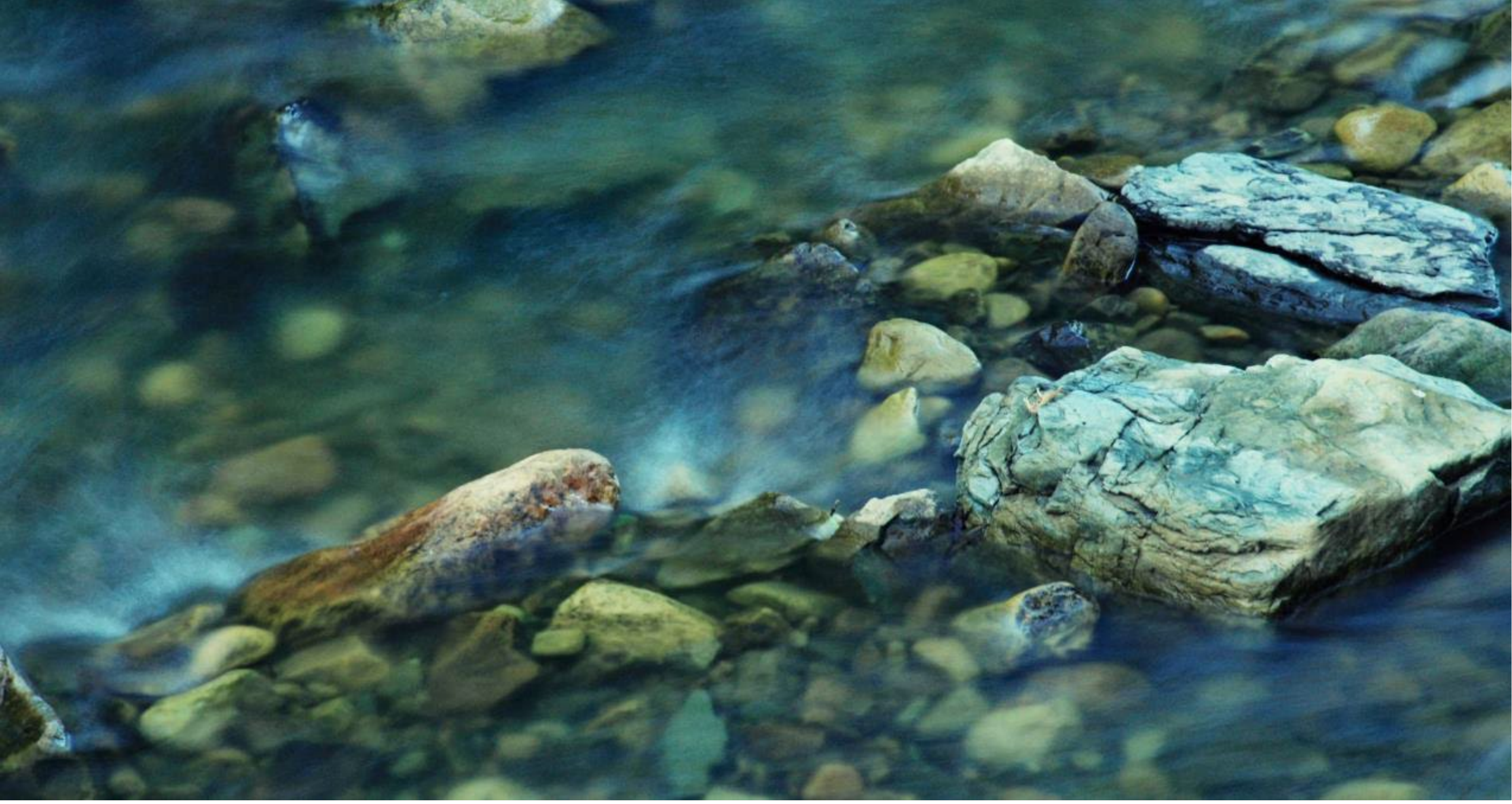

September 2024
3-60 Beach 79th Street, Far Rockaway, New York
(BCP Site No. C241207)

Sub Slab Depressurization System Design and Installation Work Plan

Prepared for 79 Arverne Development, LLC

September 2024
3-60 Beach 79th Street, Far Rockaway, New York
(BCP Site No. C241207)

Sub Slab Depressurization System Design and Installation Work Plan

Prepared for
79 Arverne Development LLC
220-46 73rd Avenue
Bayside, New York 11364

Prepared by
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290 Elwood Davis Rd #340
Liverpool, NY 13088

Project Number: E32805-01.01
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CERTIFICATION

I, Margaret A. Carrillo-Sheridan, certify that I am currently a New York State registered professional engineer as defined in 6 NYCRR Part 375 and that this *Sub Slab Depressurization System Design and Installation Work Plan* was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER *Technical Guidance for Site Investigation and Remediation* (DER-10) and DER *Green Remediation* (DER-31).

Date: Sept 24, 2024

Margaret A. Carrillo-Sheridan, PE
New York State Professional Engineer, License No. 082251

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TABLE OF CONTENTS

IN-TEXT TABLES

IN-TEXT FIGURES

APPENDICES

ABBREVIATIONS

Abingdon	Abingdon Capital LLC
AMSL	above mean sea level
BCP	Brownfield Cleanup Program
cis-1,2-DCE	cis-1,2-Dichloroethylene
CAMP	Community Air Monitoring Plan
COC	Constituent of Concern
CVOC	chlorinated volatile organic compound
CY	cubic yards
DNAPL	Dense Non-Aqueous Phase Liquid
DOB	Department of Buildings
DUSR	Data Usability Summary Report
EnviroTrac	EnviroTrac Engineering PE PC
Eurofins	Eurofins Environmental Testing Northeast, LLC
FER	Final Engineering Report
GEI	GEI Consultants, Inc., P.C.
lb	pound
Lot 14 building	off-Site building located on Tax Parcel Block 16100, Lot 14
ND	not detected
NYCDOHMH	New York City Department of Health & Mental Hygiene
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OLM	oil like material
OM&M	Operation, Maintenance, and Monitoring
OVA	organic vapor analyzer
PCE	Tetrachloroethylene
PDI	Pre-Design Investigation
PID	photoionization detector
PM10	particulate matter less than 10 microns in diameter
Posillico	Posillico Inc.
ppm	parts per million
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RAWP	Remedial Action Work Plan
RD	Remedial Design
RDD	Remedial Design Document

RI	Remedial Investigation
SCO	soil cleanup objective
SMP	Site Management Plan
SSDS	sub-slab depressurization system
SSDS Design/Work Plan	Sub Slab Depressurization System Design and Installation Work Plan
TCE	Trichloroethylene
TOC	total organic carbon
TOGS 1.1.1	Technical and Operational Guidance Series (1.1.1)
trans-1,2-DCE	trans-1,2-DCE
UST	underground storage tank
VC	Vinyl Chloride
VOC	volatile organic compound

1 Introduction

Anchor QEA Engineering, PLLC (Anchor QEA) has prepared this *Sub Slab Depressurization System Design and Installation Work Plan* (SSDS Design/Work Plan) on behalf of 79 Arverne Development LLC to support the installation of a subslab depressurization system (SSDS) at the 3-60 Beach 79th Street, Far Rockaway, Queens County Site (the Site). The SSDS will be installed in an off-site building located immediately west of the Site as required in the New York State Department of Environmental Conservation (NYSDEC) Decision Document (Decision Document; NYSDEC, August 2021). The Site remediation is being conducted under the NYSDEC Brownfield Cleanup Program (BCP), Site No. C241207.

As presented in the Decision Document, the selected Site remedy is a Track 4 remedy: restricted use with site-specific soil cleanup objectives (SCOs). The SSDS will be installed in the existing off-Site building located on Tax Parcel Block 16100, Lot 14 (Lot 14 building).

This SSDS Design/Work Plan has been prepared in general accordance with NYSDEC's *Technical Guidance for Site Investigation and Remediation* (DER-10) (NYSDEC, 2010).

1.1 Objective

The objective of the SSDS is to address the potential for vapor intrusion associated with volatile organic compounds (VOCs) present in soil vapor under the Lot 14 building to migrate into the interior space of the Lot 14 building.

1.2 SSDS Design Background

A Draft SSDS design was included as an appendix to the *Remedial Design Document* (RDD) prepared by GEI Consultants, Inc., P.C. (GEI) and dated October 2023. The RDD was subsequently approved by NYSDEC and NYS Department of Health (NYSDOH). The SSDS design prepared by GEI was not signed or stamped by a licensed professional engineer, proposed a total of seven extraction points and four vacuum monitoring points. The approved design deferred specification of blower equipment until after the extraction and monitoring points were installed.

1.2.1 Pilot Test

To confirm the conceptual layout and number of extraction and monitoring points were appropriate based on the building size and subsurface conditions, Anchor QEA prepared a Pilot Test Work Plan letter describing the proposed testing to be performed to confirm the design and operating parameters of the proposed SSD System. This work plan letter was submitted to NYSDEC and NYSDOH on June 17, 2004. The Pilot Test Work Plan was approved by NYSDEC and NYSDOH on June 28, 2024.

Anchor QEA and our SSDS design subconsultant EnviroTrac Engineering PE PC (EnviroTrac) implemented the Pilot Test Work Plan on July 19, 2024. A copy of the Pilot Test Report prepared by EnviroTrac is included as Appendix A to this SSDS Design/Work Plan.

1.2.2 Foundation Assessment and Repair

As part of the Pilot Test, Anchor QEA and EnviroTrac performed a visual assessment of the interior and exterior of the building, to determine optimal placement of the extraction points and to identify areas of the building foundation that required repair or maintenance. Based on the visual assessment, Anchor QEA and EnviroTrac identified two areas of the building foundation that were damaged (on the southwestern side), and the underlying soil had partially eroded. As described in Appendix A, the testing results indicated the damaged areas would adversely affect the operation of a full-scale system in this portion of the building.

The building owner was notified of the damaged foundation and commenced with repairs in August 2024. The repairs consisted of filling the void space (caused by the eroded soils) with RR401FAST® Polyurethane Foam Material manufactured by HMI Company. A photograph of the repaired foundation, along with a technical specification sheet for the foam material are included as Appendix B.

1.3 SSDS design/Work Plan Organization

This SSDS Design/Work Plan has been organized into sections as described in the following table.

Table 1-1
SSDS Design/Work Plan Organization

Section	Description
Section 1 – Introduction	Presents the purpose and scope of this SSDS Design/Work Plan Report as well as the site description and project background
Section 2 – SSDS Design	Describes the SSDS Design prepared by EnviroTrac.
Section 3 – SSDS Installation Approach	Presents a description of the proposed SSDS installation and testing to be performed by EnviroTrac.
Section 4 – Air Monitoring	Describes the air monitoring to be performed during SSDS installation.
Section 5 – Schedule and Reporting	Presents the proposed schedule and reporting activities to document the activities described in this SSDS Design/Work Plan.
Section 6 – References	Presents a list of documents used to support the preparation of this SSDS Design/Work Plan.
Appendices	Provides the SSDS pilot study report, SSDS design, and SSDS installation work plan (all prepared by others).

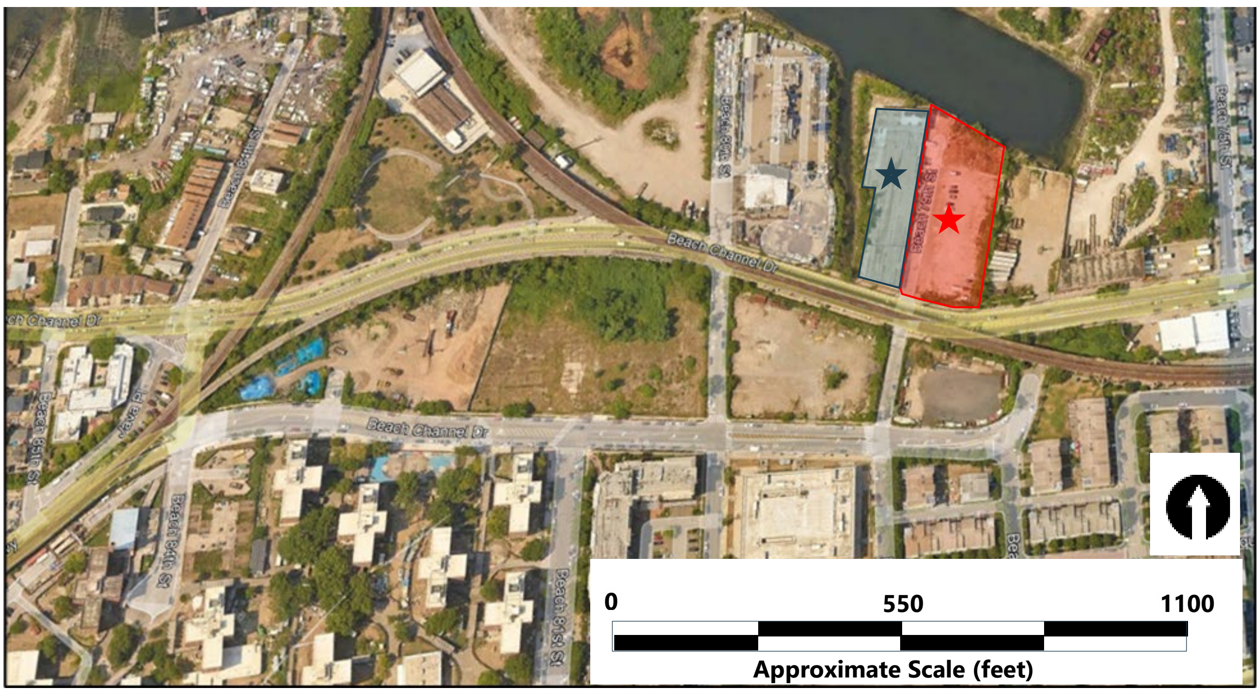
1.4 Site Background

This Section presents high level Site background information including the Site location and historical Site uses. Additional detail is provided in previous investigation reports.

1.4.1 Location and Setting

The Site is in Far Rockaway on Jamaica Bay on Tax Parcel Block 16100, Lot 18. The total Site area is 1.28 acres. Figure 1-1 below presents a Site Location Map.

Figure 1-1
Site Location Map



Source: Google Earth

★ Approximate Site Location

★ Lot 14 Building Location

The Site is bounded by Barbadoes Basin to the north, Beach Channel Drive to the south, a paved parking lot to the east, and a large commercial building (Tax Parcel Block 16100, Lot 14; the subject of this SSDS Design/WP) to the west. Brandreth Creek is located immediately west of the commercial building.

1.4.2 Site History

Historical Site uses from prior to 1894 to present included an ice factory, coal yard, bicycle manufacturing corporation, solid waste management, and various manufacturing businesses. A gasoline tank was shown on the western portion of the Site in the 1933 Sanborn Fire Insurance Map when the Site was utilized as a coal yard. The Site is an inactive NYSDEC solid waste management facility that was used for processing of construction and demolition debris. The RI Report (Gallagher Bassett, 2020) presents additional Site background and history.

1.5 Site Characterization

1.5.1 Geology

Prior Site investigations identified that historic filling has occurred within the Site boundaries. Historic fill deposits varied in depth up to nine feet thick. Beneath the historic fill, unconsolidated coastal plain soils consist of a peat-like layer overlying a generally contiguous thin (ranging from less than one-foot to approximately two-feet thick) clay layer. This peat and clay-layer overlie deeper sand deposits identified on the New York State Surficial Geology Map of New York as beach or barrier island deposits composed of sand and gravel of varying thickness from the Pleistocene Epoch (Cadwell 1986).

As detailed in the following sections, during the Phase I RA, the historic fill layer identified in the RI Report and prior remedial action work plans and design reports was not consistent with the definition of historic fill material as presented in DER-10[1]. The fill materials encountered during the Phase I RA consisted of a mixture of historic fill materials, former masonry building pads and foundation walls, timber piles, historical process piping, and construction and demolition debris.

1.5.2 Hydrogeology

A shallow water table aquifer was encountered between 5 and 8 feet below grade across the Site consistent with prior investigation data. This shallow water table fluctuates with the rise and fall of the tides and groundwater and is inferred to flow generally towards Barbadoes Basin to the northwest. The shallow water table appears to be a locally confined aquifer with the clay-layer serving as an aquitard.

[1] "Historic fill material" means non-indigenous or non-native material, historically deposited or disposed in the general area of, or on, a site to create useable land by filling water bodies, wetlands or topographic depressions, which is in no way connected with the subsequent operations at the location of the emplacement, and which was contaminated prior to emplacement.

1.5.3 Primary Constituents of Concern

Based on previous Site investigation activities, the following chlorinated volatile organic compounds (CVOCs) were identified as the primary constituents of concern (COCs):

Table 1-2
Constituents of Concern – Protection of Groundwater

Constituent	Protection of Groundwater SCOs (milligrams per kilogram)
Tetrachloroethylene (PCE)	1.3
cis-1,2-Dichloroethylene (cis-1,2-DCE)	0.25
trans-1,2-Dichloroethylene (trans-1,2-DCE)	0.19
Trichloroethylene (TCE)	0.47
Vinyl Chloride (VC)	0.02

Notes:

1. SCO – soil cleanup objective.
2. SCOs per NYSDEC's 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 Environmental Remediation Programs Table 375-6.8: Restricted Use Soil Cleanup Objectives.

Two separate areas were identified by previous investigation activities as containing CVOCs at concentrations exceeding the protection of groundwater SCOs:

- An area of approximately 1,000 SF area in the northwest corner of the Site.
- An area of approximately 7,500 SF in the central portion of the Site.

In general, the CVOCs were identified in soil above and just into the confining clay unit.

2 SSDS Design

This Section summarizes the SSDS design developed by EnviroTrac. A copy of the final design (signed and sealed by EnviroTrac's Engineer of Record) is included in Appendix C of this work plan.

Based on the results of the pilot test (described in Section 1), a full-scale SSDS has been designed to mitigate the potential for vapor intrusion to indoor air in the Lot 14 building. The proposed SSDS is comprised of 15 sub-slab extraction points (SSD-1 through SSD-15) connected to 3 exterior roof-mounted blowers (B-1 through B-3). The proposed layout of the SSDS is shown on Figure 3 of Appendix C.

The extraction points shown in Appendix C were selected based on the results of the pilot study and the visual assessment of the building interior. Where practical and to protect the extraction piping, the vertical extraction pipes will be installed near existing interior building walls or columns.

The final extraction points may be slightly modified in the field based on interior conditions.

3 SSDS Installation

This section presents an overview of the proposed SSDS installation to be performed by EnviroTrac. A copy of EnviroTrac's installation work plan is included as Appendix D to this work plan.

3.1 SSDS Installation

As described in Appendix D, EnviroTrac proposes to drill fifteen 6-inch holes through the concrete floor using a core drill. Drilling will be done using wet methods and/or direct ventilation on the drill location.

Following the removal of the concrete, the underlying subbase/soil will be excavated from each extraction point to a depth of 12 inches using hand tools. Sub slab materials excavated through the concrete floor slab as part of the installation shall be drummed and staged on-Site, pending waste characterization and disposal by EnviroTrac. Drums will be labeled "Awaiting Analysis" until waste characterization results are received.

The extraction piping will be installed according to the design and in compliance with local building codes. The fans will be mounted below the roof line and fastened to the building structure.

3.2 SSDS Startup and Testing

Following installation, EnviroTrac will perform initial testing to confirm proper operation of each SSDS component and instrumentation before bringing the system on-line. Once the SSDS is fully operational, the air flow to each of the extraction points will be manually balanced by adjusting the valves located on each vertical riser pipe. The air flow at the SSD extraction points will be considered balanced when the system produces the largest vacuum influence.

Vacuum below the slab will be measured at appropriate monitoring points using a digital micromanometer. Isolation tests of each riser will be conducted as necessary to determine the vacuum radius of influence of each extraction point. The vacuum measurements will be evaluated to confirm that the SSDS is controlling sub-slab vapor as designed. If a potential leak is suspected, smoke testing will be performed in the vicinity of a riser.

4 Air Monitoring During Installation

During the SSDS installation activities, Anchor QEA will perform air monitoring within the building interior for both dust and VOCs. The air monitoring will be performed continuously during the installation and when the extraction holes remain open. Air monitoring will cease when the extraction holes have been sealed (either temporarily or permanently).

4.1 Monitoring Location Selection and Deployment

Because the work will be performed in interior, occupied spaces, Anchor QEA will perform the monitoring at two locations on the perimeter of the work area exclusion zone (to be established by EnviroTrac and will include temporary barricades or fencing to separate the work area from the occupied commercial spaces).

VOC and particulate monitoring station locations will be determined throughout the day based on the work area and the nature of the installation activities. The VOC and particulate monitoring stations will be deployed each day before the start of work activities. Air monitoring location changes that occur during the workday will be documented in a field logbook.

4.2 Sampling Methods

Real-time monitoring for total VOCs, and particulate matter less than 10 microns in diameter (PM10) will be conducted during intrusive SSDS installation activities. As required by the NYSDOH Generic Community Air Monitoring Plan (CAMP; included as Appendix E), VOCs and PM10 will be monitored continuously during all intrusive and/or potential dust-generating activities using instrumentation equipped with electronic data-logging capabilities.

4.2.1 Total Volatile Organic Compounds

Total VOCs in ambient air will be monitored and recorded using a portable organic vapor analyzer (OVA) equipped with a photoionization detector (PID) with data-logging capabilities (MiniRae2000 or equivalent). All measurements will be made at a height of approximately five feet above the ground. Total VOC levels will be measured continuously, and a running average will be calculated and recorded every 15-minutes.

4.2.2 PM10 Monitoring

Real-time monitoring for particulates will be conducted during remedial activities at the Site. As required by the NYSDOH Generic CAMP (Appendix E), real-time airborne particulate monitoring will be conducted continuously during all intrusive or potential dust-generating activities (e.g., concrete cutting and subsurface materials removal and handling) using instrumentation equipped with electronic data-logging capabilities. A real-time particulate monitor (MIE DataRAM PDR1000 or equivalent) will be used for particulate monitoring. The equipment has an audible alarm to indicate exceedance of the action level.

All average concentrations (calculated for continuous 15-minute increments [e.g., 08:00 to 08:15, 08:15 to 08:30]) and any instantaneous readings taken to assess appropriate course of action will be recorded using an electronic data logger and/or in the field logbook.

Fugitive dust migration will be visually assessed during all work activities, and reasonable dust-suppression techniques will be used during any Site activities that may generate fugitive dust.

4.3 Action Levels

The action levels provided below will be used to initiate corrective actions, if necessary, based on real-time monitoring. Each piece of monitoring equipment will have alarm capabilities (audible and/or visual) to indicate exceedances of the action levels specified in the following subsections.

4.3.1 Action Levels for VOCs

As outlined in the NYSDOH Generic CAMP (Appendix E), if the ambient air concentration for total VOCs exceeds 5.0 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted while monitoring continues. If the total VOC concentrations readily decrease (through observation of instantaneous readings) <5.0 ppm above background, then work activities can resume with continuous monitoring.

If the ambient air concentrations for total VOCs persist at levels >5.0 ppm above background but <25.0 ppm above background, work activities will be halted, the source of the elevated VOC concentrations identified, corrective actions undertaken to reduce or abate the emissions, and air monitoring continued. Once these actions have been implemented, work activities can resume provided the following two conditions are met:

- The 15-minute average VOC concentrations remain <5.0 ppm above background.
- The 15-minute average VOCs level 200 feet downwind of the monitoring location or half the distance to the nearest potential receptor or residential/commercial structure (whichever is less but in no case <20 feet) is <5.0 ppm above background for the 15-minute average.

If the ambient air concentrations for total VOCs exceed 25.0 ppm above background, work activities must cease, and emissions-control measures must be implemented.

4.3.2 Action Levels for PM10

The following PM10 action levels and responses, based on the NYSDOH generic CAMP, will be implemented during any intrusive activity that may generate emissions:

- If the average ambient air concentration of PM10 at anyone (or more) of the sampling locations is noted at levels >100 micrograms per cubic meter (µg/m^3) above the background (upwind location) for the 15-minute interval, or if airborne dust is observed leaving the work area, intrusive Site activities will be temporarily halted. The source of the elevated PM10 concentration will be identified, corrective actions to reduce or abate the emissions will be undertaken, and air monitoring will continue. Work may continue following the implementation of dust-suppression techniques, provided the PM10 levels do not exceed 150 µg/m^3 above background and no visible dust is migrating from the work area.
- If, after implementation of dust-suppression techniques, the PM10 levels are >150 µg/m^3 above background, work will stop, and Site activities will be re-evaluated. Work will only resume after dust-suppression measures and other controls are implemented, PM10 levels are <150 µg/m^3 above background, and no visible dust is migrating from the work area.

4.4 Emissions Control Measures

Air emissions-control measures will be implemented by EnviroTrac concurrently with any intrusive activities (as needed) to limit the potential for organic vapor and dust emissions or odors from the Site. Air emissions associated with concrete floor cutting; excavation; material handling and stockpiling; other intrusive activities; and certain nonintrusive activities, such as mobilization, transportation, and restoration activities; will be controlled as described below.

The following emissions-control measures may be used during these activities, depending on specific circumstances, visual observations, and air monitoring results:

- Ventilate the immediate area with the ventilation exhausting to the outside of the building, at least ten feet from any building opening.
- Sealing extraction holes temporarily when left without extraction pipe in place.
- Apply water or BioSolve spray to exposed soil/materials.
- Cover floor penetrations with polyethylene sheeting or other appropriate material.
- Minimize surface area of exposed material.
- Containerize excavation materials and soil.
- Apply vapor-suppression foam.
- Apply water during concrete cutting activities.
- Incorporating permanent infrastructure into the existing building foundation system design.

These supplemental remedial components are in addition to the remaining remedial components presented in the NYSDEC's Decision Document (i.e., installing a site cover over site areas where the upper one foot of exposed surface soil contains COCs at concentrations above Commercial Industrial SCOs; monitored natural attenuation; installation; and operation of an SSDS beneath the existing building and appropriate vapor barrier beneath the new building, and institutional controls including preparation of an SMP.

5 Schedule and Reporting

EnviroTrac plans to initiate the SSDS installation activities immediately following NYSDEC-approval of this SSDS Design/Work Plan. The SSDS installation and testing is estimated to require approximately 4 weeks to complete.

Following completion of the SSDS installation, Anchor QEA will document the system construction in the Final Engineering Report (FER) to be submitted to NYSDEC and prepared in conformance with DER-10. A professional engineer licensed in New York State will sign and seal the FER, including the record drawings and certification statement.

An Operation, Maintenance and Monitoring (OM&M) plan will be prepared and included in the Site Management Plan for the Site.

6 References

Cadwell, D.H. et al., 1986. *Surficial Geologic Map of New York*. New York State Museum – Geological Map and Chart Series No. 40. Cartographic Editor: John B. Skiba, NYS Geologic Survey.

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GEI Consultants, Inc., P.C., *Remedial Design Document*. October 2023.

NYSDEC (New York State Department of Environmental Conservation), *Decision Document 3-60 Beach 79th Street Brownfield Cleanup Program Far Rockaway, Queens County Site No. C241207*. August 2021.

NYSDEC (New York State Department of Environmental Conservation) Division of Environmental Remediation, *DER-10 / Technical Guidance for Site Investigation and Remediation*. May 2010.

Appendix A
Pilot Study Report

Sub-Slab Depressurization System (SSDS) Pilot Test Report

Site:

350 Beach 79th Street
Far Rockaway, NY 11693

Prepared for:

Anchor QEA Engineering, PLLC
1201 3rd Avenue, Suite 2600
Seattle, WA 98101

Prepared by:

EnviroTrac Engineering P.E. P.C.
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Yaphank, NY 11980

August 2024

A Full Service Environmental Consulting and Contracting Firm

Sub-Slab Depressurization System (SSDS) Pilot Study Report
350 Beach 79th Street, Far Rockaway, NY

PURPOSE

This report is intended to summarize the results of the SSDS pilot study that was conducted by EnviroTrac on July 19th, 2024. The purpose of the test was to determine the feasibility of implementing a full-scale SSD system as a viable means of mitigation throughout the existing building structure. The results of this study were used to determine the feasibility of this technology, as well as determining the required operating parameters and layout for the selected system.

TECHNICAL SCOPE OF WORK PERFORMED

1. **Pilot Test Equipment**

For the purpose of the pilot test, EnviroTrac mobilized its mobile SSD system equipment to conduct the study at representative locations. The mobile systems consist of a radon mitigation style vacuum blowers that were connected to the temporarily installed SSDS test wells. The test equipment also includes a vacuum gauge, a flow/sample port, associated piping, and discharge stack. Major system components of the mobile SSD system are described below.

<u>Sub-Slab Depressurization Equipment:</u>

- Extraction Blowers: – Ametek Rotron Model #EN606M5ML, Regenerative Vacuum Blower (3.0 HP, 230V, 1 Phase, XP).
    - Max Flow: 200 SCFM
    - Max Vac: 75 “H_2O

  Radon Away Model No. GX4, Vacuum Blower (110V, 1 Phase).
    - Max Flow: 117 SCFM
    - Max Vac: 4.0 “H_2O

<u>Additional Test Equipment</u>

- Dwyer Instruments Handheld Air Velocity Meter – Model 471B-1
- UEI Digital Manometer – EM201B (0.000 – 20.000 “H2O)

2. **Test Zones**

To facilitate the test, EnviroTrac installed two (2) 4-inch diameter temporary extraction wells (TP-2 & TP-3). A 5-inch diameter core drill was used to install a 4-inch diameter schedule 40 PVC pipe that was sealed to the floor slab penetration. The soil immediately below the slab was manually hand cleared in order to install the temporary extraction points. Each temporary extraction well was constructed using 4-inch diameter schedule 40 PVC well screen (20-slot) that extended down into the subgrade soil (~12” bgs) and was fitted with a PVC end cap. Gravel was installed around the well screen up to the elevation of the bottom of the existing concrete floor slab. The well screen was transitioned to solid schedule 40 PVC pipe at the bottom of the existing concrete floor slab with the annulus between the outside of the PVC pipe and the concrete edge sealed with quick setting hydraulic cement. Adequate time was given to allow for the sealant to set up prior to the commencement of the pilot test. Once the temporary points were set up, the test blowers were individually mounted to the top of the test well and a flexible hose was routed from the blower to the exterior of the building.

SSDS TESTING METHODOLOGY

Throughout the pilot study each extraction well was evaluated at varying operational conditions. Prior to starting the test, each test blower was connected to the piping riser extending from the test well. A flexible hose was routed from the blower and riser pipe to the exterior of the building. In order to monitor the sub-slab vacuum response of the test, several temporary vacuum monitoring points (VMPs) were installed through the concrete floor slab, at select locations. During the test, the vacuum blowers were configured to operate at the maximum rate for each relative to flow and vacuum. Throttling of the blowers was conducted by adjusting the mobile system piping manifold control valve. During each step, operating parameters such as applied flow, vacuum, and sub-slab vacuum responses were recorded. The applied extraction well flow and vacuum were measured from a monitoring point located in the extraction piping several feet above where the piping penetrates the floor slab. The wellhead vacuum and extraction flow rate for each step were recorded as the following:

TP-1

Step #	Wellhead Vacuum (“H2O)	Extraction Flow Rate (scfm)
1	60.0	34.6
2	40.0	15.4
3	22.0	12.5
4	6.0	4.6
5	5.0	4.2

TP-2

Step #	Wellhead Vacuum (“H2O)	Extraction Flow Rate (scfm)
1	54.0	46.2
2	40.0	36.1
3	20.0	24.2
4	6.0	10.8
5	3.6	5.4

During each step vacuum influence was recorded from each monitoring point utilizing a handheld digital manometer. For each step, the operating conditions were allowed to sufficiently stabilize at a steady state condition prior to the recording of any readings.

PILOT TESTING RESULTS

The field data collected during the SSD pilot test is included as an attachment to this report. Flow and vacuum readings were recorded during each step of the SSDS test, while vacuum influence was measured at each observation point. A copy of the pilot test data analysis, along with the associated data plots, are included in the Attachments of this report.

In order to determine the performance requirements at each of the SSD extraction zones, the pilot test data is used to generate a semi-logarithmic plot of sub-slab vacuum response vs. distance. From this plot the effective Radius of Influence (ROI) of each of the test steps of the pilot study is determined by finding the radial distance where a best fit logarithmic line plot of the data intersects the line y = 0.03 ”H_2O (~7 pascals) vacuum response. Extrapolating out the results from the data set and the plots developed from TP-1 shows that applying a minimum vacuum of 20.1 “H2O at a flow rate of 11.7 cfm would achieve a minimum radius of influence (ROI) of ~30 feet. The same analysis applied to the data set and the plots developed from TP-2, shows that applying a minimum vacuum of 80.3 “H2O at a flow rate of 62.1 cfm would be required to achieve a minimum radius of influence (ROI) of ~30 feet. It was noted at the time of a previous site inspection that there were large gaps of concrete foundation that were exposed and damaged in the vicinity of TP-2. It is evident from the results of the testing that was completed in this area, that this damage would adversely affect the operation of a full scale system in this portion of the building. As such, the results of this portion of the test are not considered as representative of the vacuum and flow response from the sub-surface soils and shall not be used in determining operational requirements of the full-scale system. In order to achieve complete vacuum coverage of the building footprint, the selected ROI would be used to assist in the layout of the full scale SSD System.

CONCLUSIONS AND RECOMENDATIONS

Based on the results tabulated, the pilot testing performed demonstrates that a full-scale SSD system can serve as an effective means of mitigation for the existing site building. If a target ROI of 30 feet is selected for each proposed extraction well, it was determined that a minimum vacuum of 20.1 "H_2O and an air flow rate of 11.7 CFM would need to be applied at each extraction wellhead throughout the building. These values were conservatively determined by taking the highest calculated value for applied vacuum and extracted flow rate. Appropriate consideration shall be addressed concerning the number and spacing of the proposed extraction wells. It should be noted that the results of the pilot study data could be extrapolated further to determine required system operational parameters at other selected ROIs.

In addition, it is recommended that the repair of any noted foundation or floor slab damage or deficiencies be conducted prior to the installation of the full-scale SSD System to ensure the proper function and effectiveness of the system. It is critical for any system of this type to be implemented within a building containing a continuous and competently sealed floor in order to maintain an evenly distributed sub-slab vacuum. Any cracks, holes, or unsealed penetrations can adversely affect the operation of the system and potentially provide pathways for unwanted vapors to migrate into the habitable interior space of the structure.

Recommended Design Parameters (each extraction well):

- Target Radius of Influence (ROI): 30 feet
- Applied Vacuum (+~20% FOS): 25 "H_2O
- Applied Flow Rate (+~20% FOS): 15 CFM

FIGURES

1. Site Plan with Test Locations

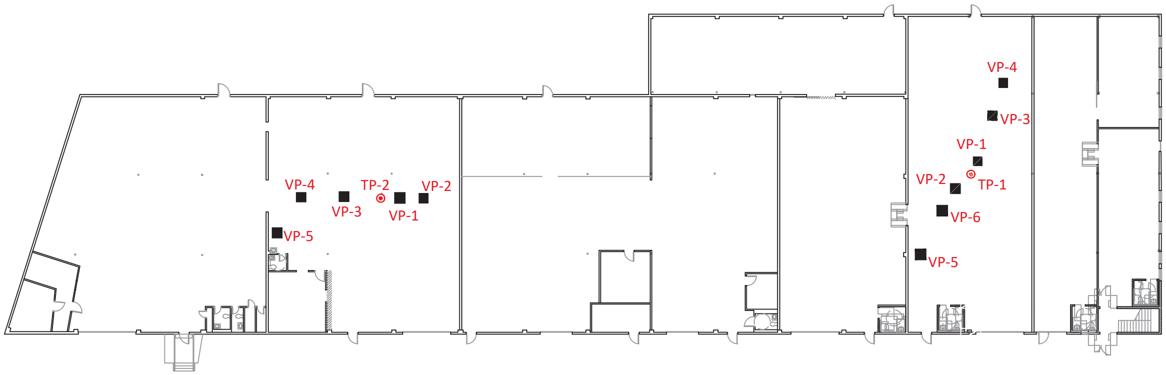
ATTACHMENTS

1. TP-1: Pilot Test Data – Field Measurements
2. TP-1: SSD Test Data Analysis
3. TP-1: Plot: SSD Vacuum Response vs. Monitoring Point Radial Distance
4. TP-1: Plot: Vacuum vs. ROI
5. TP-1: Plot: Air Flow Rate vs. ROI
6. TP-2: Pilot Test Data – Field Measurements
7. TP-2: SSD Test Data Analysis
8. TP-2: Plot: SSD Vacuum Response vs. Monitoring Point Radial Distance
9. TP-2: Plot: Vacuum vs. ROI
10. TP-2: Plot: Air Flow Rate vs. ROI
11. Test Blower(s) Specifications (Rotron EN606 & Radon Away GX4)

REFERENCES

1. ASTM E2121-21 "Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings"
2. New York State Department of Environmental Conservation, (NYSDEC), DER-10 "Technical Guidance for Site Investigation and Remediation"

FIGURES



SOURCE: CAD file provided via email by Abingdon Capital LLC, February 2024.

LEGEND:

Test Point

Vacuum Monitoring Point

0 30 Feet

ATTACHMENTS

EnviroTrac

Sub-Slab Depressurization (SSD) Pilot Test Data

Site Name: **350 Beach 79th Street**
Far Rockaway, NY

Test Date: 7/19/2024

Personnel: JAL/SW

Weather: 75 deg Sun

Extraction Well: TP-1

					Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well
					VP-1	VP-2	VP-3	VP-4	VP-5	VP-6		
					*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)
					5	10	15	25	30	14		
Blower Model	Well Head Vac "H20	System Vac	Flow (scfm)	Time	Vacuum "H_20	Vacuum "H_20	Vacuum "H_20	Vacuum "H_20	Vacuum "H_20	Vacuum "H_20	Vacuum "H_20	Vacuum "H_20
Rotron EN606	60.00	58	34.6	9:20	0.220	0.360	0.178	0.050	0.022	0.348		
	40.00	44	15.4	9:28	0.151	0.270	0.131	0.037	0.019	0.278		
	22.00	30	12.5	9:34	0.087	0.150	0.064	0.018	0.008	0.142		
	6.00	16	4.6	9:46	0.022	0.056	0.018	0.000	0.000	0.046		
GX-4	5.00	-	4.2	9:55	0.015	0.025	0.014	0.000	0.000	0.024		

Comment / Notes:

* Distance measured from Test Point to each Monitoring Point

NM = Not Measured

Summary of SSD Pilot Test

350 Beach 79th Street
Far Rockaway, NY

SSD Analysis

Test Date:	7/19/2024
Performed By:	EnviroTrac - JAL/SW
Extraction Point:	**TP-1**
Test Duration (min.):	1.0 hr
Wellhead Vacuum ("H2O):	5.0 to 60.0
Wellhead Flow (scfm):	4.2 to 34.6

TP-1

	Rotron EN606				RA GX4	
Radial Distance (ft.)	**Vacuum Response@ 60" H2O Blower Vacuum, 34.6 scfm**	**Vacuum Response@ 40" H2O Blower Vacuum, 15.4 scfm**	**Vacuum Response@ 22" H2O Blower Vacuum, 12.5 scfm**	**Vacuum Response@ 6.0" H2O Blower Vacuum, 4.6 scfm**	**Vacuum Response@ 5.0" H2O Blower Vacuum, 4.2 scfm**	**Reference Line 0.03 "H2O**
5	0.220	0.151	0.087	0.022	0.015	0.030
10	0.360	0.270	0.150	0.056	0.025	0.030
15	0.178	0.131	0.064	0.018	0.014	0.030
25	0.050	0.037	0.018	0.000	0.000	0.030
30	0.022	0.019	0.008	0.000	0.000	0.030
14	0.348	0.278	0.142	0.046	0.024	0.030

Est ROI @ 0.03" H2O Threshold

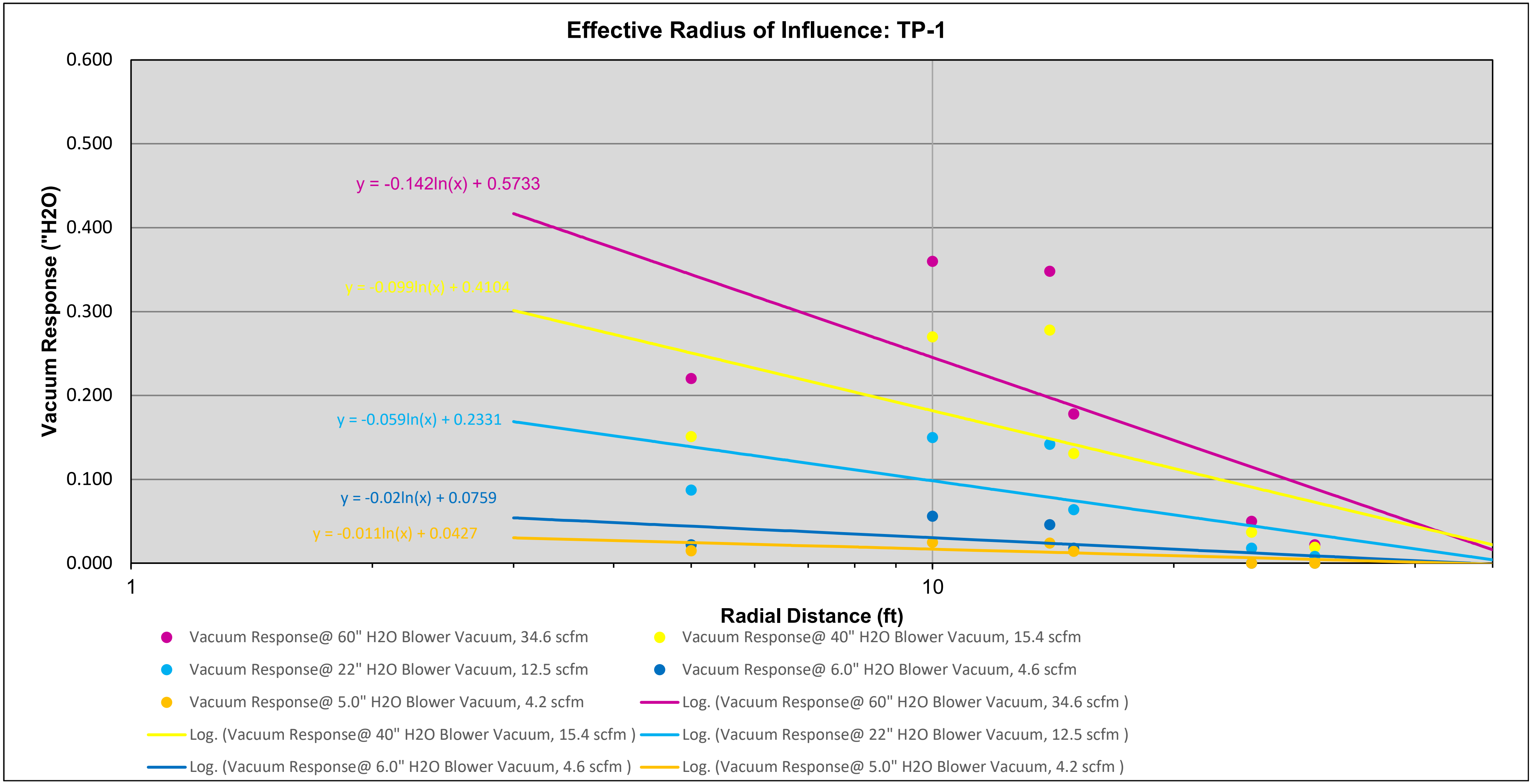
Est. ROI (ft.)	Vacuum ("H2O)	Flow (scfm)
45.9	60.0	34.6
46.6	40.0	15.4
31.3	22.0	12.5
9.9	6.0	4.6
3.2	5.0	4.2

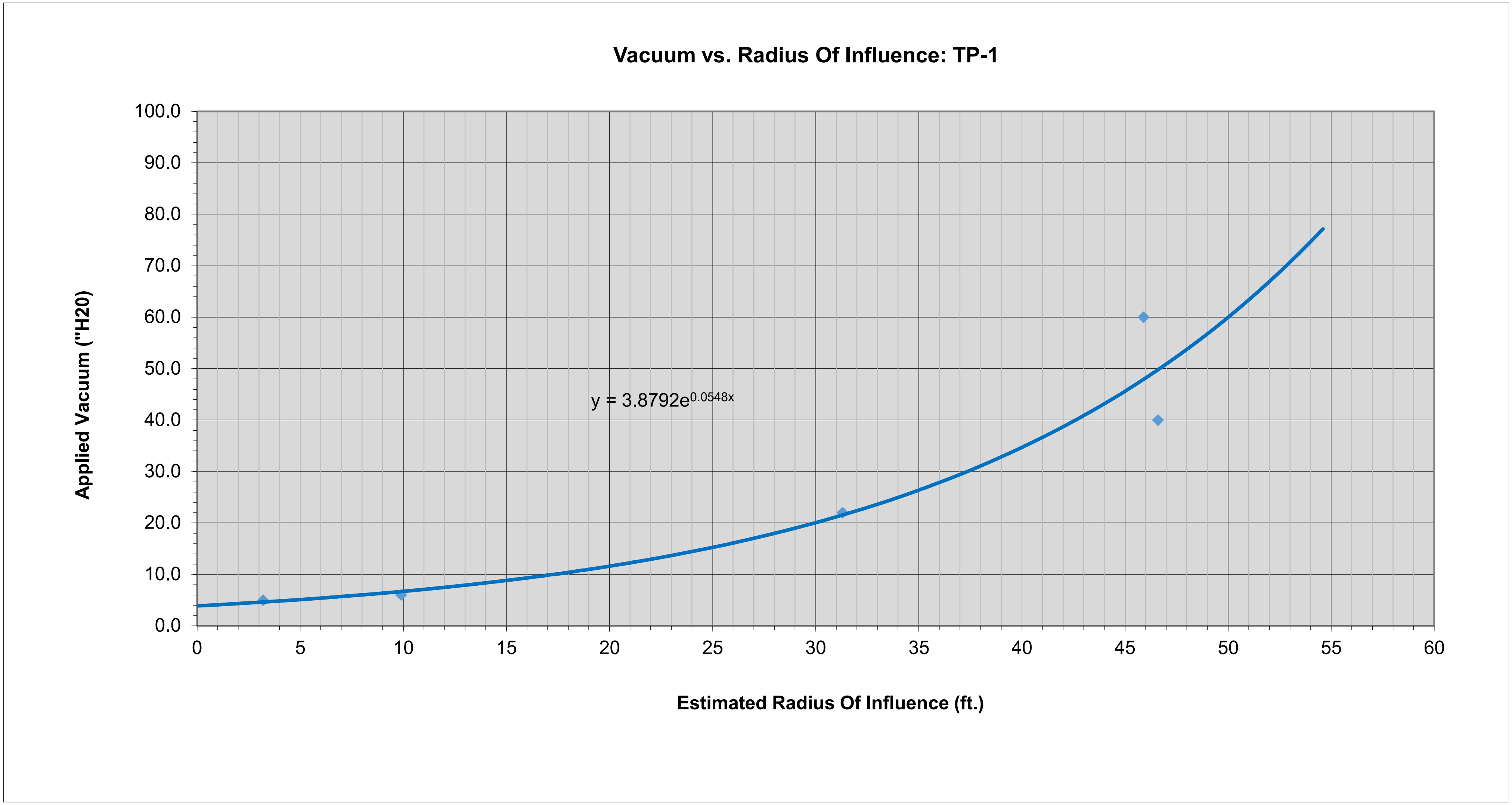
Minimum Parameters (per Extraction Point)

Target ROI (ft)	Design Vac ("H2O)	Design Flow (scfm)
25	15.3	9.5

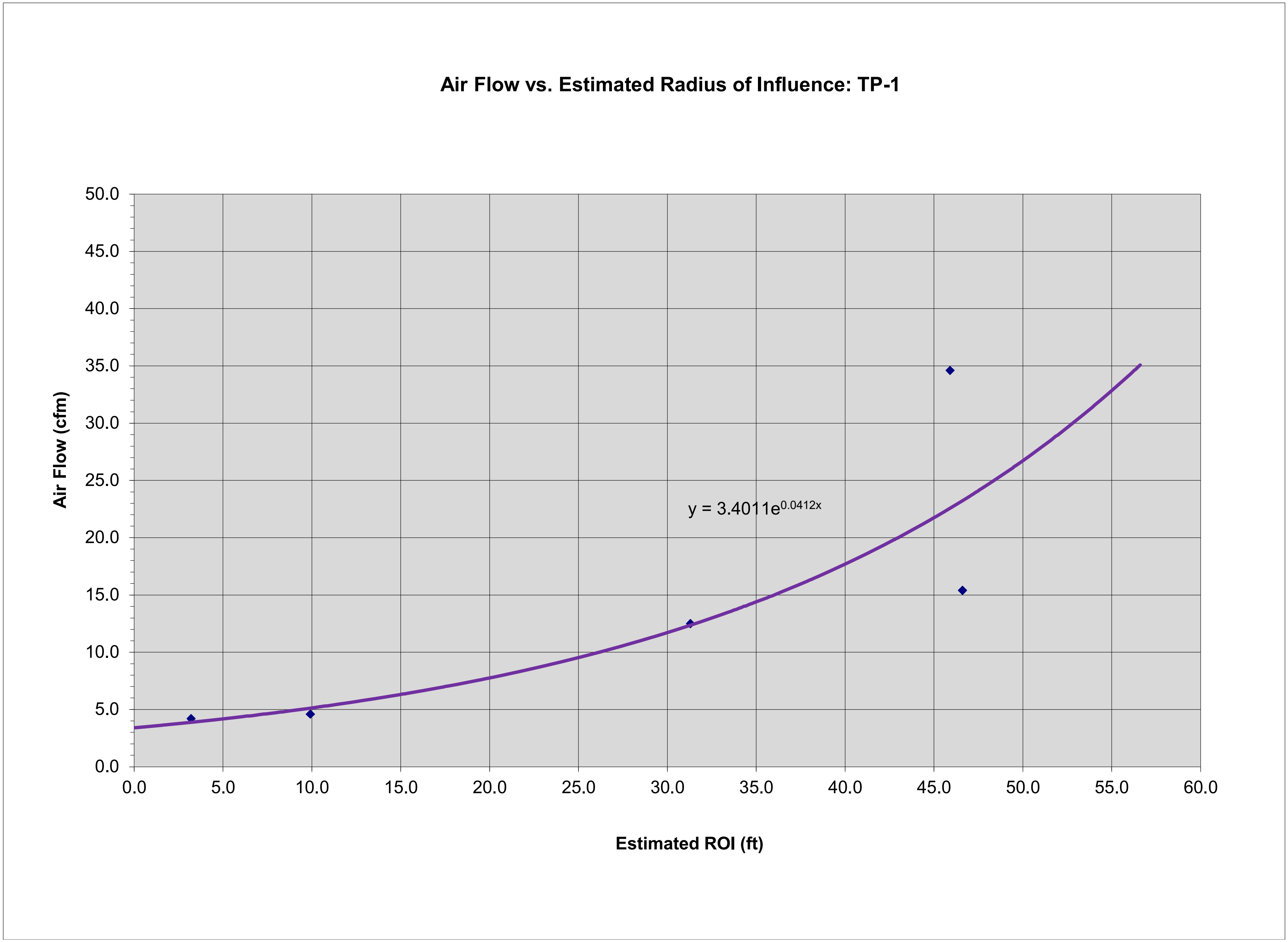
Minimum Parameters (per Extraction Point)

Target ROI (ft)	Design Vac ("H2O)	Design Flow (scfm)
30	20.1	11.7


Effective Radius of Influence: TP-1
Vacuum Response ("H2O)
Radial Distance (ft)
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1
10
y = -0.142ln(x) + 0.5733
y = -0.099ln(x) + 0.4104
y = -0.059ln(x) + 0.2331
y = -0.02ln(x) + 0.0759
y = -0.011ln(x) + 0.0427
Vacuum Response@ 60" H2O Blower Vacuum, 34.6 scfm
Vacuum Response@ 40" H2O Blower Vacuum, 15.4 scfm
Vacuum Response@ 22" H2O Blower Vacuum, 12.5 scfm
Vacuum Response@ 6.0" H2O Blower Vacuum, 4.6 scfm
Vacuum Response@ 5.0" H2O Blower Vacuum, 4.2 scfm
Log. (Vacuum Response@ 60" H2O Blower Vacuum, 34.6 scfm)
Log. (Vacuum Response@ 40" H2O Blower Vacuum, 15.4 scfm)
Log. (Vacuum Response@ 22" H2O Blower Vacuum, 12.5 scfm)
Log. (Vacuum Response@ 6.0" H2O Blower Vacuum, 4.6 scfm)
Log. (Vacuum Response@ 5.0" H2O Blower Vacuum, 4.2 scfm)



Vacuum vs. Radius Of Influence: TP-1
y = 3.8792e^0.0548x
Applied Vacuum ("H20)
Estimated Radius Of Influence (ft.)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0
5
10
15
20
25
30
35
40
45
50
55
60


Air Flow vs. Estimated Radius of Influence: TP-1
Air Flow (cfm)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
$y = 3.4011e^{0.0412x}$
Estimated ROI (ft)

Sub-Slab Depressurization (SSD) Pilot Test Data

Site Name: **350 Beach 79th Street**
Far Rockaway, NY

Test Date: 7/19/2024

Personnel: JAL/SW

Weather: 75 deg Sun

Extraction Well: TP-2

					Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well	Observation Well
					VP-1	VP-2	VP-3	VP-4	VP-5			
					*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)	*Distance (ft)
					5'	10'	15'	25'	35'			
Blower Model	Well Head Vac "H20	System Vac	Flow (scfm)	Time	Vacuum "$H_2$0	Vacuum "$H_2$0	Vacuum "$H_2$0	Vacuum "$H_2$0	Vacuum "$H_2$0	Vacuum "$H_2$0	Vacuum "$H_2$0	Vacuum "$H_2$0
Rotron EN606	54.00	62	46.2	12:07	0.330	0.320	0.034	0.021	0.011			
	40.00	46	36.1	12:16	0.235	0.238	0.025	0.015	0.008			
	20.00	30	24.2	12:22	0.150	0.151	0.014	0.008	0.000			
	6.00	16	10.8	12:31	0.056	0.055	0.000	0.000	0.000			
GX-4	3.6	-	5.4	12:40	0.036	0.030	0.000	0.000	0.000			

Comment / Notes:

* Distance measured from Test Point to each Monitoring Point

NM = Not Measured

Summary of SSD Pilot Test

350 Beach 79th Street
Far Rockaway, NY

SSD Analysis

Test Date:	7/19/2024
Performed By:	EnviroTrac - JAL/SW
Extraction Point:	**TP-2**
Test Duration (min.):	1.0 hr
Wellhead Vacuum ("H2O):	3.6 to 54
Wellhead Flow (scfm):	5.4 to 46.2

TP-2

	Rotron EN606				RA GX4	
Radial Distance (ft.)	**Vacuum Response@ 54" H2O Blower Vacuum, 46.2 scfm**	**Vacuum Response@ 40" H2O Blower Vacuum, 36.1 scfm**	**Vacuum Response@ 20" H2O Blower Vacuum, 24.2 scfm**	**Vacuum Response@ 6.0" H2O Blower Vacuum, 10.8 scfm**	**Vacuum Response @ 3.6" H2O Blower Vacuum, 5.4 scfm**	**Reference Line 0.03 "H2O**
5	0.330	0.235	0.150	0.056	0.036	0.030
10	0.320	0.238	0.151	0.055	0.030	0.030
15	0.034	0.025	0.014	0.000	0.000	0.030
25	0.021	0.015	0.008	0.000	0.000	0.030
35	0.011	0.008	0.000	0.000	0.000	0.030

Est ROI @ 0.03" H2O Threshold

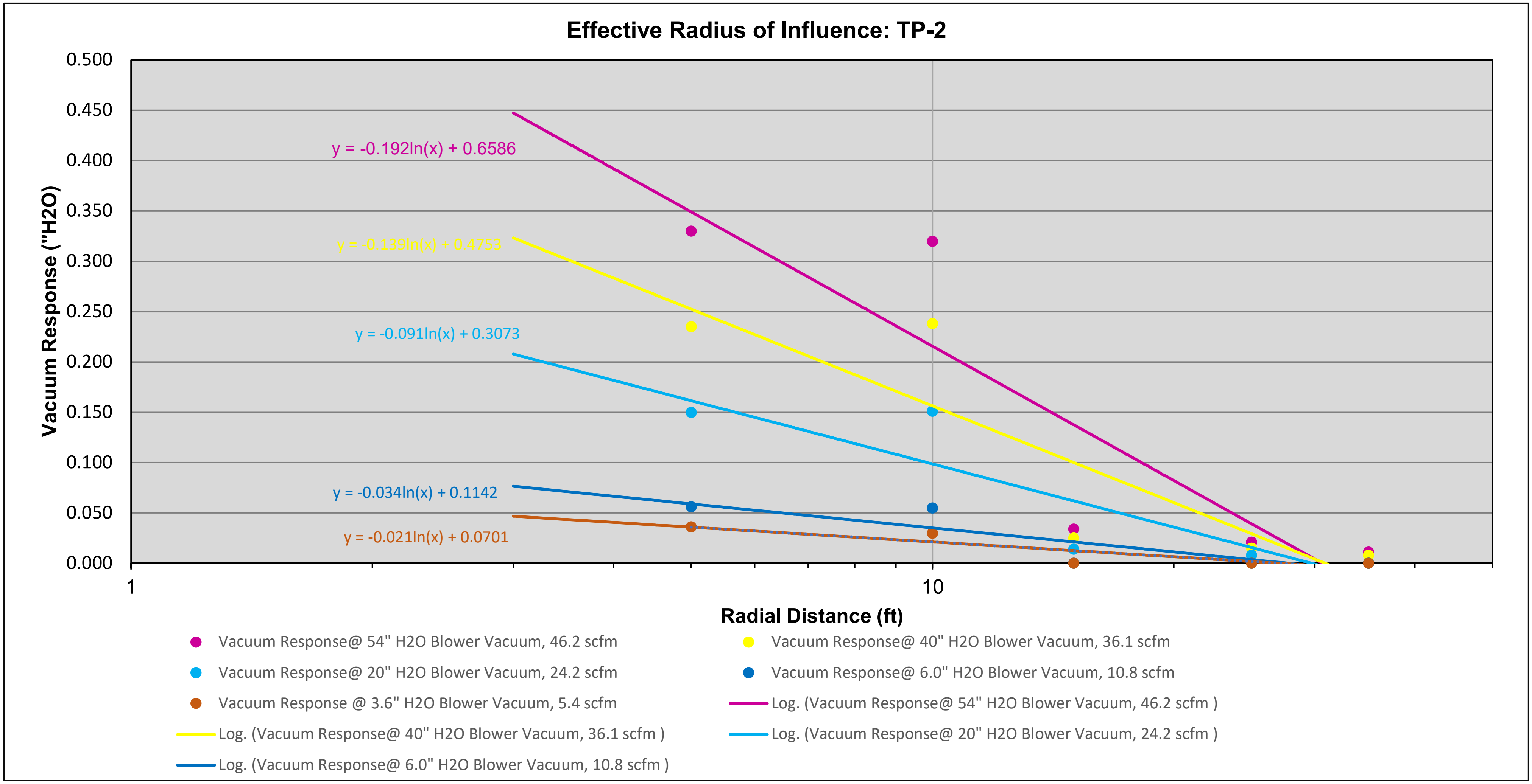
Est. ROI (ft.)	Vacuum ("H2O)	Flow (scfm)
26.4	54.0	46.2
24.6	40.0	36.1
21.1	20.0	24.2
11.9	6.0	10.8
6.7	3.6	5.4

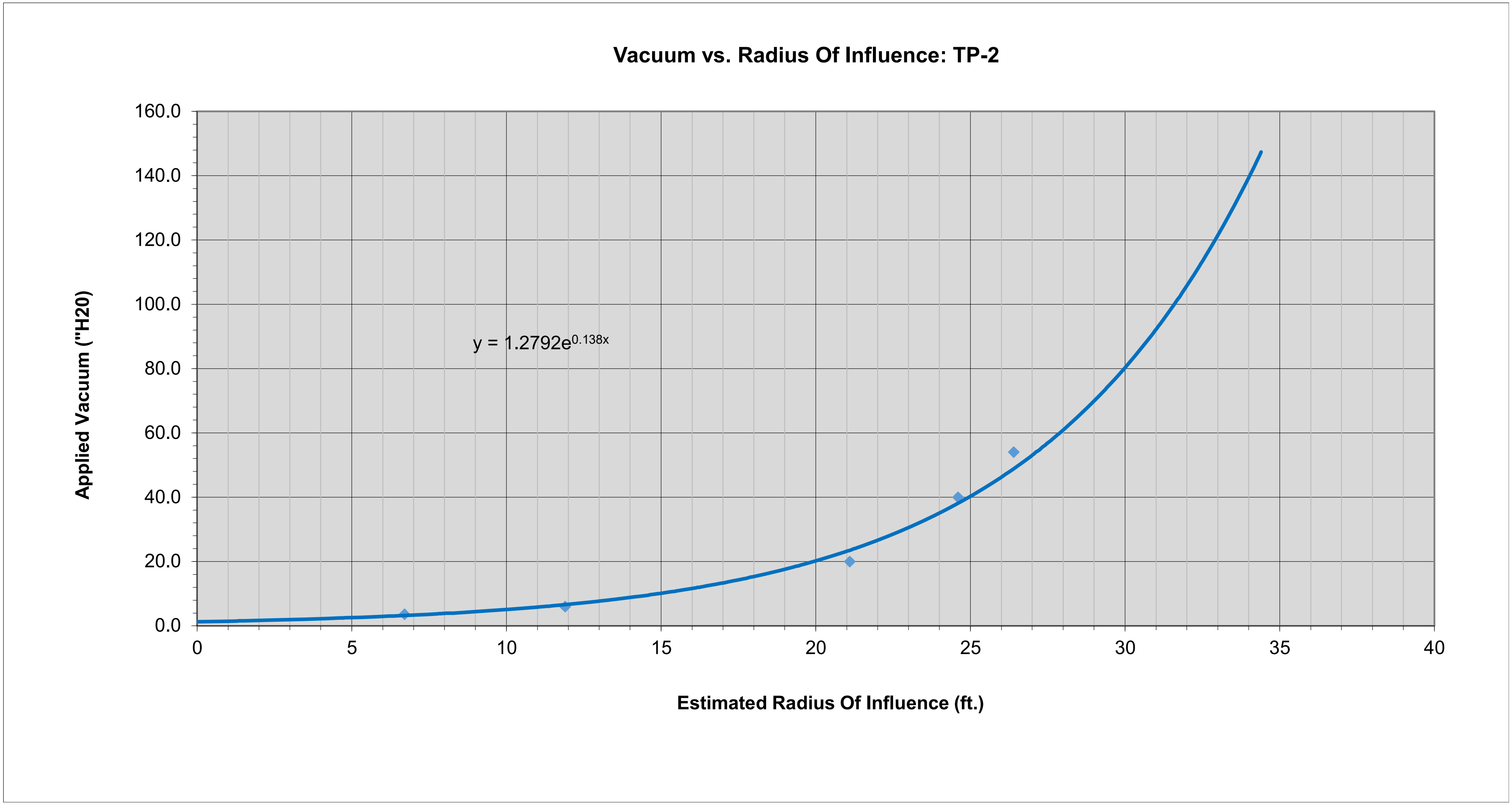
Minimum Parameters (per Extraction Point)

Target ROI (ft)	Design Vac ("H2O)	Design Flow (scfm)
25	40.3	38

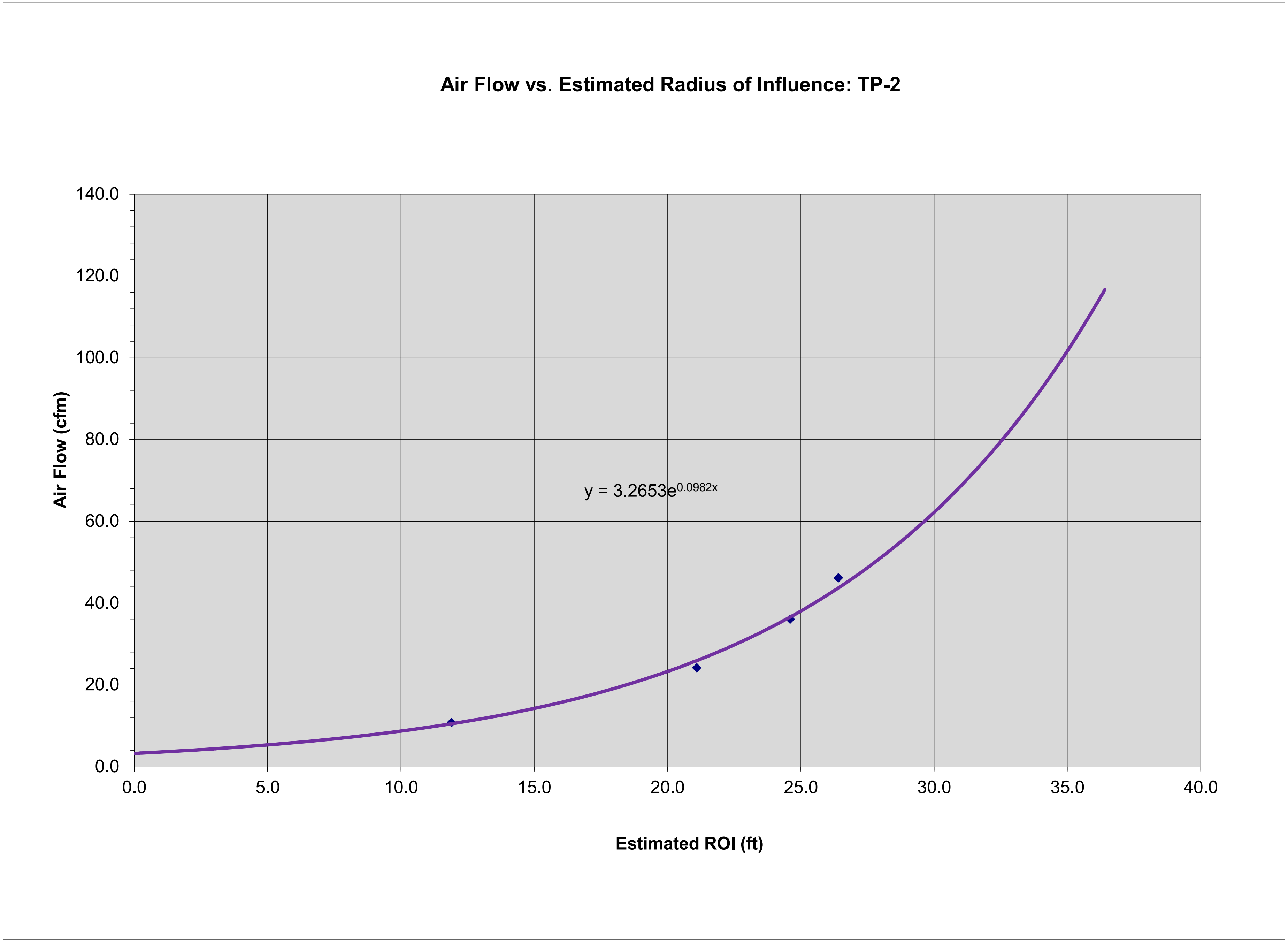
Minimum Parameters (per Extraction Point)

Target ROI (ft)	Design Vac ("H2O)	Design Flow (scfm)
30	80.3	62.1


Effective Radius of Influence: TP-2
0.500
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
Vacuum Response ("H2O)
y = -0.192ln(x) + 0.6586
y = -0.139ln(x) + 0.4753
y = -0.091ln(x) + 0.3073
y = -0.034ln(x) + 0.1142
y = -0.021ln(x) + 0.0701
1
10
Radial Distance (ft)
Vacuum Response@ 54" H2O Blower Vacuum, 46.2 scfm
Vacuum Response@ 40" H2O Blower Vacuum, 36.1 scfm
Vacuum Response@ 20" H2O Blower Vacuum, 24.2 scfm
Vacuum Response@ 6.0" H2O Blower Vacuum, 10.8 scfm
Vacuum Response @ 3.6" H2O Blower Vacuum, 5.4 scfm
Log. (Vacuum Response@ 54" H2O Blower Vacuum, 46.2 scfm)
Log. (Vacuum Response@ 40" H2O Blower Vacuum, 36.1 scfm)
Log. (Vacuum Response@ 20" H2O Blower Vacuum, 24.2 scfm)
Log. (Vacuum Response@ 6.0" H2O Blower Vacuum, 10.8 scfm)



Vacuum vs. Radius Of Influence: TP-2
y = 1.2792e^0.138x
Applied Vacuum ("H20)
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
0
5
10
15
20
25
30
35
40
Estimated Radius Of Influence (ft.)


Air Flow vs. Estimated Radius of Influence: TP-2
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Air Flow (cfm)
y = 3.2653e^0.0982x
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Estimated ROI (ft)

EN/CP 606
Explosion-Proof Regenerative Blower

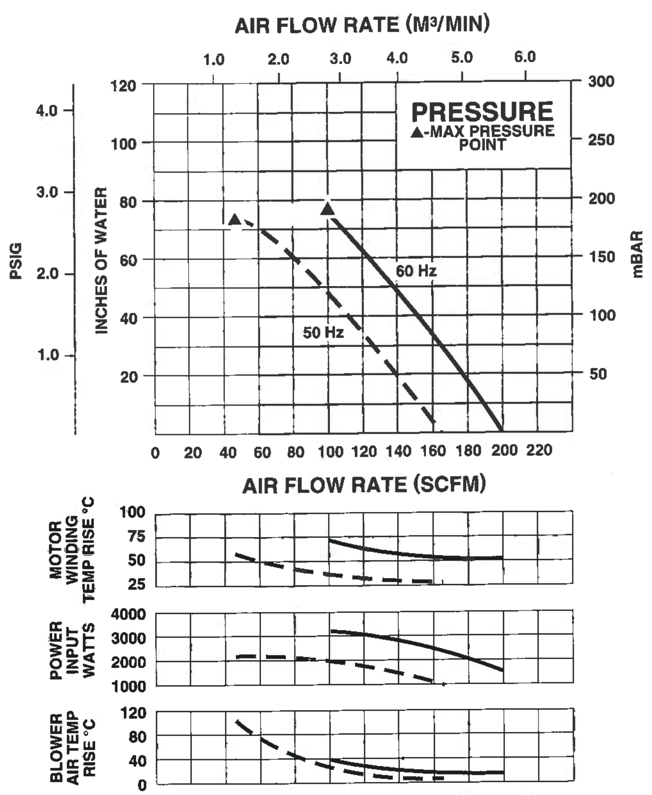
FEATURES
- Manufactured in the USA
- Maximum flow: 200 SCFM
- Maximum pressure: 75 IWG
- Maximum vacuum: 75 IWG
- Standard motor: 3.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

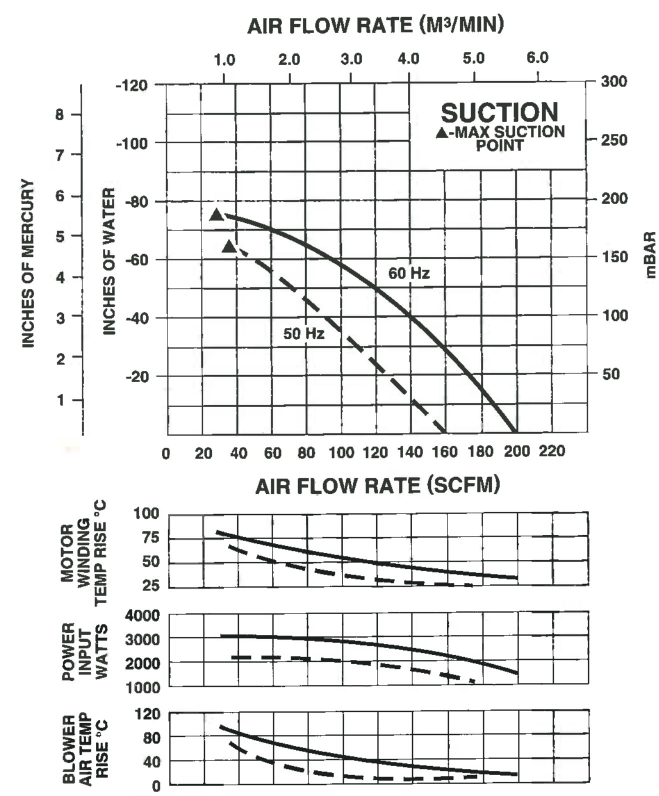
MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)

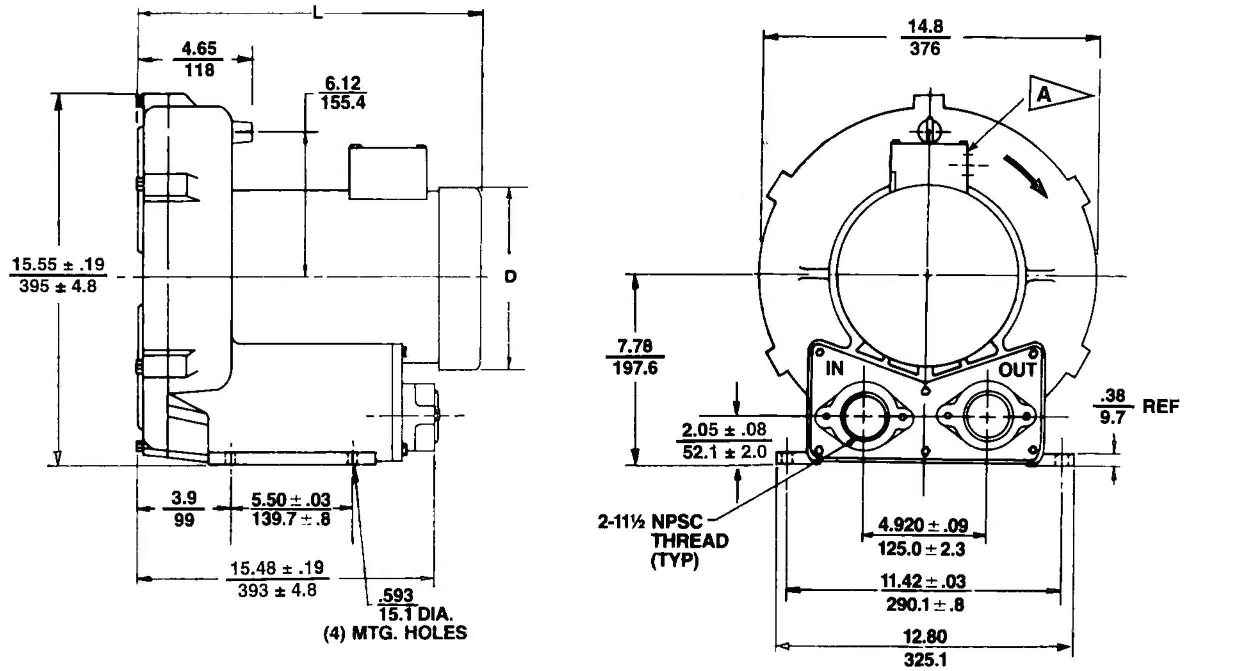
BLOWER PERFORMANCE AT STANDARD CONDITIONS





EG&G ROTRON, SAUGERTIES, N.Y. 12477 • 914/246-3401 • FAX 914/246-3802

EN/CP 606
Explosion-Proof Regenerative Blower



DIMENSIONS:	IN / MM
TOLERANCES:	.XX ± .1 / 2.5
(UNLESS OTHERWISE NOTED)	

MODEL	L (IN) ± .3	L (MM) ± 8	D (IN) ± .1	D(MM) ±3
EN/CP606M72ML	17.89	454	7.2	182
EN/CP606M5ML	19.9	505	8.5	216

A ▷ 0.75" NPT CONDUIT CONNECTION

SPECIFICATIONS

MODEL	EN606M5ML	EN606M72ML		EN606M86ML	CP606FU5MLR	CP606FU72MLR
Part No.	038538	038536		038437	–	038972
Motor Enclosure – Shaft Material	Explosion-proof – **CS**	Explosion-proof – **CS**		Explosion-proof – **CS**	Chem XP – **SS**	Chem XP – **SS**
Horsepower	3.0	3.0		3.0	Same as EN606M5ML – 038538 except add Chemical Processing (CP) features from catalog inside front cover	Same as EN606M72ML – 038536 except add Chemical Processing (CP) features from catalog inside front cover
Phase – Frequency [1]	Single - 60 Hz	Three - 60 Hz		Three - 60 Hz		
Voltage [1]	208-230	208-230	460	575		
Motor Nameplate Amps	15.5-14.5	7.8-7.4	3.7	3.0		
Max. Blower Amps [3]	19	7.6	3.8	3.1		
Inrush Amps	94-88	60-54	27	26		
Starter Size	1	0	0	0		
Service Factor	1.0	1.0		1.0		
Thermal Protection [2]	Class B - Pilot Duty	Class B - Pilot Duty		Class B - Pilot Duty		
XP Motor Class – Group	I-D, II-F&G	I-D, II-F&G		I-D, II-F&G		
Shipping Weight	130 lb (59 kg)	106 lb (48 kg)		106 lb (48 kg)		

[1] Rotron motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **200-220/400-440 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

[2] Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

[3] Maximum blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

Specifications subject to change without notice. Please contact factory for specification updates.

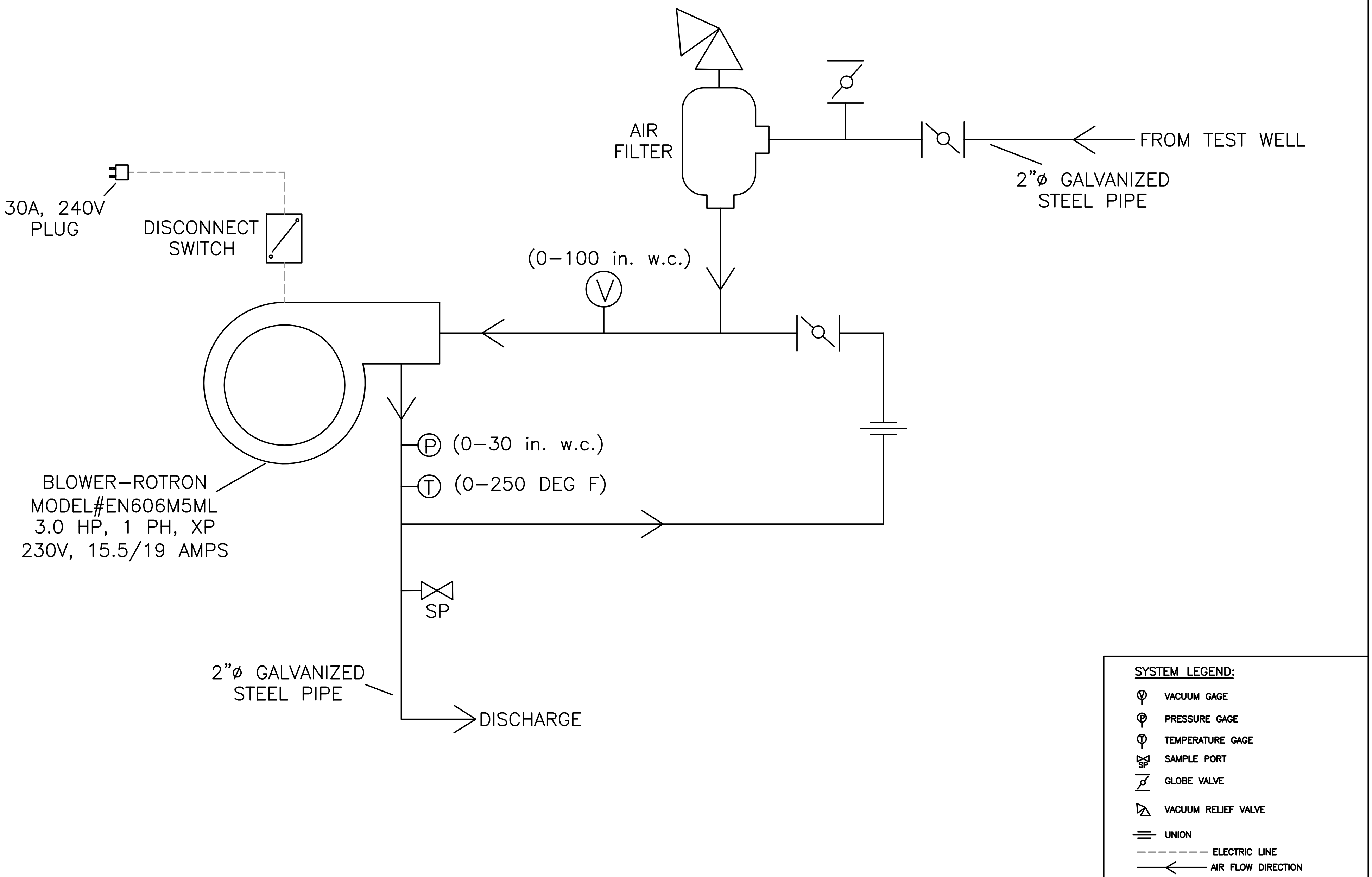


FIGURE #
1

SVE TEST TRAILER PROCESS AND INSTRUMENTATION DIAGRAM

DRAWN BY: J.W.
AUGUST 25, 2010

EnviroTrac
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
Phone: (631) 924-3001 Fax: (631) 924-5001

GX PRO SERIES

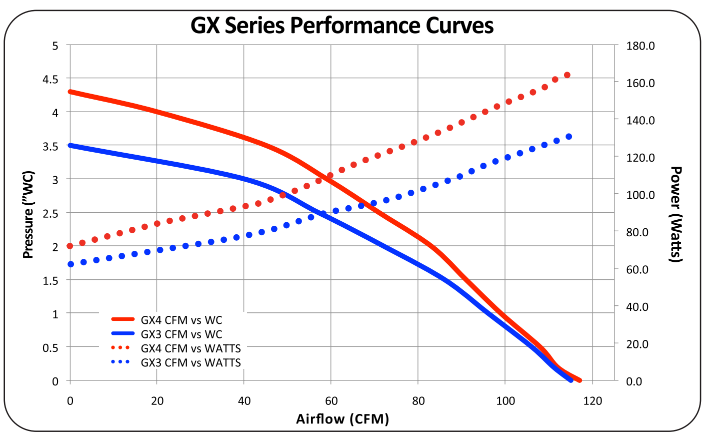
RadonAway®

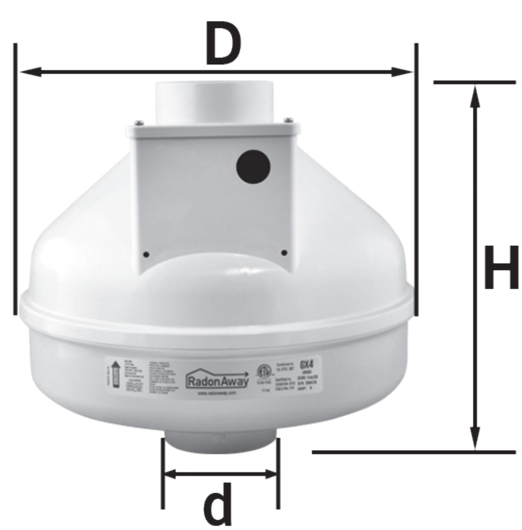
GX3/GX4

Features

- Revolutionary patent pending design
- Eternalast™ polycarbonate plastic housing
- Water-hardened thermally-protected motor
- Optimal for moderate to tight soils
- Quiet operation
- Rated for indoor and outdoor use
- Rated for commercial or residential use
- Vapor Tite™ technology to inhibit radon and soil gas leakage
- ETL listed by Intertek to UL507 and CSA C22.2 Standards

MODEL	P/N	FAN DUCT DIAMETER	WATTS	RECOM. MAX. OP. PRESSURE "WC	TYPICAL CFM vs. STATIC PRESSURE WC					
					0"	1.0"	2.0"	3.0"	4.0"	5.0"
GX3	28584	3"	60-135	3.3"	115	96	72	40	-	-
GX4	28585	3"	70-170	4.0"	117	99	83	59	20	-





MODEL	DUCT SIZE - OD (d)	DIAMETER (D)	HEIGHT (H)
GX3	3.5"	11.9"	10.9"
GX4	3.5"	11.9"	10.9"

MADE IN USA with U.S. and imported parts.

ETL Listed — Intertek

5 YEAR WARRANTY — RadonAway® Pro Series inline radon fans are covered by a 5-year, limited warranty.

For more information
(800) 767-3703
RadonAway.com

RadonAway®

Rev A 1020
P/N 02083

Appendix B
Foundation Repair Documentation

Foundation Repair with Polyurethane Foam

TECHNICAL DATA SHEET

RR 401, FAST, Lightning

HMI

Dual-Component, Expansive Polyurethane Foam

DESCRIPTION:

RR 401 Foam was designed for heavy lifting and high traffic areas. With over three times the compressive strength and comparable reaction speed to RR 201, it exceeds typical specifications for DOT projects.
RR 401 FAST Foam was formulated to give our customers the great benefits of RR401 with more speed, and less spread.
RR401 Lightning was formulated specifically for jobs that require the most speed and the least amount of spread.

APPLICATIONS:

- Residential, Commercial & Highway
- Thick/Heavy Slabs
- High/Heavy Traffic Areas
- Industrial Floors
- Soil Stabilization
- Void Filling

BENEFITS:

- Fast Reaction Speed - Faster than RR 401
- Up to 18x Expansion
- Great hydro-insensitive properties - can be used in wet environments

TECHNICAL DATA:

Density ASTM D1622	
Average (lbs./ft^3)	4.0 – 4.5

Compression Properties ASTM D1621	
Modulus (psi)	2300
Proportional Stress (psi)	100
Proportional Elongation (%)	6.0
Crushing Strength Stress Avg. (psi)	121
Crushing Strength Elongation (%)	9.2

Tensile Properties ASTM D1623	
Modulus (psi)	5680
Proportional Stress (psi)	208
Proportional Elongation (%)	5.4

Open Cell Content ASTM D2856	
Closed Cell Content (%)	>90

Water Absorption ASTM D2842	
Water Absorption (Vol. Basis) (%)	0.55
Water Absorption (Area Basis) (lb/ft)	0.13
Water Absorption (Weight Basis) (%)	6.4

Shear Properties ASTM C273	
Modulus (psi)	343
Proportional Stress (psi)	29.6
Proportional Elongation (%)	20.7
Breaking Strength Stress Avg. (psi)	39.4
Breaking Strength Elongation (%)	44.4

HMI Testing	**401**	**401 FAST**	**401 Lightning**
Time at Reaction (mm:sec)	00:04	00:03	00:02
Peak Exotherm (f)	272	277	280
Time at Peak Exotherm (mm:sec)	00:13	00:10	00:07
Time at Tack Free (mm:sec)	00:07	00:05	00:04
Time at Peak Expansion (mm:sec)	00:09	00:08	00:07

ALS C US Certified to NSF/ANSI/CAN 61

RR 401, FAST, Lightning

Dual-Component, Expansive Polyurethane Foam

EQUIPMENT & COMPONENT RATIOS:

The two part polyurethane process will give optimal performance when all systems are operating in correct sequence. Recirculate the material well before use. RR A (part A) is connected to the isocyanate pump with HMI Polyol (part B) connected to the resin/polyol pump. Part A and Part B must be mixed on a 1:1 ratio for designed reaction time, expansion rate, cure time, and density.

STORAGE OF CHEMICALS:

Store in original container protected from direct sunlight in a dry, cool and well ventilated area, away from heat, sparks, open flame, strong oxidizers, radiation and other initiators. Keep container tightly closed and sealed until ready for use. Do not store above 100°F. Do not allow material to freeze; Condensation and moisture can cause the material to crystallize.

SAFE HANDLING OF LIQUID COMPONENTS:

Take skin, auditory, eye and respiratory safety precautions during material handling and installation. Avoid breathing vapors or spray mists for long periods of time. Avoid contact with eyes, skin, and clothing. In case of eye contact, gently flush eyes with large amounts of water for at least 15 minutes and get prompt medical attention. If chemicals contact with clothing and skin, remove contaminated clothing and launder. Flush skin with lukewarm water for at least 15 minutes and seek medical attention if irritation to skin occurs. For more information, refer to Polyol Resin Blends Safety and Handling Guidelines (Technical Bulletin AX228) issued by Alliance for the Polyurethanes Industry. Arlington, VA: American Plastics Council.

SAFETY PRECAUTIONS:

If used incorrectly, the polyurethane foam may present a serious fire hazard. Part A and Part B mix to make foam that creates a chemical reaction which produces heat and fumes. While installing material, inject material, wait for expansion, wait to cool off, and then install additional material. DO NOT install additional material before this reaction is complete. Applying foams too thick in a single injection can build dangerously high temperatures inside the finished foam, which could lead to splitting, charring, or even spontaneous combustion.

HMI recommends that thickness not exceed two inches for closed celled foams. If multiple passes are sprayed or injected, sufficient time must be allowed for the exothermic heat to dissipate before each additional injection is applied. The foam applicator/contractor engaged in the application or use of polyurethane material should be made aware of the combustibility of the foam and fire hazards it can present if misused or over applied. Proper precautions and safety measures should be utilized.

Appendix C
Subslab Depressurization System Design

SUB-SLAB DEPRESSURIZATION SYSTEM

DESIGN FIGURES

SITE LOCATION:
350 BEACH 79TH STREET
FAR ROCKAWAY, NEW YORK 11693

PREPARED FOR::
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1201 3RD AVENUE, SUITE 2600
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AUGUST 2024

PREPARED BY:
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PROJECT ENGINEER

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REVISION No.: 1.0

DRAWING TITLE

TITLE SHEET

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FIGURE NO.

SSDS-001.00

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NOTES:

1. VAPOR COLLECTION PIPING: 4 INCH DIAMETER SCHEDULE 40 PVC PERFORATED OR SLOTTED (0.02" SLOT) PIPING SHALL BE USED FOR THE SUBSURFACE EXTRACTION POINTS TO BE INSTALLED BELOW THE CONCRETE SLAB. A 4" SCHEDULE 40 PVC DOME CAP SHALL BE INSTALLED AT THE END OF EACH LEG.

2. SSD VENT PIPING:
   - 2.1. SUB-SURFACE SOLID PIPING: 4 INCH DIAMETER SCHEDULE 40 PVC PIPE SHALL BE CONNECTED TO THE VAPOR COLLECTION PIPING/EXTRACTION POINTS VIA A 4 INCH DIAMETER COUPLING OR 90 DEG ELBOW FITTING, LOCATED AT THE TOP OF EACH EXTRACTION POINT. EACH LEG OF THE VENT PIPING WILL BE EXTENDED TO A DESIGNATED LOCATION IN THE NEAR VICINITY OF AN EXISTING INTERIOR WALL OR COLUMN. ALL PIPE AND FITTING CONNECTIONS SHALL BE EITHER SOLVENT WELD OR THREADED CONNECTIONS.
   - 2.2. ABOVE GRADE PIPING: ALL EXPOSED ABOVE GRADE VENT PIPE SHALL BE CAST IRON, NO-HUB PIPE AND FITTINGS. ALL PIPE AND FITTING CONNECTIONS SHALL BE NEOPRENE FLEXIBLE COUPLINGS WITH STAINLESS STEEL BANDS. THIS PIPING SHALL BE EXTENDED VERTICALLY THOUGH THE BUILDING FIRST FLOOR CONCRETE FLOOR SLAB. EACH PIPING ZONE HEADER SHALL BE ROUTED ALONG THE BUILDING FIRST FLOOR CEILING AND PENETRATE HORIZONTALLY THROUGH THE EXTERIOR WALL IN EACH DESIGNATED BLOWER LOCATION. THE PIPING RISER SHALL EXTEND THROUGH THE ROOF INTO THE INLET OF EACH ROOF MOUNTED BLOWER. THE EXHAUST PIPING SHALL TERMINATE AT LEAST 2 FEET ABOVE THE SURFACE OF THE ROOF, IN A LOCATION AT LEAST 10 FEET AWAY FROM ANY WINDOW OR OTHER OPENING INTO THE CONDITIONED SPACES OF THE BUILDING THAT IS LESS THAN 2 FEET BELOW THE EXHAUST POINT, AND 10 FEET AWAY FROM ANY ADJOINING OR ADJACENT BUILDING.

3. IN BUILDINGS DESIGNED WITH INTERIOR FOOTINGS OR OTHER BARRIERS TO LATERAL FLOW OF SUB-SLAB SOIL GAS, VENT PIPES SHALL BE INSTALLED IN EACH ISOLATED, NON-CONNECTED FLOOR AREA. IF MULTIPLE VENT POINTS ARE USED IN NON-CONNECTED FLOOR AREAS, VENT PIPES ARE PERMITTED TO BE MANIFOLDED BELOW THE FLOOR SLAB INTO A SINGLE VENT.

4. TO RETARD SOIL GAS ENTRY, LARGE OPENINGS THROUGH CONCRETE SLABS OR OTHER FLOOR ASSEMBLIES IN CONTACT WITH THE SOIL, SUCH AS SPACES AROUND BATHTUB, SHOWER, OR TOILET DRAINS, SHALL BE FILLED OR CLOSED WITH MATERIALS THAT PROVIDE A PERMANENT AIRTIGHT SEAL SUCH AS NON-SHRINK MORTAR, GROUTS, EXPANDING FOAM, OR SIMILAR MATERIAL DESIGN FOR SUCH APPLICATION.

5. TO RETARD SOIL GAS ENTRY, SMALLER GAPS AROUND ALL PIPES, WIRE, OR OTHER OBJECTS THAT PENETRATE THE CONCRETE SLAB OR OTHER FLOOR ASSEMBLY SHALL BE MADE AIRTIGHT WITH AN ELASTOMER JOINT SEALANT OR POLYETHYLENE TAPE, AS DEFINED IN ASTM C920-87, AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

6. TO RETARD SOIL GAS ENTRY ALL CONTROL JOINTS, ISOLATION JOINTS AND ANY OTHER JOINTS IN CONCRETE SLABS OR BETWEEN SLABS AND FOUNDATION WALLS SHALL BE SEALED. A CONTINUOUS FORMED GAP "TOOLED EDGE" WHICH ALLOWS THE APPLICATION OF A SEALANT THAT WILL PROVIDE A CONTINUOUS, AIRTIGHT SEAL SHALL BE CREATED ALONG ALL JOINTS. WHEN THE SLAB HAS CURED, THE GAP WILL BE CLEARED OF ANY LOOSE MATERIAL AND FILLED WITH AN ELASTOMER JOINT SEALANT, AS DEFINED IN ASTM C920-87, AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

7. CONCRETE MASONRY FOUNDATION WALLS BELOW THE GROUND SURFACE SHALL BE CONSTRUCTED TO MINIMIZE THE TRANSPORT OF SOIL GAS FROM THE SOIL TO THE BUILDING. HOLLOW BLOCK MASONRY WALLS SHALL BE SEALED AT THE TOP TO PREVENT THE PASSAGE OF AIR FROM THE INTERIOR OF THE WALL TO THE LIVING SPACE. AT A MINIMUM, ONE COURSE OF SOLID MASONRY, ONE COURSE OF MASONRY GROUTED SOLID, OR A POURED CONCRETE BEAM AT OR ABOVE THE FINISHED GROUND SURFACE LEVEL SHALL BE USED FOR THIS PURPOSE. WHERE A BRICK VENEER OR OTHER MASONRY LEDGE IS INSTALLED, THE COURSE IMMEDIATELY BELOW THAT LEDGE SHALL ALSO BE SEALED.

8. JOINTS, CRACKS, OR OTHER OPENINGS AROUND ALL PENETRATIONS OF BOTH EXTERIOR AND INTERIOR SURFACES OF MASONRY BLOCK WALLS BELOW THE GROUND SURFACE SHALL BE SEALED WITH AN ELASTOMETRIC SEALANT THAT PROVIDES AN AIRTIGHT SEAL. PENETRATIONS OF POURED CONCRETE WALLS SHALL ALSO BE SEALED ON THE EXTERIOR SURFACE. THIS INCLUDES SEALING OF WALL TIE PENETRATIONS.

9. ALL EXPOSED AND VISIBLE INTERIOR SSD VENT PIPES SHALL BE IDENTIFIED WITH AT LEAST ONE LABEL ON EACH FLOOR LEVEL. THE LABEL SHALL READ: "ACTIVE VAPOR MITIGATION SYSTEM".

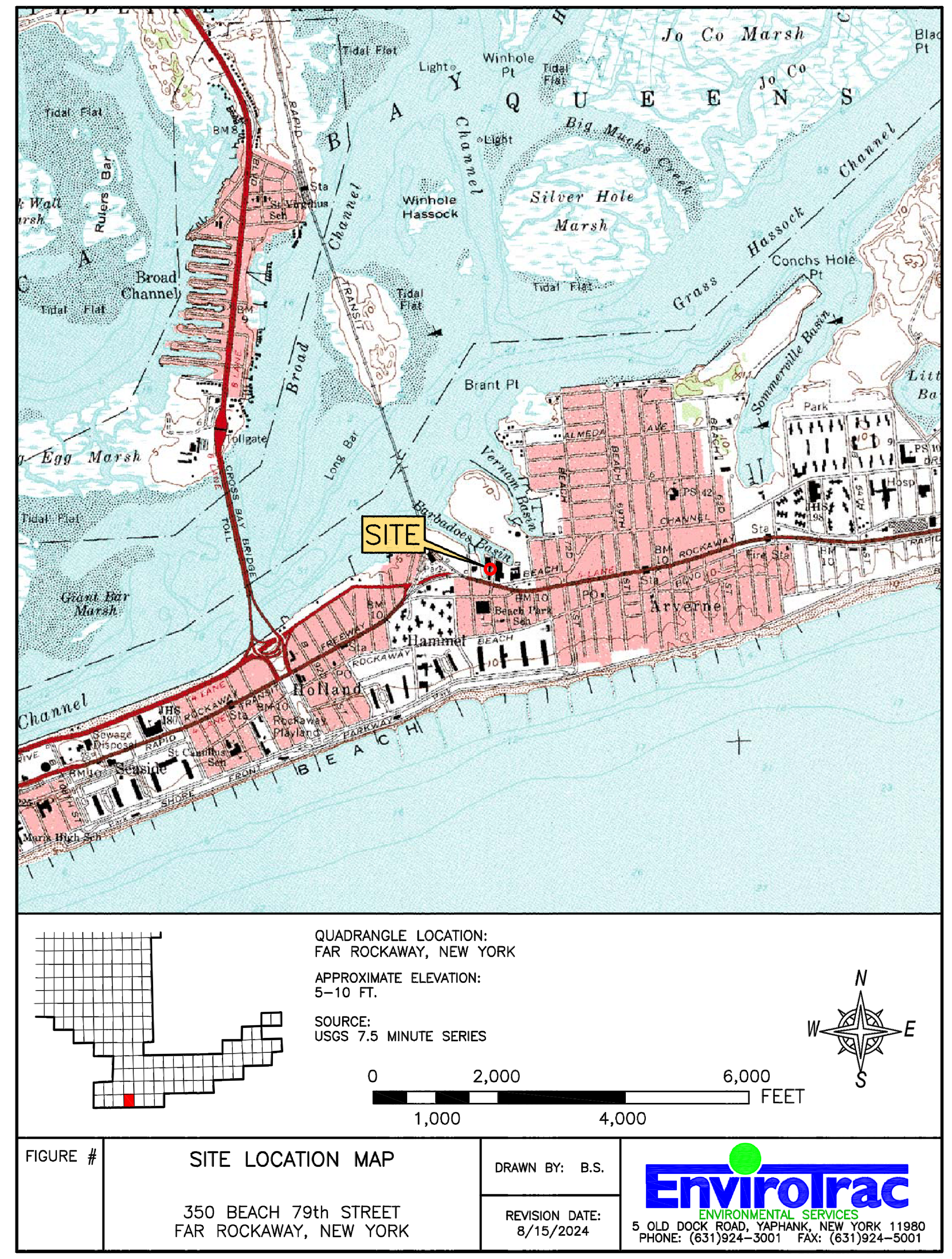
10. VENTILATION FAN(S): EACH OF THE THREE (3) IN-LINE VACUUM BLOWERS SHALL BE INSTALLED NEAR THE ROOF OF THE EXISTING BUILDING AS DEPICTED IN THE "BLOWER AND ROOF PIPING DETAIL". THE FAN SHALL BE INSTALLED AS PER THE MANUFACTURER'S INSTRUCTIONS. A 240 V, 1-PHASE, ELECTRICAL DISCONNECT SWITCH SHALL BE SUPPLIED AND INSTALLED BY A LICENSED ELECTRICIAN IN ACCORDANCE WITH ALL APPLICABLE LOCAL ELECTRICAL CODES. EACH VACUUM BLOWER SHALL BE CAPABLE OF PRODUCING A MINIMUM OF 89 CFM @ 30"H2O VACUUM. EACH VACUUM BLOWER SHALL BE A OBAR COMPACT RADIAL BLOWER, MODEL NO. GBR76-UD, MANUFACTURED BY OBAR SYSTEMS INC, SOUTH NEWFOUNDLAND, NJ, OR EQUAL.

11. SYSTEM INDICATOR: A VACUUM GAUGE SHALL BE INSTALLED 0N EACH LEG OF THE VAPOR VENT PIPING IN ORDER TO PROVIDE A VISUAL INDICATION OF THE SYSTEM OPERATION. THE VACUUM GAUGE SHALL BE INSTALLED AT THE LOWEST ACCESSIBLE LOCATION OF EACH MANIFOLD LEG IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE VACUUM GAUGES WILL BE 2-12" DIAL, LOW VACUUM DIAPHRAGM GAUGES, 1.5% FULL SCALE ACCURACY. THE VACUUM GAUGES SHALL BE DWYER SERIES LPG4 LOW PRESSURE GAUGE, 0 TO 60" H2O RANGE, MODEL NO. LPG4-D7522N, MANUFACTURED BY DWYER INSTRUMENTS, MICHIGAN CITY, IN.

12. VACUUM ALARM: ONE (1) VACUUM ALARM SHALL BE INSTALLED IN ORDER TO PROVIDE AN AUDIBLE AND VISUAL ALARM IN THE EVENT THE VACUUM FAN SHUTS DOWN AND THERE IS A LOSS OF VACUUM WITHIN THE SYSTEM PIPING. THE ALARM UNIT SHALL CONNECT TO THE PROCESS PIPING VIA A $\frac{1}{4}$" DIAMETER FLEXIBLE POLYETHYLENE TUBE AND POWERED THROUGH A 110V ELECTRICAL OUTLET. THE ALARM UNIT SHALL BE A MODEL GBR25-R, PRESSURE GAUGE / ALARM, MANUFACTURED BY OBAR SYSTEMS, INC.

13. VACUUM MONITORING POINTS: VACUUM TEST POINTS SHALL BE INSTALLED AT A MINIMUM OF FIFTEEN (15) LOCATIONS IN THE CONCRETE SLAB FOR THE PURPOSE OF TESTING THE EFFECTIVENESS OF THE SSD SYSTEM. THE VAPOR MONITORING POINTS SHALL BE DRILLED-IN-PLACE STAINLESS STEEL VAPOR PIN INSERTS. EACH MONITORING POINT SHALL BE CAPPED USING A SCREW IN PLACE FLUSH MOUNT STAINLESS STEEL COVER. EACH VAPOR PIN SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDED INSTALLATION INSTRUCTIONS. MONITORING POINTS SHALL BE STAINLESS STEEL VAPOR PINS (MODEL VPIN0522SS) AND FLUSH MOUNTED STAINLESS STEEL SECURE COVER MANUFACTURED BY COX COLVIN, PLAIN CITY, OH.

14. ALL COMPONENTS OF THE SUB SLAB DEPRESSURIZATION SYSTEM SHALL BE IN ACCORDANCE WITH ASTM E 2121-21 "STANDARD PRACTICE FOR RADON MITIGATION SYSTEMS IN EXISTING LOW-RISE RESIDENTIAL BUILDINGS" AND NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, (NYSDEC), DER-10 "TECHNICAL GUIDANCE FOR SITE INVESTIGATION AND REMEDIATION".



DRAWING INDEX	
DWG. No.	TITLE
SSDS-001.00	TITLE SHEET
SSDS-002.00	DRAWING INDEX, SITE LOCATION, ABBREVIATIONS AND NOTES
SSDS-003.00	SITE PLAN
SSDS-004.00	MISCELLANEOUS DETAILS

ABBREVIATIONS	
SSDS	SUB-SLAB DEPRESSURIZATION SYSTEM
DWG	DRAWING
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
VMP	VACUUM MONITORING POINT
SCH	SCHEDULE
TYP	TYPICAL

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REVISION No.: 1.0

DRAWING TITLE

DRAWING INDEX, SITE LOCATION, ABBREVIATIONS AND NOTES

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FIGURE NO.

SSDS-002.00

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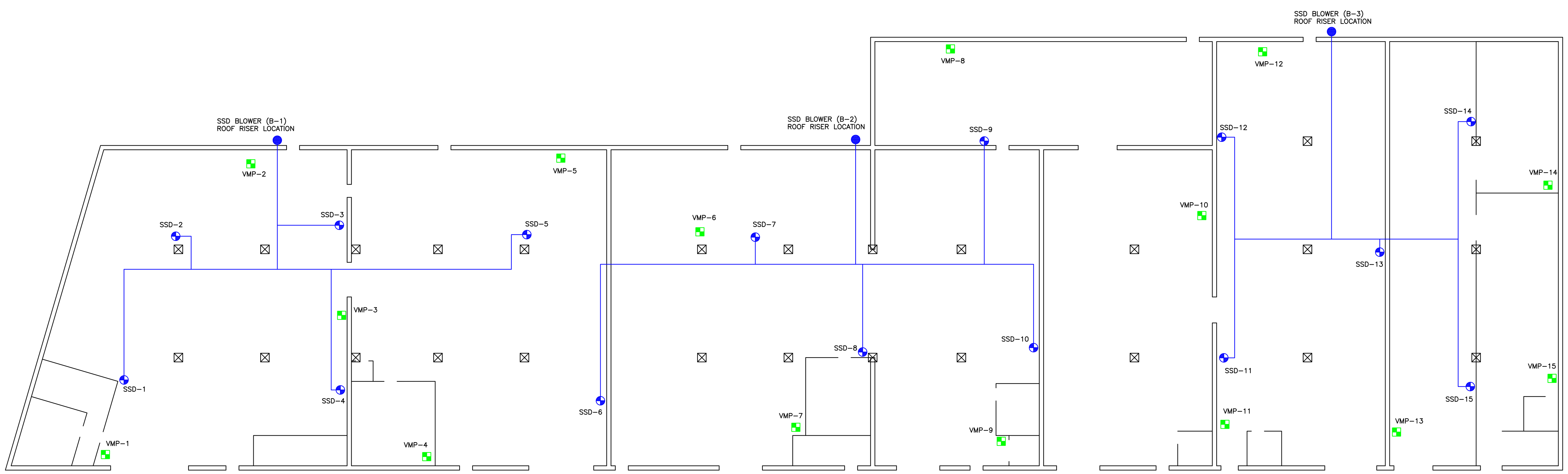

north

LEGEND:

- SSDS EXTRACTION POINT
- PIPE RISER TO ROOF
- VACUUM MONITORING POINT (VAPOR PIN)
- SSDS OVERHEAD PIPING

0 16' 32'

SCALE: 1"=16'

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DRAWING TITLE

SITE PLAN - FIRST FLOOR

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FIGURE NO.

SSDS-003.00

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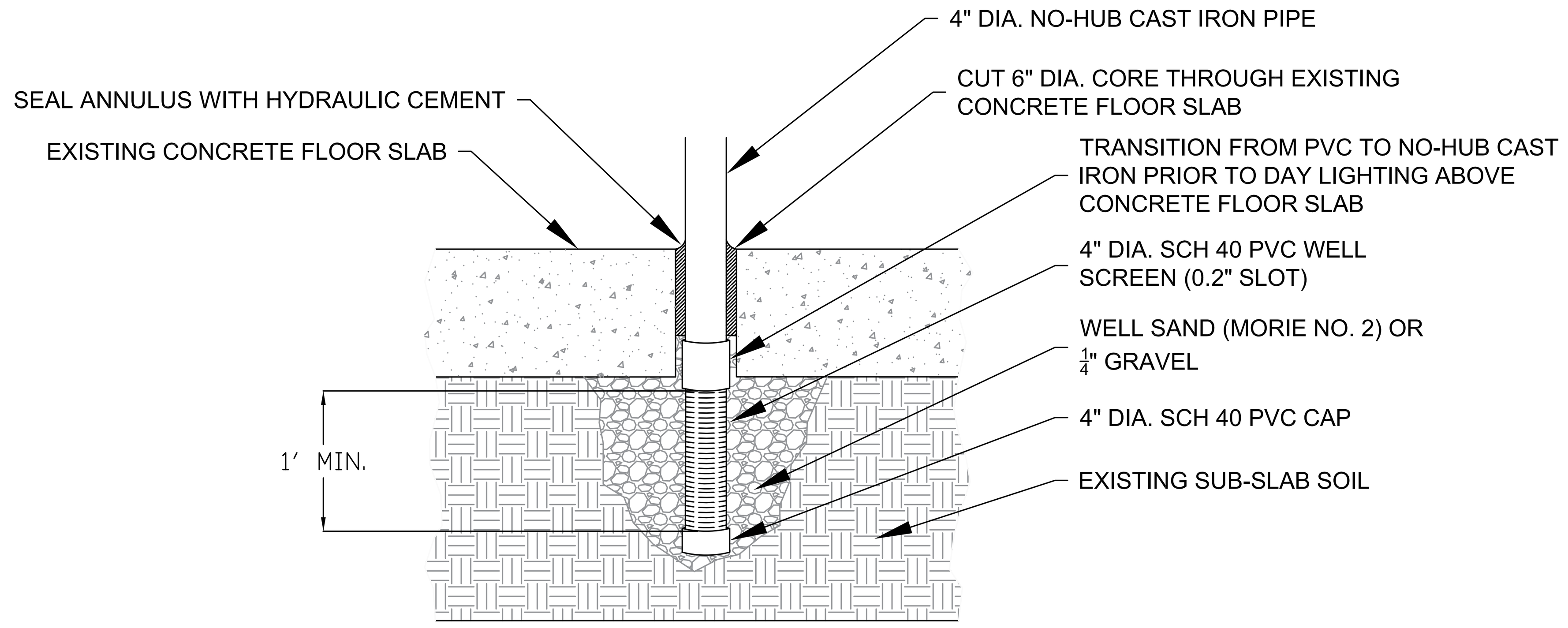
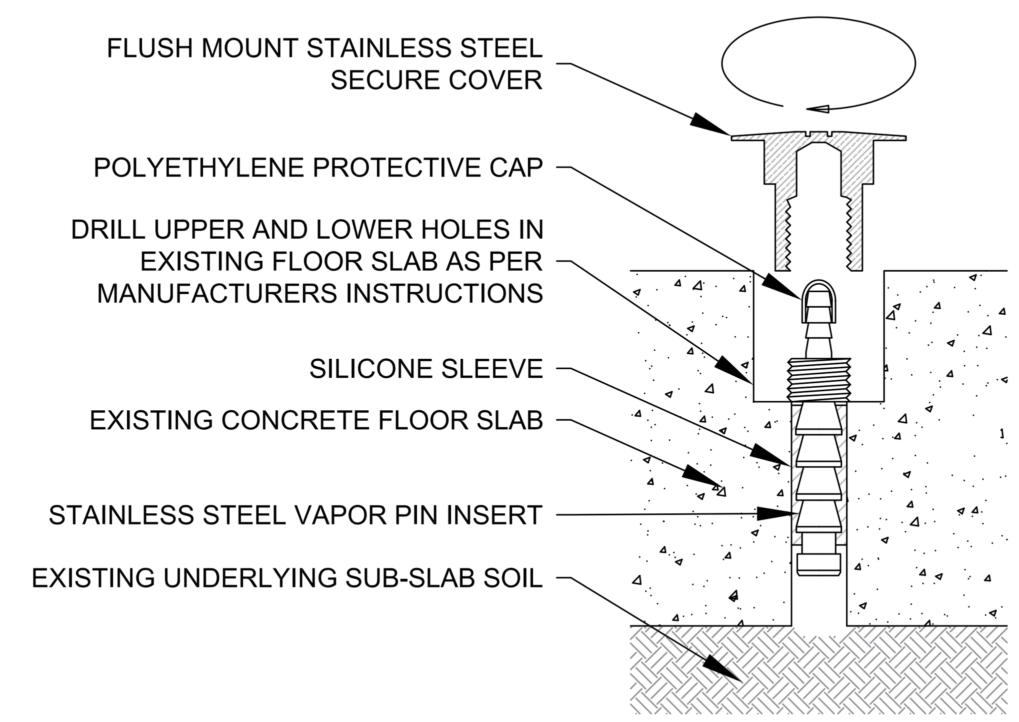
EXTRACTION POINT DETAIL

(SSDS-1 - SSDS-15) NOT TO SCALE



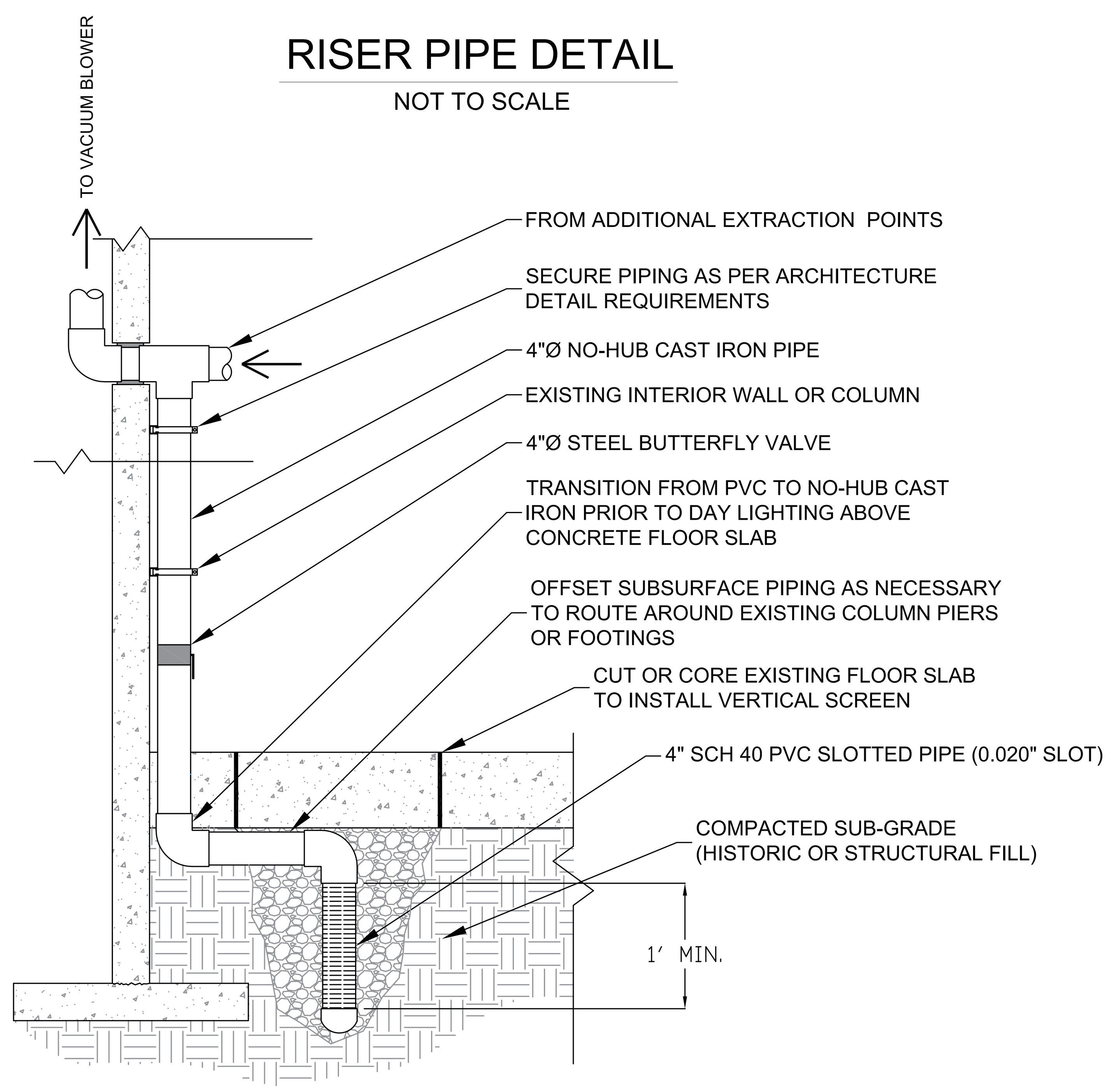
VAPOR / VACUUM MONITORING POINT

NOT TO SCALE



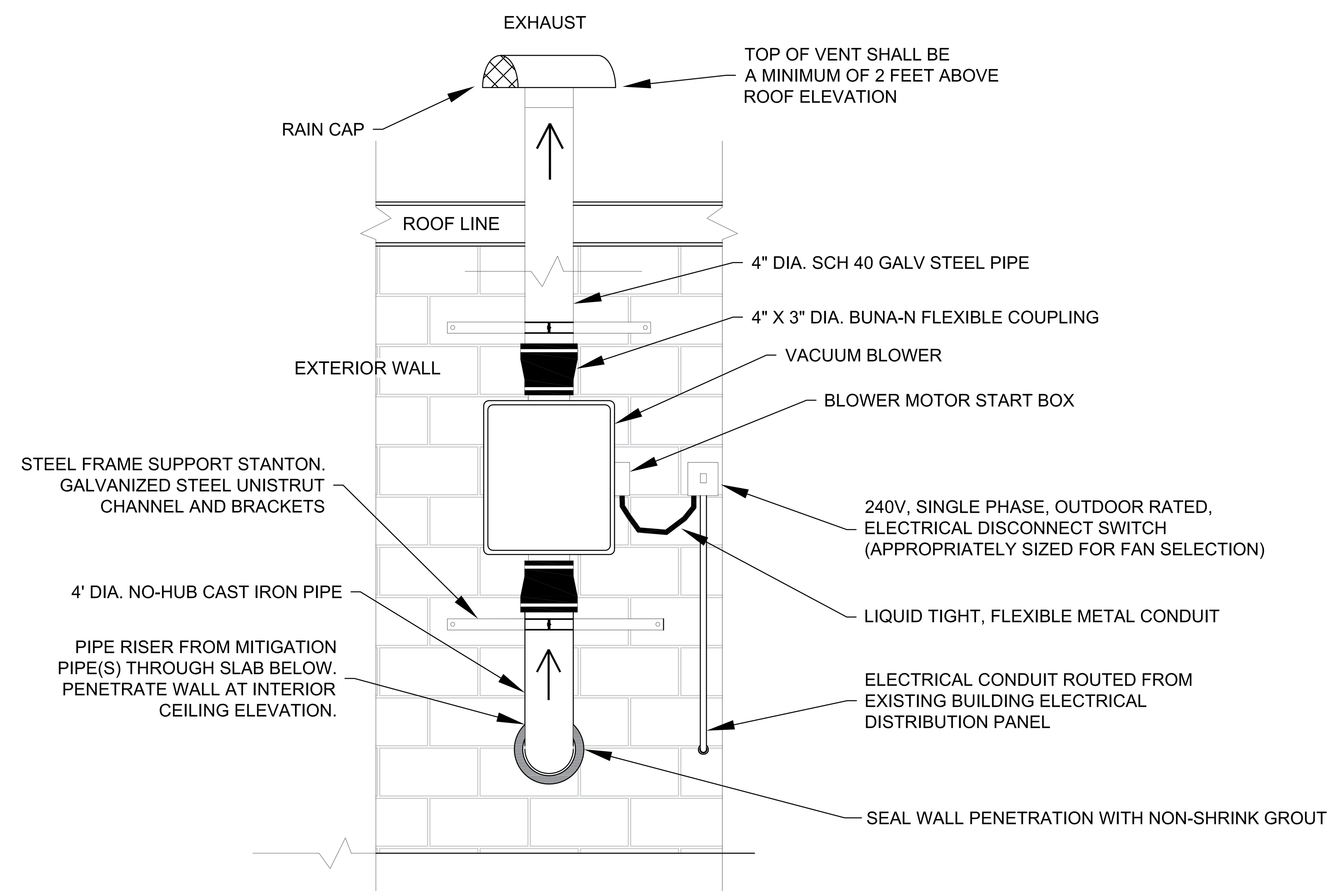
RISER PIPE DETAIL

NOT TO SCALE



BLOWER AND ROOF PIPING DETAIL

NOT TO SCALE



NOTES:

A. BUILDING DETAILS SHOWN FOR CONCEPTUAL PURPOSES ONLY. NOT TO BE USED FOR STRUCTURAL OR ARCHITECTURAL PURPOSES.
B. VACUUM BLOWER/FAN MAKE/MODEL: OBAR SYSTEMS INC, MODEL NO. GBR76-UD
C. VACUUM ALARM(S) MAKE/MODEL: OBAR SYSTEMS INC, MODEL NO. GBR25-R

PROJECT ENGINEER

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REVISION No.: 1.0

DRAWING TITLE

MISCELLANEOUS DETAILS

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FIGURE NO.

SSDS-004.00

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Appendix D
Installation Work Plan

EnviroTrac
Environmental Services

It is our understanding that the site consists of an existing single commercial building, which includes a concrete slab-on-grade finished floor. The SSD system shall be constructed in accordance with the previously approved design figures issued by EnviroTrac Engineering P.E. P.C. (EnviroTrac) dated August 30, 2024. The purpose of the system is to mitigate vapors encountered during previous site investigation activities. The proposed SSD system will consist of a three (3) vacuum fans connected to a network (3 zones) of individual suction points that will provide vacuum influence beneath the footprint of the subject facility.

SCOPE OF WORK:

Task 1: Installation of SSDS Extraction Points, Piping, and Vacuum Blowers

- Prior to the commencement of any subsurface work EnviroTrac shall request an 811 utility markout call. Additionally, a private utility markout shall be performed in conjunction with GPR within the building in the areas of planned excavations.
- Furnish and install up to fifteen (15) 4-inch diameter extraction wells that shall be installed through the existing building concrete floor slab. Each well shall consist of an ~1 foot long, 4-inch diameter PVC schedule 40 PVC well screen (0.02-inch slot) embedded in well gravel. The well shall be installed using a 5-inch diameter concrete core drill through the existing concrete floor slab. The underlying soil shall be removed to a depth of approximately 12 inches below the underside of the floor slab. The extraction piping shall be 4-inch diameter schedule 40 PVC routed from the extraction well screen located below the floor slab into the building space. The top of the well shall be sealed flush with the existing concrete floor slab using hydraulic cement to fill the annulus between the riser pipe and the cored hole.
- Furnish and install all piping and accessories associated with the piping risers that will be routed from each extraction pit to the building's first floor ceiling. Each pipe riser shall be constructed using 4-inch diameter cast iron no-hub pipe and fittings with stainless steel/neoprene clamp on couplings.
- Above grade piping shall be run to the designated riser location from each pit and routed vertically to the building roof near an interior wall or column (as depicted within the design figures). The pipe risers shall be combined as depicted to manifold into three separate zones. The common header from each piping zone shall penetrate through the building exterior wall at each of the specified extraction fan locations. Each riser pipe that penetrates the to the building exterior shall be sealed utilizing hydraulic cement sealant.
- Each vertical pipe riser extending up from each of the fifteen (15) extraction pits shall be fitted with a steel butterfly valve and vacuum gauge.
- Furnish and install fifteen (15) vacuum monitoring points (VMP). Each VMP shall be a stainless steel vapor pin, manufactured by Cox-Colvin.
- Furnish and install three (3) vacuum fans that shall be positioned on the building rear exterior wall, at an elevation below the roof line, adjacent to where each riser pipe penetrates the building. The SSDS fans shall be a model GBR76UD compact radial blower, manufactured by OBAR Systems Inc.
- Furnish and install three (3) vacuum alarm units to be installed on each pipe header (one (1) per extraction zone) within the building. Each vacuum sensor/alarm shall be model GBR25R vacuum alarm/indicators, manufactured by Obar Systems Inc..
- Electrical power for each of the three (3) blowers and the three (3) alarm units shall be provided from the existing building electrical service. All electrical work shall be conducted by a NYS licensed electrician, and installed in accordance with any applicable electrical codes, including NEC.
- Once the vacuum fan installation is completed, a demonstration of the effectiveness of the system will be conducted. Vacuum readings will be collected from each of the monitoring points located though out the floor slab in order to demonstrate sufficient vacuum within

the sub-slab area.

Additional Notes:

- Size and capacity of the selected equipment are based on information provided regarding existing site conditions, and the approved design figures provided by EnviroTrac Engineering P.E. P.C.
- All labor will be considered non-union and non-prevailing wage rates.
- All construction will be conducted during normal business hours (7am-4pm, M-F) or additional labor fees shall apply.
- All permits will be by others, or under a separate proposal.
- Pricing includes applicable taxes.
- Coordination, correspondence, or reporting with all local, state, or federal regulatory agencies by others.
- All waste (soil) classification, sampling, labeling, management, transportation, or disposal shall be by others, or under a separate scope of work.
- Minor changes and incidental conflicts to the drawings are anticipated. Additional or out of scope services will be negotiated and billed at EnviroTrac's standard rates and will not be charged without prior authorization by the Client/Owner.
- Periodic operation and maintenance (O&M) costs can be provided under a separate proposal.

Appendix E
New York State Department of Health
Generic Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.