International Business Machines Corporation

2455 South Road
Poughkeepsie, NY, 12601

March 31, 2022

Jessica LaClair
New York State Department of Environmental Conservation
Division of Environmental Remediation, Remedial Bureau D
625 Broadway, 12th Floor
Albany, New York 12233-7013

Re: Vapor Intrusion Engineering Controls 2021 Annual Report
IBM Poughkeepsie Facility, Poughkeepsie, New York
NYSDEC Site No. 314001
EPA ID NYD080480734

Dear Ms. LaClair:

The enclosed document presents a summary of the monitoring conducted in 2021 in accordance with IBM's Performance Monitoring Plan (PMP) for Vapor Intrusion Engineering Controls at the IBM Poughkeepsie facility.

If you wish to further discuss this document or have questions, please contact Mr. Steve Brannen of IBM at (845) 433-1509.

Sincerely,
International Business Machines Corporation

Nicolette Visalli
US Manager, Environmental, Chemical & Safety Services
Global Real Estate

Enclosure. Vapor Intrusion Engineering Controls 2021 Annual Report

cc: J. Kenney, NYSDOH
B. Ashby, IBM
S. Brannen, IBM

SANBORN HEAD ENGINEERING

Building Trust. Engineering Success.

VAPOR INTRUSION ENGINEERING CONTROLS 2021 ANNUAL REPORT

IBM Poughkeepsie Facility
Poughkeepsie, New York
NYSDEC Site No. 314001
USEPA ID No. NYD080480734

IBM
Poughkeepsie, New York

Prepared for IBM Corporation
File No. 4238.02
March 2022

SANBORN HEAD ENGINEERING
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20 Foundry Street
Concord, NH 03301

Stephen P. Brannen
IBM Corporation
2455 South Road
Poughkeepsie, New York 12601

March 30, 2022
File No. 4238.02

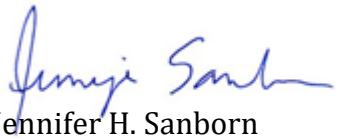
Re: Vapor Intrusion Engineering Controls 2021 Annual Report
IBM Poughkeepsie Facility
Poughkeepsie, New York
NYSDEC Site No. 314001
USEPA ID No. NYD080480734

Dear Mr. Brannen:

The enclosed report presents a summary of the monitoring conducted in 2021 in accordance with IBM's Performance Monitoring Plan (PMP) for Vapor Intrusion Engineering Controls at the IBM Poughkeepsie facility. Please contact us if you have any questions.

Very truly yours,
SANBORN, HEAD ENGINEERING, P.C.

David Shea, P.E.
Principal Engineer



Jennifer H. Sanborn
Project Director

Encl. 2021 Annual Report

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VAPOR INTRUSION ENGINEERING CONTROLS
2021 ANNUAL REPORT

IBM Poughkeepsie Facility
Poughkeepsie, New York

Prepared for
IBM Corporation

IBM
Poughkeepsie, New York

Prepared by
Sanborn, Head Engineering, P.C.

File 4238.02
March 2022

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NYS Professional Engineer Certification
Vapor Intrusion Engineering Controls - 2021 Annual Report
IBM Poughkeepsie Facility
NYSDEC Site No. 314001

I, David Shea, certify that I am currently a NYS registered professional engineer and that the vapor intrusion engineering controls employed at this site are protective of public health and the environment, based on the data and information provided to me and my inquiry of those persons responsible for operating the engineering controls and gathering the data and information.

Date: March 30, 2022

Name: David Shea

NYS P.E. License No. 70026

P:\4200s\4238.02\Source Files\2021 Annual Report\PE Certification Page.docx

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APPENDICES

1.0 INTRODUCTION

This report summarizes the results of monitoring conducted in 2021 for the soil vapor intrusion (VI) engineering controls (ECs) established in accordance with IBM's Performance Monitoring Plan for Vapor Intrusion Engineering Controls (PMP)[1] for certain buildings at the IBM Poughkeepsie Facility (the site). The PMP is currently under review by the New York State Department of Environmental Conservation (NYSDEC) and Department of Health (NYSDOH) (collectively the Departments).

The site is located at 2455 South Road, Poughkeepsie, New York. A Site Location Plan is provided as Figure 1, and a map of the site buildings subject to the PMP is provided as Figure 2. The work described herein was conducted on behalf of IBM by Sanborn, Head Engineering, P.C. in accordance with the PMP. The services conducted, and this report, are subject to the standard limitations for this type of work, as described in Appendix A.

1.1 Report Organization

This report is organized into four sections as described below:

Section 1.0 presents a general introduction, including the background and purpose of the report.

Section 2.0 summarizes the status of building use and occupancy in 2021.

Section 3.0 provides a summary of the VI EC operations in 2021.

Section 4.0 is the closing.

1.2 Background and Purpose

Indoor air and VI assessments were completed in accordance with IBM's October 23, 2012 Resource Conservation and Recovery Act (RCRA) Facility Investigation Work Plan (RFI Work Plan)[2] for volatile organic compound (VOC) source assessment, which was approved by the Departments in an August 12, 2013 letter to IBM. The purpose of the assessments was to evaluate the potential presence of certain VOCs in indoor air related to potential VI from subsurface VOC sources beneath certain occupied buildings on the site. Findings and results for the completed RFI work are found in a series of reports submitted to the Departments.

As part of the RFI, indoor air sampling was conducted in 8 buildings. Among those 8 buildings, IBM implemented reasonable and practical measures to reduce VOC concentrations in 6 buildings (B001, B002, B003, B004, B008, and B012) as reviewed and approved by the Departments. The remaining 2 of 8 buildings subject to indoor air sampling (B077 and B416) did not require any measures based on the indoor air VOC sampling results. Nonetheless, these two buildings were included in the PMP for periodic checks for changes

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1 Sanborn, Head Engineering, PC, *Performance Monitoring Plan for Vapor Intrusion Engineering Controls, IBM Poughkeepsie Facility, Poughkeepsie, NY,* November 2021 (includes Amendment #1).

2 *RFI Work Plan, VOC Source Assessment, IBM Poughkeepsie Facility*, Sanborn Head Engineering P.C. and IBM Corporation, October 2012.

to building conditions and status of heating, ventilating, and air conditioning (HVAC)[3] operations under the presumption that existing HVAC operations may be acting as VI ECs.

Thirty-two site buildings were not subject to indoor air sampling under the RFI because they are either located outside the area of known presence of VOCs in soil vapor or groundwater (21 buildings), within the footprint of VOC presence in soil vapor or groundwater but unoccupied (7 buildings), or may be subject to occupational VOC presence in indoor air due to the presence of groundwater remediation systems or treatment residuals handling (4 buildings). The 11 buildings that were unoccupied or that may be subject to occupational VOC presence are included in the PMP for periodic checks for changes to building infrastructure, use, and occupancy. A summary of each of the 19 buildings subject to the PMP and the implemented VI ECs, if any, is provided in Table 1.

The VI ECs rely upon both active and passive components. Active VI ECs rely upon active mechanical measures to maintain appropriate indoor air quality, and include subslab depressurization (SSD) systems, trench and manhole vapor extraction systems (VES), and HVAC systems. Passive ECs do not employ mechanical systems; examples include sealing of utility penetrations and floor covers.

Annual checks were conducted at the site by IBM in 2021 in accordance with the VI EC long-term monitoring plan included in the PMP and presented in Appendix B.

The purpose of this report is to summarize the status of building use/occupancy and the consistency of VI EC operations in the buildings that were the subject of the PMP for the calendar year 2021.

2.0 STATUS OF BUILDING USE AND OCCUPANCY

Two buildings had minor occupancy or use changes, as discussed in the following sections. No other significant occupancy and use changes were observed in other buildings during the 2021 PMP checks or noted by IBM. A summary of occupancy and use changes that were noted in 2021 based on PMP checks and discussions with IBM is provided in Table 2.

2.1 B003

A formerly vacant area in the northeast corner of the first floor of B003 is now in use as an archive storage area, but remains unoccupied. Infrastructure changes were made to the walls, doorways, and floors in that area. There were no changes to occupancy on the first floor of B003 in 2021.

2.2 B416

The cafeteria area of B416 is no longer in use nor occupied. In addition, a tenant-occupied office area was vacated and replaced with IBM employees with similar operations and use (office space). There were no other changes to occupancy in B416 in 2021.

[3] B077 does not have an active HVAC system and is only periodically occupied.

3.0 STATUS OF VI ENGINEERING CONTROLS

The VI ECs at the site include the following:

- B003 – SSD system for the full building footprint and two vapor extraction systems (VES) for perimeter utility floor trenches and certain interior stormwater manholes.
- B001, B004 – Partial building footprint SSD system and HVAC ECs for the remaining portion of the building footprints.
- B001, B002, B004, B008, B012 – HVAC ECs for either the full or partial building footprint.
- B416 – Changes to HVAC operations were not needed for VI control; however, it is presumed that the HVAC systems may be acting as ECs and need to remain operating in occupied areas.
- B001, B002, B003, B004, B012 – Passive ECs – Sealing of preferential VI pathways and closed perimeter hallway doorways (B012 only).

VI EC performance monitoring was conducted in 2021 in accordance with the PMP and included HVAC system operational checks, passive EC checks, and monitoring of SSD/VES operational and vacuum conditions.

The PMP documents the HVAC settings that reflect conditions that have been shown effective for VI ECs as determined by previous acceptable indoor air quality sampling results. In addition, the PMP calls for SSD system and passive EC checks. In accordance with the PMP, if differences are noted during checks, further assessment or actions may be appropriate.

A summary of the 2021 VI EC operational checks is provided in Table 2 and described in the following sections.

3.1 B001

An SSD system began operating beneath the northern, mostly occupied area of B001 on November 18, 2014. The southern portion of B001 is a storage/warehousing area that is not routinely occupied. An HVAC system in the warehouse area is activated by a motion sensor when the area is accessed. In addition, sealed preferential pathways serve as ECs within the building.

Indoor air sampling conducted in December 2014 after SSD system start-up indicated acceptable indoor air quality in the building, including in the warehouse area to the south of the SSD system influence, as documented in a report submitted to the Departments.[4]

Based on the November 2021 system operations checks and cross-slab differential pressure (DP) measurements, the SSD system is operating in accordance with its design objectives. The November 2021 cross-slab DP readings, the approximate extent of subslab

[4] Sanborn, Head Engineering, PC, *Performance Monitoring and Confirmatory Sampling Results, Building 001 Vapor Extraction System, IBM Poughkeepsie Facility, Poughkeepsie, NY,* January 2015

depressurization, and the induced vacuum at each of the operating extraction ports are shown on Figure 3.[5] The area of subslab vacuum influence and induced vacuum at the extraction ports were found to be consistent with conditions observed in 2014 as documented in the B001 SSD system O&M Manual[6] included in the PMP (see Appendix C for the figure from the O&M Manual showing SSD operating conditions).

During the PMP checks, no changes were noted to the HVAC operational settings for the unit located in the warehouse area.

During the passive EC checks, the epoxy used to seal one of the preferential pathways in B001 (a hatch) was found to be damaged. The sealant on the hatch was subsequently repaired by IBM and no further action is needed.

3.2 B003

VI ECs implemented in B003 include an SSD system beneath the building footprint and two vapor extraction systems to collect vapor from the perimeter floor trenches and certain interior stormwater manholes. The three systems began operation on October 2, 2013. In addition, sealed preferential pathways serve as ECs within the building.

Indoor air sampling conducted in November 2013 after SSD system start-up indicated acceptable indoor air quality, as documented in a report submitted to the Departments.[7]

The November 2021 cross-slab differential pressure readings for the B003 SSD system, the approximate extent of subslab depressurization, and induced vacuum at each of the operating extraction ports are shown on Figure 4. The area of subslab vacuum influence and induced vacuum at the extraction ports were found to be consistent with those observed in December 2014 as documented in the SSD system O&M Manual[8] (see Appendix C for the figure from the O&M Manual showing SSD operating conditions), with the following exceptions:

- The area of subslab vacuum influence in the northeast corner of B003 covers a smaller area than in December 2014. While the cross-slab differential pressure measurements have shown a loss of influence, the applied vacuum at the extraction ports in this area are consistent with the December 2014 readings. As mentioned in Section 2.1, this is an unoccupied area where renovations have been conducted to accommodate an archive storage area. In 2022, IBM is planning to assess the cause of the change in subslab

[5] Note that the subslab vapor monitoring ports that were found to be outside the influence of the SSD system after system start-up (i.e., the grayed-back ports on Figure 3) are not monitored as part of the PMP with the assumption that these ports remain outside the area of influence. This applies to the figures for B003 and B004 as well.

[6] Sanborn, Head Engineering, PC, *Operations and Maintenance Manual, B001 Subslab Vapor Extraction and Treatment System, Building 001 - IBM Poughkeepsie Facility, Poughkeepsie, NY,* March 2015.

[7] Sanborn, Head Engineering, PC, *Performance Monitoring and Confirmatory Sampling Results, Building 003 Vapor Extraction System, IBM Poughkeepsie Facility, Poughkeepsie, NY,* February 2014.

[8] Sanborn, Head Engineering, PC, *Operations and Maintenance Manual, B003/B004 Subslab Vapor Extraction and Treatment System, Buildings 003 and 004 - IBM Poughkeepsie Facility, Poughkeepsie, NY,* April 2015.

vacuum in this area and make adjustments to improve the subslab vacuum in this area of the building.

- A localized change was observed at SSV1082 on the western side of the building, where the DP was measured at 0.000 inches of water column (in. WC) as compared to -0.004 in. WC in December 2014, shifting it outside the influence of the SSD system. This slight shift in DP can be attributable to normal variations of the system, change in barometric pressure, and other factors that impact building pressure (e.g., doors open versus closed). This impact covers a discrete, unoccupied area of the building surrounded by areas under SSD influence, and therefore additional actions are not warranted.

The November 2021 differential pressure measurements and induced vacuums at the trench and manhole extraction ports associated with the VES are shown on Figure 5 and are consistent with the 2014 measurements (see Appendix C for the figure from the O&M Manual showing operating conditions).

The passive ECs in B003 were found to be in satisfactory condition.

3.3 B004

An SSD system is operating beneath the loading dock in the western area of B004 as shown on Figure 6. The SSD system consists of one extraction port that was connected to the B003 SSD system and began operation on February 17, 2015. In addition, HVAC systems serve as ECs in areas outside the area of influence of the SSD system, and sealed preferential pathways serve as ECs within the building.

Indoor air sampling conducted in February 2015 after SSD system start-up indicated acceptable indoor air quality, as documented in a report submitted to the Departments.[9]

Based on the November 2021 system operational checks and the cross-slab differential pressure measurements, the SSD system is operating in accordance with its design objectives. The November 2021 cross-slab differential pressure readings within B004, the approximate extent of subslab depressurization, and induced vacuum at the extraction port are shown on Figure 6 and were found to be consistent with conditions observed in 2015, as documented in the April 2015 B003/B004 SSD system O&M Manual (see Appendix C for the figure from the O&M Manual showing SSD operating conditions).

There were no changes to the HVAC operational settings observed during the PMP checks.

The passive ECs in B004 were found to be in satisfactory condition.

3.4 B416

B416 is a Category 4 building; therefore, changes are allowed to the HVAC operational settings as long as the units remain operating in occupied areas. Operational adjustments

[9] Sanborn, Head Engineering, PC, *Performance Monitoring and Confirmatory Sampling Results, Building 004 Vapor Extraction System, IBM Poughkeepsie Facility, Poughkeepsie, NY,* March 2015.

were made in 2021 to four of the five HVAC units in B416, and included increasing the schedules to 24/7 operation (previously operated during normal working hours). No additional action is needed given that the units are continuing to run while the areas are occupied.

3.5 B002, B008, and B012

There were no changes to the HVAC operational settings observed during the PMP checks in B002, B008, and B012. In addition, the passive sealants were found to be in satisfactory condition in B002 (none are present in B008 and B012).

4.0 CLOSING

The findings of routine checks of building use and occupancy, and the results of performance monitoring of the VI ECs conducted in 2021 in accordance with the PMP, indicate conditions consistent with those under which appropriate IAQ has been previously documented, with a couple minor exceptions noted below.

- The area of influence for the B003 SSD system decreased in the northeast corner of the building, which is currently unoccupied. IBM intends to assess this issue in 2022 and make adjustments to achieve similar subslab vacuum conditions as previously measured.

- One preferential pathway sealant in B001 was found to be damaged and was subsequently repaired.

Based on the results of subslab vacuum monitoring and routine system operations monitoring, the SSD systems in B001, B003, and B004, and the vapor extraction systems for the trenches and manholes in B003, are meeting their design objectives.

In 2022 IBM intends to continue checks of building use and occupancy and the operation of the VI ECs in accordance with the PMP. If significant changes are observed, IBM will consult with the Departments and evaluate whether additional indoor air sampling is appropriate. In addition, IBM intends to address the change in subslab vacuum influence in the northeast corner of B003 in 2022 and update the Departments accordingly.

TABLES

Table 1
Building Conditions and VI Engineering Controls
2022 VI EC Annual Report
IBM Poughkeepsie Facility
Poughkeepsie, NY

Building ID	Description of Current Use	# Floors	SSD/VES Engineering Controls	Summary of HVAC Adjustments for VI Engineering Controls	Preferential Pathways Sealed
001	Warehouse, vacant space, printing, storage, offices	1	Partial Building SSD	None	X
002	Light machining, offices, storage, vacant space	3	None	Operational adjustments to AHUs serving Level 1 to provide full-time operation, resulting in an increase in overall OA exchange.	X
003	Storage, offices, vacant space, DI water, laboratory	3	Full Building SSD VES for perimeter trenches and manholes	None	X
004	Loading dock, mail room, storage	3	Partial Building SSD	Operational adjustments to AHUs serving Level 1 to provide full-time operation, resulting in an increase in overall OA exchange.	X
008	Data center and offices	3	None	Increased the volume of OA makeup to the first floor, and made adjustments to the operational schedules.	
012	First floor vacant. Data center and offices on second and third floors.	3	None	Increased the volume of OA makeup to the first floor.	
020	Central utility plant (steam and chilled water); connected to Building 030	2	None	None	
026	Boiler room	1	None	None	
028	Solvent dispensing and hazardous material handling/storage (virgin and waste chemicals)	1	None	None	
030	Groundwater treatment; ; connected to Building 020	1	None	None	
033	Warehouse	1	None	None	
075	Storage/vacant	1	None	None	
077	Storage and recycling	1	None	None	
098	Vacant	1	None	None	
414	Vacant	1	None	None	
415	Vacant	1	None	None	
416	Offices, cafeteria, kitchen	1	None	None	
450	Industrial wastewater treatment plant	3	None	None	
454	Vacant	1	None	None	

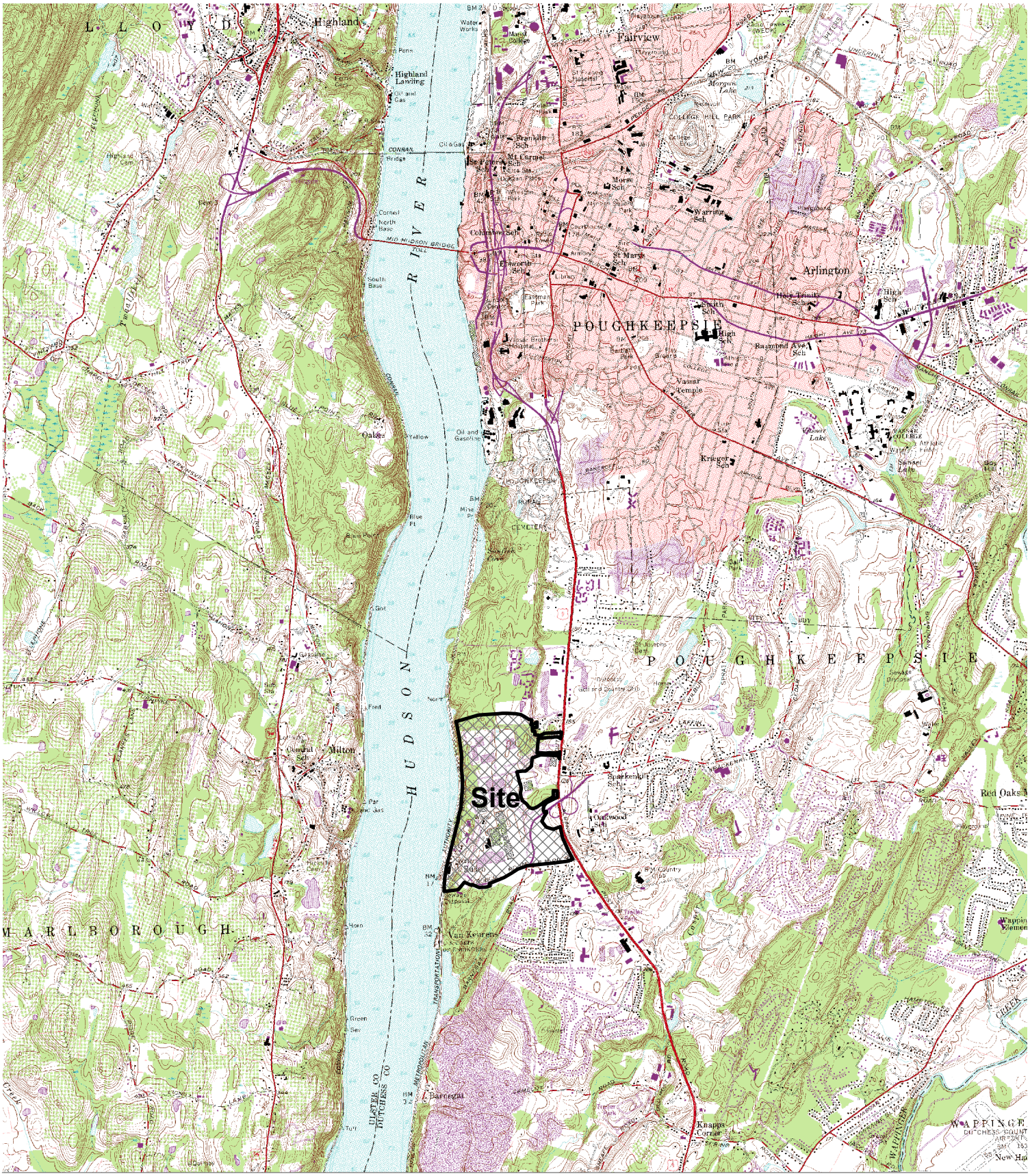
Notes
1. Abbreviations:
OA = Outside Air
AHU = Air Handling Unit
HVAC = Heating, Ventilation, and Air Conditioning Unit
SSD = Subslab Depressurization System
SVE = Soil Vapor Extraction
VES = Vapor Extraction System
VI = Vapor Intrusion

Table 2
Summary of 2022 PMP Monitoring
2022 VI EC Annual Report
IBM Poughkeepsie Facility
Poughkeepsie, NY

Building ID	Occupancy and Use Changes?	If yes, describe	HVAC Operational Settings Different than PMP?	If yes, describe	Passive Sealant Repairs Needed?	If yes, describe	SSD Systems Operating in Accordance with Design Objectives?	If no, describe
001	N		N		Y	TA2002 (hatch) sealant was damaged. Subsequently repaired.	Y	
002	N		N		N		NA	
003	N	Renovations in the northeast corner to accommodate for new archive storage room. No change to occupancy (area remains unoccupied).	NA		N		N	Decreased area of subslab vacuum influence in northeast corner of building (currently unoccupied). IBM to address in 2022.
004	N		N		N		Y	
008	N		N		NA		NA	
012	N		N		NA		NA	
020	N		NA		NA		NA	
026	N		NA		NA		NA	
028	N		NA		NA		NA	
030	N		NA		NA		NA	
033	N		NA		NA		NA	
075	N		NA		NA		NA	
077	N		NA		NA		NA	
098	N		NA		NA		NA	
414	N		NA		NA		NA	
415	N		NA		NA		NA	
416	Y	-Cafeteria closed - no longer occupied. -Office tenant moved out and replaced by IBM staff with similar office use. No action needed.	Y	Adjusted AC-1, AC-2, AC-3, AC-4 operating schedules to 24/7 (previously on during working hours). No action needed.	NA		NA	
450	N		NA		NA		NA	
454	N		NA		NA		NA	

Notes
1. Refer to the VI EC Annual Report text for additional information on the occupancy/use and VI EC changes noted above.
2. Abbreviations:
NA = Not Applicable
SSD = Subslab Depressurization System
HVAC = Heating, Ventilation, and Air Conditioning
PMP = Performance Monitoring Plan

FIGURES



N
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Note
Base map taken from 15 minute USGS Quadrangle Map: Poughkeepsie, N.Y., dated 1957 (Photorevised 1982)

Drawn By: E. Wright
Designed By: J. Flood
Reviewed By: J. Sanborn
Project No: 4238.02
Date: March 2022

2,000' 0 4,000' Feet

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Figure 1

Site Location Plan

2021 Vapor Intrusion Engineering Controls Annual Report

IBM Poughkeepsie Facility
Poughkeepsie, New York

Figure 2

Building Status

2021 Vapor Intrusion Engineering Controls Annual Report

IBM Poughkeepsie Facility
Poughkeepsie, New York

Drawn By: E. Wright
Designed By: J. Flood
Reviewed By: J. Sanborn
Project No: 4238.02
Date: March 2022

Figure Narrative

This figure shows the buildings at the IBM Poughkeepsie facility that are subject to the Performance Monitoring Plan for Vapor Intrusion Engineering Controls.

Notes

1. Base plan was prepared using AutoCAD files provided by Grubb & Ellis Management Services, Inc. (GEMS) in December 2009.

Legend

001 Indicates building number

Category 1 - Subslab depressurization (SSD) or subslab soil vapor extraction (SVE) system for full building footprint

Category 2 - SSD system for partial building footprint

Category 3 - HVAC as Engineering Control

Category 4 - No changes to HVAC were needed for VI mitigation purposes

Building is not routinely occupied

Possible occupational VOC presence

Feet
175' 87.5' 0 175' 350'

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Figure 3

Building 001 Subslab Pressure Response to Vapor Extraction

2021 Vapor Intrusion Engineering Controls Annual Report

IBM Poughkeepsie Facility

Poughkeepsie, New York

Drawn By:	E. Wright
Designed By:	J. Flood
Reviewed By:	J. Sanborn
Project No:	4238.02
Date:	March 2022

Figure Narrative

This figure shows subslab vapor extraction system operation data and observed subslab pressure response. Subslab pressure was monitored using a digital manometer referenced to the indoor pressure. Negative values indicate subslab pressure less than indoor air pressure. A differential pressure of less than -0.004 in. wc typically indicates that the vapor extraction system is intercepting vapor. The outer extent of subslab vacuum influence (grey shaded area) is based on differential pressure measurements collected at system start-up. Subslab monitoring ports outside the area of influence are not monitored under the VI EC PMP.

Legend

- SSV2037 — Subslab vapor monitoring port
- SSV2001 — Subslab vapor monitoring port not monitored
- EP2003 — Vapor extraction port connected to system
- EP2011 — Vapor extraction port not connected to system
- EP2003 in. wc — Extraction Port Vacuum (extraction port)
- -0.36 — Subslab air pressure (in. wc) relative to room air pressure
- Area where differential pressure measurements less than -0.004 in. wc were recorded on November 20, 2021

20 10 0 20 40

Feet

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Figure 4

Building 003 Subslab Pressure Response to Vapor Extraction

2021 Vapor Intrusion Engineering Controls Annual Report

IBM Poughkeepsie Facility
Poughkeepsie, New York

Drawn By:	E. Wright
Designed By:	J. Flood
Reviewed By:	D. Shea
Project No:	4238.02
Date:	March 2022

Figure Narrative

This figure shows the operation data and observed pressure response to subslab vapor extraction. Subslab pressure was monitored using a digital manometer referenced to the indoor air pressure. Negative values indicate pressure less than indoor air pressure. A differential pressure of less than -0.004 in. wc typically indicates that the vapor extraction system is intercepting vapor. The outer extent of subslab vacuum influence (grey shaded area) is based on differential pressure measurements collected at system start-up. Subslab monitoring ports outside the area of influence are not monitored under the VI EC PMP.

Legend

SSV1001 — Subslab Vapor Monitoring Location

SSV1043 — Subslab Vapor Monitoring Location not monitored

EP1001 — Vapor Extraction Port

EP1001 — Vapor Extraction Port not connected to system

Data collected on November 17 and 20, 2021

EP1002 in. wc — Extraction Port Vacuum (extraction port)

-0.082 — Subslab air pressure (in. wc) relative to room air pressure

Area where differential pressure measurements less than -0.004 in. wc were recorded on November 17 and 20, 2021

20 10 0 20 40
Feet

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Figure 5

Building 003 Measured Trench and Manhole Vapor Extraction Parameters

2021 Vapor Intrusion Engineering Controls Annual Report

IBM Poughkeepsie Facility
Poughkeepsie, New York

Drawn By:	E. Wright
Designed By:	J. Flood
Reviewed By:	D. Shea
Project No:	4238.02
Date:	March 2022

Figure Narrative

This figure shows the operation data and observed pressure response to trench and manhole vapor extraction. Trench air pressure was monitored using a digital manometer referenced to the indoor air pressure. Negative values indicate trench pressure less than indoor air pressure.

Legend

- TEP1002 — Trench extraction port (West Trench extraction system)
- MHEP30 — Manhole extraction port (West Trench extraction system)
- TEP1010 — Trench extraction port (East Trench extraction system)
- MHEP29 — Manhole extraction port (East Trench extraction system)
- TEP1001 — Vapor extraction port not connected to system
- Ⓜ — Manhole
- Covered Utility Floor Trench

Data collected on November 17 and 20, 2021

TEP1002 in. wc — Trench Extraction Port Vacuum (extraction port)

-0.007 — Trench air pressure (in. wc) relative to room air pressure

20 10 0 20 40
Feet

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Open (Uncovered) Trench

TEP1006 10 in. wc
TEP1016 10 in. wc
MHEP30 1.5 in. wc
MHEP31 1.0 in. wc
TEP1002 9.5 in. wc

TEP1006 -0.012 TEP1005 -0.011 TEP1004 TEP1003 -0.009 MHEP31 TEP1002 TEP1001

TEP1014 -0.007 TEP1016

TEP1015 -0.007 MHEP-Center

TEP1013 -0.015 TEP1012 -0.012 TEP1011 TEP1010 -0.010 TEP1009 TEP1008 MHEP29 -0.015 TEP1007

TEP1012 26 in. wc
TEP1010 26 in. wc
MHEP-Center 1.5 in. wc
TEP1008 26 in. wc
MHEP29 2.0 in. wc

Last Edited By: ewright

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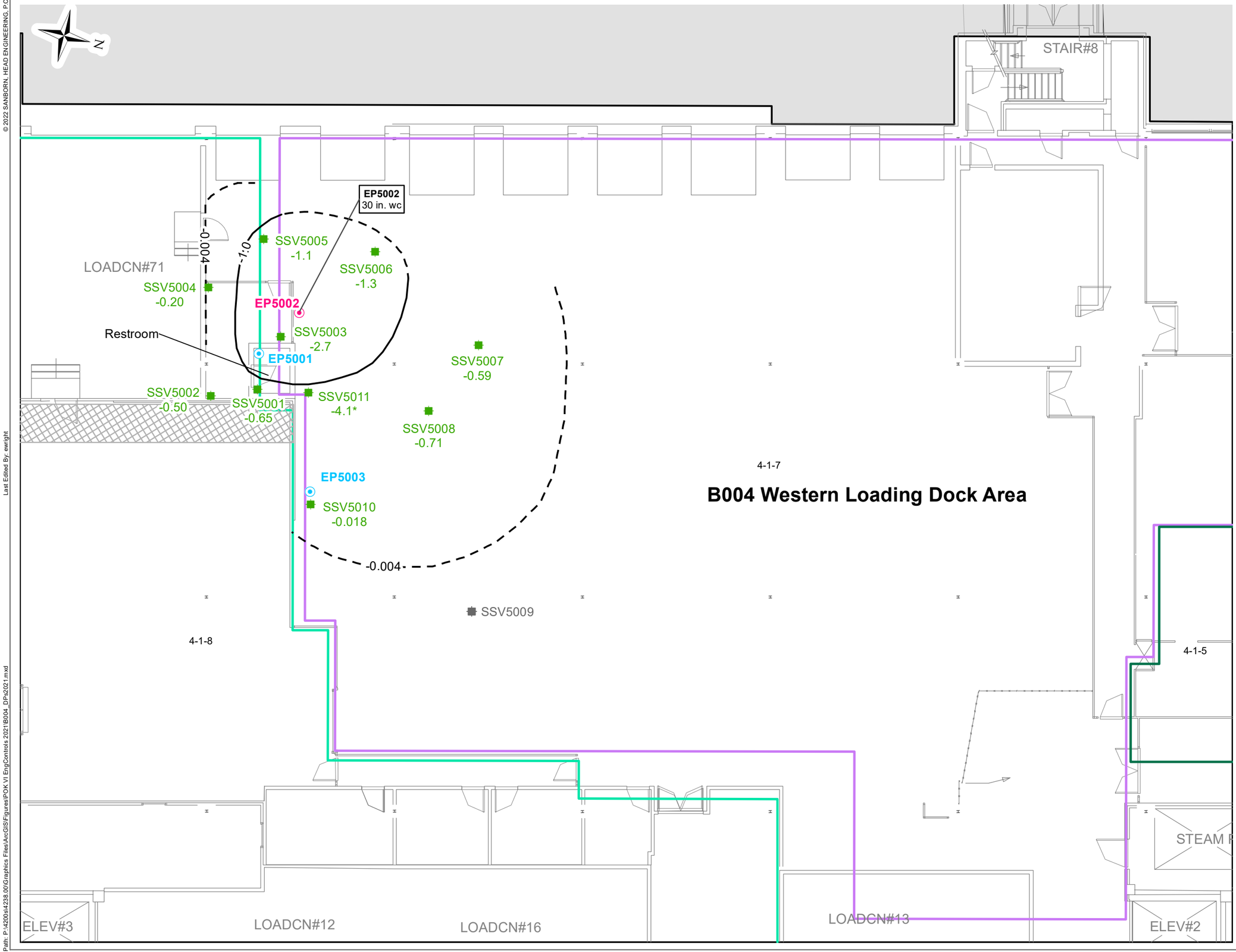

Figure 6

Building 004 Subslab Pressure Response to Vapor Extraction

2021 Vapor Intrusion Engineering Controls Annual Report

IBM Poughkeepsie Facility
Poughkeepsie, New York

Drawn By:	E.Wright
Designed By:	J. Flood
Reviewed By:	D. Shea
Project No:	4238.02
Date:	March 2022

Figure Narrative

This figure shows subslab vapor extraction system operation data and observed subslab pressure response. Subslab pressure was monitored using a digital manometer referenced to the indoor pressure. Negative values indicate subslab pressure less than indoor air pressure. A differential pressure of less than -0.004 in. wc typically indicates that the vapor extraction system is intercepting vapor. The outer extent of the -0.004 in WC contour is based on differential pressure measurements collected at system start-up. Subslab monitoring ports outside of the -0.004 in WC contour are not monitored under the VI EC PMP.

Legend

- SSV5001 — Subslab vapor monitoring location
- SSV5009 — Subslab vapor monitoring location not monitored
- EP5002 — Connected subslab soil vapor extraction port
- EP5001 — Unconnected subslab soil vapor extraction port

Data collected on November 17, 2021

- EP5002 / in. wc — Extraction port Vacuum (extraction port)
- -0.65 — Subslab air pressure (in. wc) relative to room air pressure
- -4.1* — * Anomalous differential pressure measurement. Not used to develop differential pressure contours.
- Inferred differential pressure contour (in. wc). Negative values indicate vacuum conditions.
- Differential pressure contour (in. wc). Negative values indicate vacuum conditions.

6 3 0 6 12
Feet

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APPENDIX A

LIMITATIONS

APPENDIX A
SHPC LIMITATIONS

1. The findings and conclusions described in this report are based in part on the data obtained from a finite number of samples from widely spaced locations. The figures are intended to depict inferred conditions during a given period of time, consistent with available information. The actual conditions will vary from that shown, both spatially and temporally. Other interpretations are possible. The nature and extent of variations between sampling locations may not become evident until further investigation is initiated. If variations or other latent conditions then appear evident, it may be necessary to re-evaluate the conclusions of this report.

2. In preparing this report, SHPC has relied on certain information provided by other parties referenced herein. We did not independently verify the accuracy or completeness of all information reviewed or received in the preparation of this report.

3. Quantitative laboratory testing was performed by others as part of the investigation as noted within the report. Where such analyses have been conducted by an outside laboratory, unless otherwise stated in the report, SHPC has relied upon the data provided, and has not conducted an independent evaluation of the reliability of these data. It must be noted that additional compounds not searched for during the current study may be present in vapor and indoor air at the site. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their distribution within the vapor and indoor air may occur due to the passage of time, seasonal water table fluctuations, recharge events, and other factors.

4. This report has been prepared for the exclusive use of the IBM Corporation for specific application to the IBM Poughkeepsie facility in accordance with generally accepted hydrogeologic and engineering practices. No warranty, expressed or implied, is made. The contents of this report should not be relied on by any other party without the express written consent of SHPC.

5. In preparing this report, SHPC has endeavored to conform to generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. SHPC has attempted to observe a degree of care and skill generally exercised by the technical community under similar circumstances and conditions.

APPENDIX B

SUMMARY OF LONG-TERM VI MANAGEMENT PLAN

Table B-1
Summary of Long-Term VI Management Plan by Building
IBM Poughkeepsie Facility
Poughkeepsie, NY

Building Category	Building	Monitoring Type and Frequency (Note 4)													
		Building use, occupancy, and infrastructure		SSD/SVE EPs; TEPs; MHEPs, as applicable (Note 1)		SSD/SVE subslab vacuum field		HVAC system manual checks (Note 2)		VOC entry pathways sealants checks		Interior door closure checks		Indoor air monitoring (Note 3)	
Category 1: SSD and/or SVE for full building footprint	003	√	Annually	√	Monthly	√	Annually		None	√	Annually		Not applicable	√	If SSD system is terminated
Category 2: SSD for partial building footprint	001	√	Annually	√	Monthly	√	Annually	√	Annually	√	Annually		Not applicable	√	If changes found, or SSD system is terminated
	004	√	Annually	√	Monthly	√	Annually	√	Annually	√	Annually		Not applicable	√	If changes found, or SSD system is terminated
Category 3: HVAC EC for full or partial building footprint	002	√	Annually		Not applicable		Not applicable	√	Annually	√	Annually		Not applicable	√	If changes found
	008	√	Annually		Not applicable		Not applicable	√	Annually		Not applicable		Not applicable	√	If changes found
	012	√	Annually		Not applicable		Not applicable	√	Annually		Not applicable	√	Annually	√	If changes found
Category 4: No EC - Alteration of HVAC systems was not necessary for VI mitigation purposes	077	√	Annually		Not applicable		Not applicable		Not applicable		Not applicable		Not applicable	√	If changes found
	416	√	Annually		Not applicable		Not applicable	√	Annually		Not applicable		Not applicable	√	If changes found
Building Is Not Routinely Occupied	026, 033, 075, 098, 414, 415, 454	√	Annually		Not applicable		Not applicable		None		Not applicable		Not applicable	√	If changes found
Potential Occupational VOC Presence	020, 028, 030, 450	√	Annually		Not applicable		Not applicable		None		Not applicable		Not applicable	√	If changes found

Notes
1. SSD system manual checks will be supplemented by operator readings and continuous, automated monitoring of operations, including alarms that cause system shut down.
2. For category 2 buildings, HVAC system operational checks will only be conducted for the area outside the influence of the SSD system.
3. Indoor air monitoring will only be conducted if changes are identified that could impact indoor air quality and/or occupant exposures (e.g., vacant areas becoming re-occupied, long-term changes to HVAC system operating conditions, SSD termination).
4. Annual checks will be completed in the 4th quarter of the PMP annual reporting period.

Abbreviations:
EC = Engineering control
SSD = Subslab depressurization
SVE = Subslab soil vapor extraction
TEPs = Trench extraction ports
MHEPs = Manhole extraction ports

APPENDIX C

SSD OPERATIONS FIGURES FROM OM&M MANUALS

Last Edited By: clavack
Path: S:\CON\DATA\3400s\3463.00\Graphics Files\ArcGIS\Figures\SourceFiles\B001 O&M Manual\20141215_B001_SVE_System_Startup.mxd

Figure from B001 OM&M Manual, March 2015

Building 008

EP2005
52 in. wc
12 scfm
69 F
42% RH
700 ppb

EP2006
51 in. wc
5.3 scfm
73 F
39% RH
1,800 ppb

EP2007
50 in. wc
27 scfm
73 F
39% RH
1,800 ppb

T-310C

SSV2001 Not monitored
SSV2005 Not monitored
SSV2015 Not monitored
EP2001 0.004
0.004 SSV2016
0.007
SSV2027
-0.019 SSV2025
EP2011 -0.021
SSV2028 0
SSV2006 0
SSV2014 0
SSV2004 0
-0.032 SSV2045
-0.024
SSV2044
SSV2043 -0.049
-0.014 SSV2026
SSV2039 -0.019
SSV2048
Loading Dock Area
SSV2029 Not monitored
-0.053 SSV2030
-0.012
EP2014
-0.046
SSV2031
-0.004
-0.004
SSV2049
Server Room
-0.077 SSV2017
-0.28 SSV2024
Electrical Room
0.005 SSV2002
SSV2007 0
-0.006 SSV2013
-0.069 SSV2018
-0.017 SSV2023
Print Room
-0.44
EP2015
SSV2032 -0.22
-0.16
SSV2034
SSV2033 0.022
SSV2046 -0.39
SSV2035
-0.11
Office Area
-0.023
SSV2047
0.008 SSV2003
SSV2008 0.011
-0.004 EP2002
SSV2037 -0.52
SSV2042 -0.30
0.017 T-034SA T-034S
SSV2036
-0.19
SSV2038
-0.073 SSV2019
-0.15 SSV2022
EP2012
SSV2040 -0.051
Alcove
EP2009
17 in. wc
60 scfm
62 F
35% RH
2,600 ppb
SSV2012 0
Print Room Storage
-0.093
SSV2009 0
SSV2011 0
SSV2021
-0.14
-0.058
SSV2010
-0.56
T-008SB T-008S
EP2008
50 in. wc
79 scfm
66 F
35% RH
4,900 ppb
Linkway Bridge to Building 004
SSV2020 0.005
SSV2041
Warehouse Area

T-010S
T-032S
T-032SA

EP2004
52 in. wc
37 scfm
70 F
42% RH
81 ppb

EP2003
24 in. wc
76 scfm
70 F
50% RH
120 ppb

EP2013
50 in. wc
32 scfm
71 F
41% RH
830 ppb

EP2010
17 in. wc
63 scfm
69 F
37% RH
320 ppb

EP2016
39 in. wc
32 scfm
62 F
56% RH
670 ppb

Figure 2

Subslab Pressure Response to Vapor Extraction

Building 001 Vapor Extraction System
O&M Manual

IBM Poughkeepsie Facility
Poughkeepsie, New York

Drawn By:	C. LaVack
Designed By:	R. Welch
Reviewed By:	B. Green/D. Shea
Project No:	3463.02
Date:	March 2015

Figure Narrative

This figure shows subslab vapor extraction system operation data and observed subslab pressure response. Subslab pressure was monitored using a digital manometer referenced to the indoor pressure. Negative values indicate subslab pressure less than indoor air pressure. The shaded area indicates the zone where differential pressure measurements were less than -0.004 in. wc as recorded on December 11, 2014 during system startup activities.

Legend

Refer to Figure 4 for additional legend items

- SSV2001 — Subslab vapor monitoring port
- EP2003 — Connected Subslab soil vapor extraction port
- EP2001 — Unconnected Subslab soil vapor extraction port

EP2003
in. wc
scfm
F
% RH
ppbv

Extraction Port
Vacuum (extraction port)
Flow Rate (std. cu. ft. per min.)
Temperature
Relative Humidity
PID Concentration

Footprint of subslab pressure response to vapor extraction (extent of -0.004 in. wc vacuum)

20 10 0 20 40
Feet

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Figure from B003/B004 OM&M Manual, April 2015

EP1030
30 in. wc
0.55 scfm
78 F
26% RH
2,600 ppb

EP1004
66 in. wc
1.1 scfm
77 F
30% RH
640 ppb

EP1029
17 in. wc
0.17 scfm
74 F
0.4% RH
1,100 ppb

EP1011
27 in. wc
0.59 scfm
72 F
40% RH
1,400 ppb

EP1023
29 in. wc
14 scfm
69 F
31% RH
1,400 ppb

EP1021
39 in. wc
2.5 scfm
70 F
42% RH
7,100 ppb

EP1010
70 in. wc
1.6 scfm
71 F
35% RH
5,800 ppb

EP1009
68 in. wc
0.77 scfm
73 F
28% RH
3,500 ppb

EP1015
71 in. wc
12 scfm
73 F
38% RH
1,400 ppb

EP1008
69 in. wc
6.4 scfm
72 F
27% RH
1,400 ppb

EP1013
69 in. wc
7.9 scfm
73 F
33% RH
2,400 ppb

EP1012
72 in. wc
7.8 scfm
75 F
35% RH
280 ppb

SSV1018 0.007
SSV1020 0
SSV1070 0.064
SSV1027 -0.005
SSV1029 -0.003
SSV1031 0
SSV1033 -0.023
SSV1061 -0.014
SSV1042 0
SSV1043 0
SSV1066 0
SSV1019 0
SSV1028 -0.013
SSV1032 -0.029
SSV1034 -0.005
SSV1082 -0.004
SSV1035 -0.014
SSV1026 -0.024
SSV1030 -0.096
SSV1001 -0.098
SSV1040 -0.062
SSV1038 -0.078
SSV1081 -0.042
EP1018 -0.037
SSV1004 -0.084
SSV1062 -0.034
SSV1005 -0.24
SSV1003 -0.05
SSV1017R 0
SSV1067 -0.005
SSV1002 -0.032
SSV1039 -0.03
SSV1077 -0.1
SSV1078 -0.072
SSV1037 -0.18
SSV1036 -0.2
SSV1063 -0.032
SSV1044 -0.18
SSV1060 -0.04
SSV1071 -0.041
SSV1041 -0.047
SSV1076 -0.13
SSV1074 -0.011
SSV1052 -0.009
SSV1079 -0.015
SSV1087 -0.092
SSV1069 -0.024
SSV1056 -0.01
SSV1053 Destroyed
SSV1025 -0.051
SSV1046 -0.95
SSV1045 0
SSV1059 -0.022
SSV1055 -0.023
SSV1054 -0.086
SSV1080 -0.055
SSV1049 -0.24
SSV1024 Inaccessible
EP1027 -0.036
SSV1015 -0.31
EP1006 -0.004
SSV1047 -0.45
EP1002 -0.008
SSV1084 -0.5
SSV1016 -0.095
SSV1064 0
SSV1072 -0.009
SSV1014 -0.009
SSV1013 -0.081
SSV1075 -0.03
SSV1010 -0.82
SSV1006 -0.35
SSV1048 -0.16
SSV1050 -0.26
EP1003 -0.012
SSV1086 0
SSV1023 0
SSV1058 -0.056
SSV1068 -0.029
SSV1051 -1.6
SSV1022 0
SSV1065 0
SSV1092 -0.24
SSV1012 Inaccessible
SSV1011 -0.64
SSV1007 -0.17
SSV1008 0.006
SSV1085 -0.013
SSV1021 Inaccessible
SSV1057 -0.012
SSV1009 -0.004

EP1029 EP1011 EP1030 EP1028 -0.013 EP1004 EP1023 EP1021 EP1010 EP1009 EP1008 EP1012 EP1013 EP1031 EP1026 EP1016 EP1017 EP1015 EP1005 EP1025 EP1024 EP1020 EP1007 EP1014 EP1032 EP1001 EP1022 EP1019

3-1-2 AHU
3-1-4 AHU
3-1-6 AHU
3-1-3 AHU
3-1-5 AHU
3-1-8 AHU

EP1032
17 in. wc
1.1 scfm
73 F
38% RH
530 ppb

EP1005
22 in. wc
0.41 scfm
79 F
28% RH
610 ppb

EP1031
72 in. wc
5.8 scfm
77 F
33% RH
530 ppb

EP1001
68 in. wc
6.3 scfm
74 F
24% RH
690 ppb

EP1026
64 in. wc
7 scfm
78 F
30% RH
1,300 ppb

EP1025
21 in. wc
0.38 scfm
72 F
29% RH
1,800 ppb

EP1024
19 in. wc
1.1 scfm
73 F
26% RH
1,100 ppb

EP1022
68 in. wc
2.6 scfm
72 F
27% RH
1,500 ppb

EP1019
69 in. wc
2.5 scfm
74 F
36% RH
1,400 ppb

EP1020
68 in. wc
8 scfm
75 F
45% RH
510 ppb

EP1017
70 in. wc
3.9 scfm
76 F
46% RH
2,700 ppb

EP1016
66 in. wc
36 scfm
74 F
74% RH
1,200 ppb

EP1007
69 in. wc
13 scfm
72 F
28% RH
290 ppb

EP1014
32 in. wc
0.51 scfm
69 F
30% RH
1,500 ppb

Figure 3

Building 003 Subslab Pressure Response to Vapor Extraction

Vapor Extraction System O&M Manual

IBM Poughkeepsie Facility
Poughkeepsie, New York

Drawn By: C. LaVack
Designed By: R. Welch
Reviewed By: D. Shea
Project No: 3463.01
Date: April 2015

Figure Narrative

This figure shows the operation data and observed pressure response to subslab vapor extraction. Subslab pressure was monitored using a digital manometer referenced to the indoor air pressure. Negative values indicate pressure less than indoor air pressure.

Legend

SSV1001 — Subslab Vapor Monitoring Location

EP1001 — Vapor Extraction Port

EP1001 — Vapor Extraction Port not connected to system

Data collected on December 10 & 11, 2014

EP1002
in. wc
scfm
F
% RH
ppb

Extraction Port
Vacuum (extraction port)
Flow Rate
Temperature
Relative Humidity
PID Concentration

-0.082 — Subslab air pressure (in. wc) relative to room air pressure

Area where differential pressure measurements less than -0.004 in. wc were recorded on December 10 & 11, 2014

3-1-6 AHU — Mechanical room for indicated air handling unit (AHU)

20 10 0 20 40
Feet

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Figure from B003/B004 OM&M Manual, April 2015

Figure 4

Building 003 Measured Trench and Manhole Vapor Extraction Parameters

Vapor Extraction System O&M Manual

IBM Poughkeepsie Facility
Poughkeepsie, New York

Drawn By:	C. LaVack
Designed By:	R. Welch
Reviewed By:	D. Shea
Project No:	3463.01
Date:	April 2015

Figure Narrative

This figure shows the operation data and observed pressure response to trench and manhole vapor extraction. Trench and manhole air pressure was monitored using a digital manometer referenced to the indoor air pressure. Negative values indicate trench or manhole pressure less than indoor air pressure.

Legend

- TEP1002 — Trench extraction port (West Trench extraction system)
- MHEP30 — Manhole extraction port (West Trench extraction system)
- TEP1010 — Trench extraction port (East Trench extraction system)
- MHEP29 — Manhole extraction port (East Trench extraction system)
- TEP1001 — Vapor extraction port not connected to system
- (M) — Manhole

Data collected on December 10 & 11, 2014

TEP1002	
in. wc	Trench Extraction Port Vacuum (extraction port)
scfm	Flow Rate
F	Temperature
% RH	Relative Humidity
ppb	PID Concentration
µg/m³	TCE Concentration

-0.014 — Trench or Manhole air pressure (in. wc) relative to room air pressure

Covered Utility Floor Trench

3-1-6 AHU — Mechanical room for indicated air handling unit (AHU)

20 10 0 20 40
Feet

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Open (Uncovered) Trench

TEP1006
8.5 in. wc
110 scfm
74 F
29% RH
180 ppb
4.6 µg/m³

TEP1016
8.5 in. wc
86 scfm
71 F
31% RH
110 ppb
4.5 µg/m³

MHEP30
3.5 in. wc
140 scfm
69 F
32% RH
570 ppb
1,500 µg/m³

MHEP31
0.5 in. wc
22 scfm
71 F
31% RH
330 ppb
940 µg/m³

TEP1002
7.0 in. wc
51 scfm
70 F
42% RH
180 ppb
1.9 µg/m³

TEP1005 -0.012
TEP1004 -0.012
TEP1003 -0.009
TEP1001 0
TEP1014 -0.011
MH-Center -0.58
MHEP-Center
TEP1015 -0.011
MH30 -0.019
MH31 -0.042
MH29 -0.041
TEP1013 -0.011
TEP1012
TEP1011 -0.015
TEP1010
TEP1009 -0.015
TEP1008
TEP1007 -0.014

TEP1012
19 in. wc
95 scfm
73 F
40% RH
1,000 ppb
170 µg/m³

TEP1010
19 in. wc
83 scfm
71 F
33% RH
200 ppb
1.1 µg/m³

MHEP-Center
3.0 in. wc
100 scfm
71 F
32% RH
3,800 ppb
26,000 µg/m³

TEP1008
19 in. wc
79 scfm
71 F
31% RH
490 ppb
870 µg/m³

MHEP29
1.5 in. wc
21 scfm
69 F
33% RH
260 ppb
13 µg/m³

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Figure from B003/B004 OM&M Manual, April 2015

EP5002
30 in. wc
49 scfm
70 F
6.2% RH
2.2 ppm

-0.004

4-1-8
AHU

4-1-7
AHU

Restroom

Steam

SSV5001
SSV5002
SSV5003
SSV5004
SSV5005
SSV5006
SSV5007
SSV5008
SSV5009
SSV5010
SSV5011

EP5001
EP5002
EP5003

-1.0
-1.3
-0.084
-1.4
-1.7
-0.60
-0.50
-0.99
-0.57
-0.67
-0.13
-0.020
0.043

-1.0
-0.004

B004 Western Loading Dock Area

Figure 6

Building 004 Subslab Pressure Response to Vapor Extraction

Vapor Extraction System O&M Manual

IBM Poughkeepsie Facility
Poughkeepsie, New York

Drawn By:	C. LaVack
Designed By:	J. Sanborn
Reviewed By:	B. Green/D. Shea
Project No:	3463.01
Date:	April 2015

Figure Narrative

This figure shows subslab vapor extraction system operation data and observed subslab pressure response. Subslab pressure was monitored using a digital manometer referenced to the indoor pressure. Negative values indicate subslab pressure less than indoor air pressure. A differential pressure of less than -0.004 in. wc typically indicates that the vapor extraction system is intercepting vapor.

Legend

- **SSV5001** Subslab vapor monitoring location
- **EP5002** Connected Subslab soil vapor extraction port
- **EP5001** Unconnected Subslab soil vapor extraction port

EP5002	Extraction Port
in. wc	Vacuum (extraction port)
scfm	Flow Rate (std. cu. ft. per min.)
F	Temperature
% RH	Relative Humidity
ppm	PID Concentration

- -1.0 Differential Pressure, in wc
- Inferred Differential Pressure Contour (in wc). Negative values indicate vacuum conditions
- Differential Pressure Contour (in wc). Negative values indicate vacuum conditions

6 3 0 6 12
Feet

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