: Single-pole double-throw (SPDT).
Repeatability: ±15% FS.
Electrical Rating: Standard: Max., 1.5A/250 VAC, max. switching rate: 6 cycles/min.; Gold Contact Option: 0.4 A/ 250 VAC.
Electrical Connections: Push-on screw terminals. M20x1.5 with cable strain relief or optional 1/2˝ NPT connection.
Process Connections: 5/16˝ (7.94 mm) outside diameter tubing, 1/4˝ (6.0 mm) inside diameter tubing.
Mounting Orientation: Vertically, with pressure connections pointing downwards.
Mechanical Working Life: Over 10^6 switching operations.
Weight: 5.6 oz (160 g).
Enclosure Rating: IP54.
Agency Approvals: CE, RoHS.

Installing Hoses

Important: Pressure tubing cannot be kinked. Pay particular attention to this point if you run hoses over an edge. It is better to form a loop. If the hoses are kinked, the device cannot function accurately.

a) For connection to the pressure switch two fittings inherent in the housing are provided for hoses with an internal diameter of 1/4˝ (6.0 mm).

1. Connect a hose with the higher pressure to socket P1 which is located on the lower section of the housing.

2. Connect a hose with the lower pressure to socket P2 which is located on the middle section of the housing.

After you have installed the hoses, it is absolutely essential to check them for tightness of fit at the connection points and to make sure that they run without any kinks.

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Electrical Connection
Work on electrical installations must only be carried out by electricians who are specifically trained for this purpose.

⚠CAUTION First make sure that there is no voltage on the connecting cable while you are working on the electrical connections. Otherwise, a possible electric shock may result and the connected equipment may be damaged. The connecting cable can be run to the pressure switch from three sides, according to choice. The screw cable connection has a plug-in design for this purpose. Rotate protective cover accordingly.

For cable gland models, the seal in the screw cable connection is designed for cables with alternative sheath diameters of 0.275˝ (7 mm) or 0.393˝ (10 mm). Only use these sizes – otherwise the screw cable connection cannot seal adequately.

1. If using a 0.275˝ (7 mm) connecting cable, you can line up the press nut, the plain washer and the sealing ring directly on the cable.

2. If using a 0.393˝ (10 mm) connecting cable, you must first break the inner rubber ring out of the sealing ring directly on the cable. Then line up the press nut, the plain washer and the sealing ring on the cable.

Wiring
The switching device in this pressure switch is designed as a change-over contact as can be seen from the wiring diagram (Figure 1). The rest position is shown in Figure 1 (pressure below the activation switch point on dial).

1. In the instance where pole 3 (COM) closes to Pole 2, the pressure is increasing (NO).

2. In the instance where pole 3 (COM) closes to Pole 1, the pressure is decreasing (NC).

Protect the feed line (to pole 3) by fuse, either in control system or along the line, and do so with:

1. Max. 1.5 A / 250 VAC, if you are loading the contact with an resistive load;

2. Max 0.4 A / 250 VAC, if you are loading the contact with an inductive load (such as relay);

3. Max. 0.1 A / 250 VDC, if you are using the pressure switch in the weak current version with gold-plated contacts.

The connections are intended for crimp-type sockets, 0.25 in (6.3 mm).

1. Make sure the crimp connection is perfect, and that the cable lugs fit properly on to the connections.

2. If you do not have any crimp-type sockets available, you can also use the cable lugs which are supplied with mounted screw terminals. However, these are only intended for rigid copper wire.

3. On flex, it is either necessary to crimp on strand end sleeves – and then you can also screw the strands on – or to crimp cable lugs on directly as previously described.

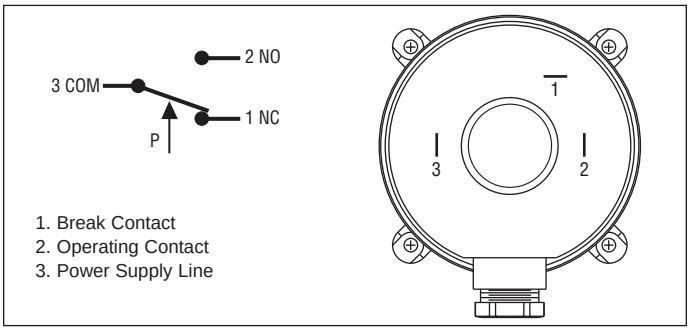

Figure 1

Setting the Pressure Range
Make absolutely certain that there is no voltage on the electrical connections before you carry out any setting on the pressure switch. Otherwise, it could be fatal if you accidentally touch the electrical connections or the metal adjusting screw while you are performing the settings.

a) Use the adjustment dial to set the pressure which should trip the switch on an increase of pressure.

1. The indications on the dial are only correct for the vertical mounting position.

2. When the pressure falls, the switch returns to its resting position as soon as the pressure falls below the dead band.

Attaching Cover
a) Insert the screw cable connection into the recess provided for this purpose on the housing.

b) Then place the housing cover in position and screw it down evenly on to the pressure switch.

Testing the Setting
Do not operate the system until the housing is closed. Otherwise there is the possibility of an electric shock if you accidentally touch live parts.
Check the trip and reset pressures by slowly increasing the pressure and then allowing it to fall again.

IMPORTANT: Observe the maximum permissible operating pressure of 40˝ w.c. (10 kPa) which is indicated in the data sheet. Otherwise the pressure switch may be damaged.

MAINTENANCE
Upon final installation of the Series ADPS Adjustable Differential Pressure Switch, no routine maintenance is required. A periodic check of system operation is recommended. The Series ADPS is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

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Appendix C

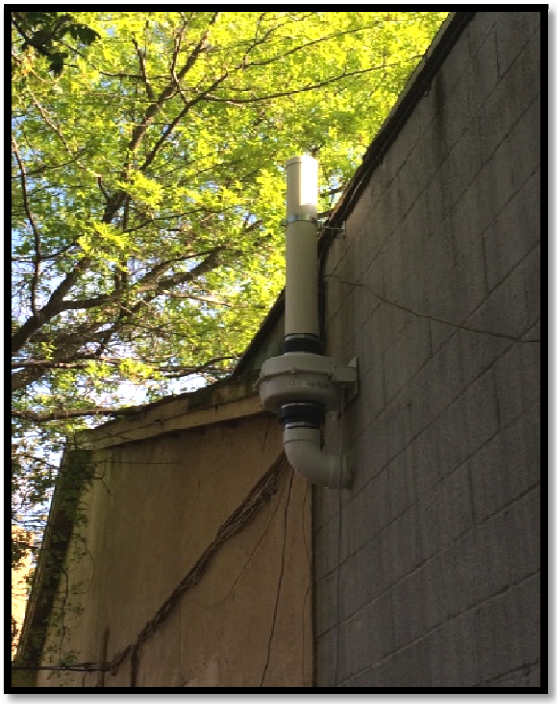
Vapor Mitigation System Photo Description

Alpine Environmental Services, Inc., 438 New Karner Road, Albany, New York 12205
Ph. (518) 250-4047; Fax (518) 250-4353

May 2016

80 Herricks Road
Mineola, NY

Systems monitoring panel



System 2B fan and exhaust piping

Extraction pipe 2B-1 balancing valve and labeling

System 2A fan and exhaust piping

Extraction Point 2A-1

System 1B horizontal piping run

SVTT1 removed and capped

Extraction Point 2A-3

Extraction Point 3A-5

Extraction Points 1B-3 and 1B-4

Appendix D

Vapor Mitigation System Inspection & Monitoring

- Inspection Procedures
- Operating Pressure Spreadsheet
- Repair / Modification Log

Alpine Environmental Services, Inc., 438 New Karner Road, Albany, New York 12205
Ph. (518) 250-4047; Fax (518) 250-4353

1.0 Vapor Mitigation System Annual Inspection Procedures

A periodic inspection is recommended to verify the VMS is operating as designed. At a minimum, an annual inspection should be performed. Prior to performing any test or inspection on the system, notify parties managing the building and parties monitoring the low pressure alarms of the intent to test/inspect.

Inspection Procedures:

1.01 System Fan: Observe the fan during operation. Pay special attention to any abnormal noises coming from the fan, buzzing or scraping, or no sound at all. If abnormal noises (i.e. scraping, buzzing, cyclical pointed sounds, or no operational sound at all, etc.) are observed, refer to the Troubleshooting Guide (Section 6.3.4 of O & M Manual). Observe the exhaust stack for possible obstructions (i.e. ice, etc.). Please Note: The system fans are designed to be maintenance free, for the life of the fans. All moving parts of the system are sealed in the fan-housing unit. The fan-housing unit should only be opened by the fan manufacturer. Any attempt to open the fan-housing unit will destroy the factory-installed seals and void any warranty, parts and labor, on the fan.

1.02 System Piping and Connections: Inspect the exposed system piping and connections for any breach or damage. Repair or replace any observed damage effecting system operation.

1.03 Slab/System Interface Seals: Inspect the seal at each of the extraction pipe (a breach in the seal should produce an air leak noise when the system is in operation). If breech is observed, caulk with polyurethane caulk

1.04 Pressure Differential: Test system differential pressure gauges for functionality. Remove input line or shut down sub-system to verify differential pressure gauges return to a zero reading. Replace any dysfunctional differential pressure gauges and restore sub-system operation.

1.05 Observe the pressure differential readings on the monitoring panel for the system. Record the differential pressure in the table provided (Section 2.0 below). Compare the differential pressure in the sub-system

exhaust stack to the acceptable operating pressure. If static pressure is outside the acceptable range, evaluate the fan for problems. If no problems are identified with the fan, perform sub-slab pressure testing to verify the sub-slab pressure field extension (PFE) is sufficient under the "new" static operating pressure. Adjust system ball valves as needed to redistribute PFE. If acceptable PFE cannot be achieved, replace the system fan.

1.06 Electrical: Observe electrical components for damage. Repair damaged components. Test system electrical disconnects / switches for functionality. Repair any dysfunctional components.

1.07 Inspection Documentation: Document the inspection (Table A), sub-system and extraction line pressure readings (Section 2.0), and any repairs or modifications made (Section 3.0) and maintain a logbook of the periodic inspections for the life of the mitigation system.

TABLE A

Inspection Date	Inspector Name	Address/Phone #	Inspection Result

2.0 Vapor Mitigation System Pressure Gauge Readings:

Date:	Initial Reading: May 19, 2016				
Sub-system 1A					
RadonAway GP501 Operating Pressure	-3.5"WC				
Acceptable Operating Range:	-0.25 to -3.8"WC				
Sub-system 2A					
RadonAway GP501 Operating Pressure	-2.85"WC				
Acceptable Operating Range:	-0.25 to -3.8"WC				
Sub-system 3A					
RadonAway GP501 Operating Pressure	-1.45"WC				
Acceptable Operating Range:	-0.25 to -3.8"WC				
Sub-system 4A					
RadonAway GP501 Operating Pressure	-2.95"WC				
Acceptable Operating Range:	-0.25 to -3.8"WC				
Sub-system 1B					
RadonAway GP501 Operating Pressure	-3.3"WC				
Acceptable Operating Range:	-0.25 to -3.8"WC				
Sub-system 2B					
RadonAway GP501 Operating Pressure	-2.1"WC				
Acceptable Operating Range:	-0.25 to -3.8"WC				

3.0 Repair Log

	Date:	Date:	Date:
Component (ie fan, gauge, etc.)			
Description of the Deficiency or Problem			
Description of the Modification or Repair			

	Date:	Date:	Date:
Sub System ID			
Component (ie fan, gauge, etc.)			
Description of the Deficiency or Problem			
Description of the Modification or Repair			