HAZARD RANKING SYSTEM (HRS) DOCUMENTATION RECORD COVER SHEET

Name of Site: Southeast Hennepin Area Groundwater and Vapor

EPA ID No.: MNN000506043

Contact Persons

Documentation Record:

Patrick Hamblin
National Priorities List Coordinator
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Chicago, Illinois 60606
(312) 886-6312

Alicia Shultz and Sandy Anagnostopoulos
Environmental Scientists
Tetra Tech, Inc.
1 South Wacker Drive, Suite 3700
Chicago, IL 60606
(312) 201-7723

Pathways, Components, or Threats Not Scored

The ground water, surface water, and air migration pathways, and the soil exposure component of the soil exposure and subsurface intrusion pathway are not scored in this Hazard Ranking System (HRS) documentation record because the subsurface intrusion component of the soil exposure and subsurface intrusion pathway is sufficient to qualify the site for the National Priorities List (NPL). The ground water, surface water, and air migration pathways, and the soil exposure component of the soil exposure and subsurface intrusion pathway are of concern to the U.S. Environmental Protection Agency (EPA), and may be considered during a future evaluation. At the time of the listing, the site score is sufficient without the pathways and component mentioned above.

Ground Water Migration Pathway: As documented in Section 5.2 of this HRS documentation record, chlorinated volatile organic compounds (VOCs) including tetrachloroethylene (PCE) up to 102 microgram per liter (µg/L), trichloroethylene (TCE) up to 2,020 µg/L, and their degradation products of cis-1,2-dichloroethylene (DCE) up to 1,390 µg/L, trans-1,2-DCE up to 44.9 µg/L, and vinyl chloride up to 24.9 µg/L were detected in groundwater samples collected in the study area (see Table 9 of this HRS documentation record). The ground water migration pathway was not scored due the lack of drinking water wells within 4 miles of the Southeast Hennepin Area Groundwater and Vapor site (Ref. 8, p. 12). The migration pathway may be investigated further; however, the listing of the site would not be changed by evaluating this pathway.

Surface Water Migration Pathway: The Surface Water Migration Pathway was not scored because its inclusion would not significantly affect the site score (Ref. 1, Section 2.2.3). No surface water or sediment samples documenting an observed release to this pathway were identified in the references used to prepare this HRS documentation record.

Soil Exposure and Subsurface Intrusion Pathway – Soil Exposure Component: The Soil Exposure Component of the Soil Exposure and Subsurface Intrusion Pathway was not scored because its inclusion would not significantly affect the site score (Ref. 1, Section 2.2.3). Direct contact with soil is limited because most of the site area is covered with asphalt or concrete (Ref. 4, p. 4).

Air Migration Pathway: VOC contamination was detected in outdoor samples collected in the study area including trichloroethylene (TCE) up to 1.4 micrograms per cubic meter (µg/m^3). The potential targets associated by the VOC contamination are evaluated in the Soil Exposure and Subsurface Intrusion Pathway. Scoring the threat posed by this release will not impact the listing decision (Ref. 30, p. 23).

HAZARD RANKING SYSTEM (HRS) DOCUMENTATION RECORD

Name of Site:	Southeast Hennepin Area Groundwater and Vapor
EPA Region:	5
Date Prepared:	September 2021
Street Address of Site*:	Hoover Street NE and Spring Street NE
City, County, State, Zip:	Minneapolis, Hennepin County, Minnesota, 55413
General Location in the State:	Southeastern portion of state (Figure 1 of this HRS documentation record)
Topographic Maps:	St. Paul West, 1972 (Ref. 3)
Latitude:	44° 59′ 42.19″ North
Longitude:	93° 13′ 03.92″ West

The coordinates specified above for Southeast Hennepin Area Groundwater and Vapor were measured from the intersection of Hoover Street NE and Spring Street NE (Refs. 4, pp. 1, 3; 5).

* The street address, coordinates, and contaminant locations presented in this HRS documentation record identify the general area the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, disposed, or placed, or has otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

Pathway	**Pathway Score**
Ground Water[1] Migration	Not Scored
Surface Water Migration	Not Scored
Soil Exposure and Subsurface Intrusion	100.00
Air Migration	Not Scored
HRS SITE SCORE	**50.00**

[1] "Ground water" and "groundwater" are synonymous; the spelling is different due to "ground water" being codified as part of the HRS, while "groundwater" is the modern spelling.

WORKSHEET FOR COMPUTING HRS SITE SCORE

	S Pathway	**S^2 Pathway**
Ground Water Migration Pathway Score (S_{gw})	NS	NS
Surface Water Migration Pathway Score (S_{sw})	NS	NS
Soil Exposure and Subsurface Intrusion Pathway Score (S_{sessi})	100.00	10,000
Air Migration Pathway Score (S_a)	NS	NS
$S^2_{gw} + S^2_{sw} + S^2_{sessi} + S^2_a$		10,000
$(S^2_{gw} + S^2_{sw} + S^2_{sessi} + S^2_a) / 4$		2,500
$\sqrt{} (S^2_{gw} + S^2_{sw} + S^2_{sessi} + S^2_a) / 4$		**50.00**

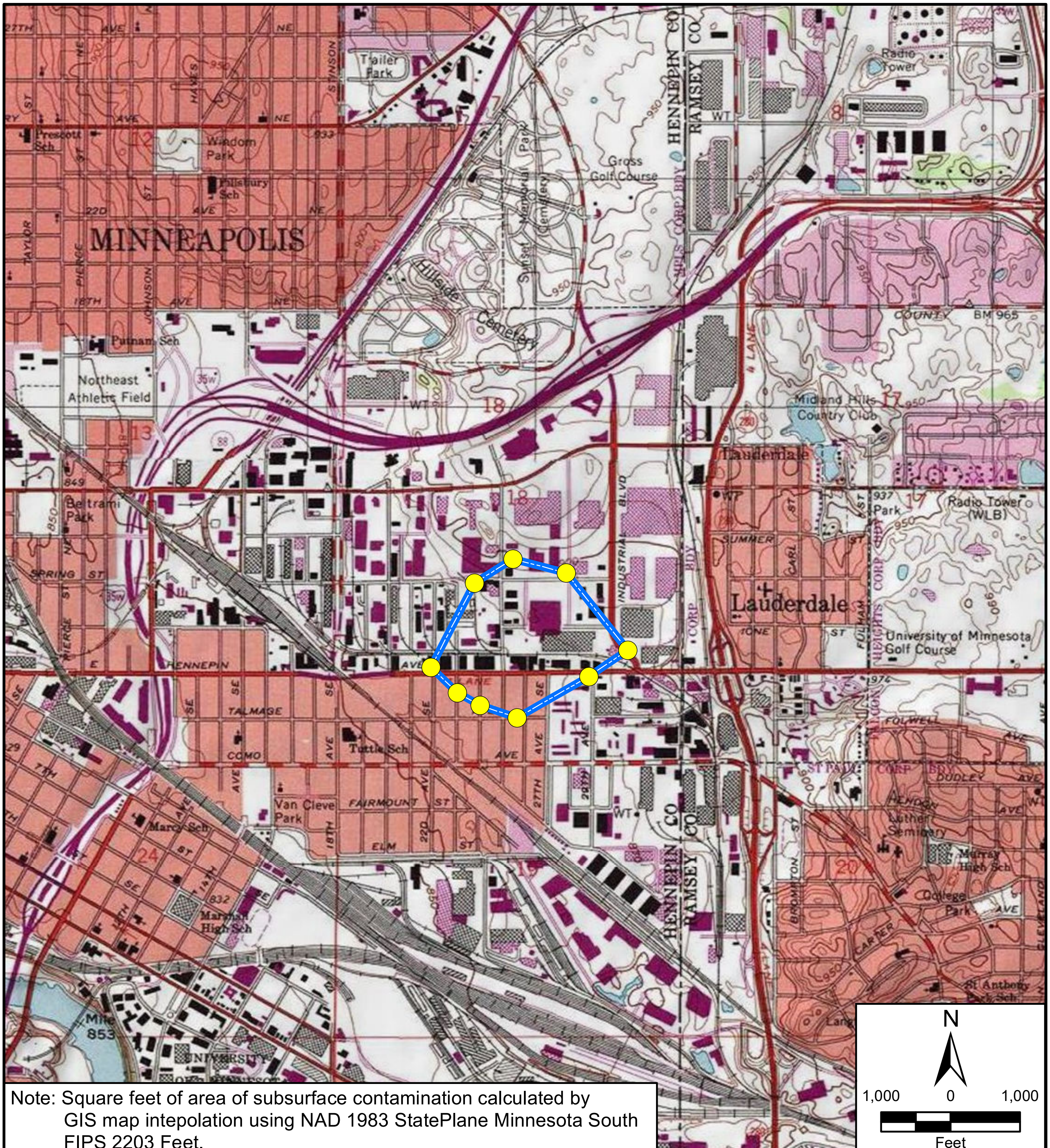
Note:

NS = Not scored

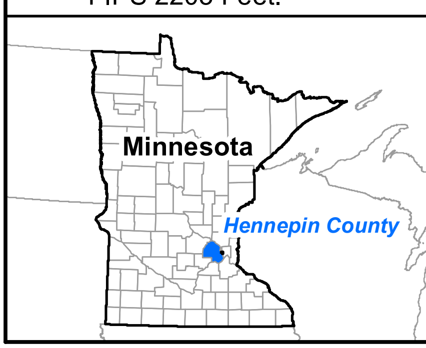
Table 5-11 – Subsurface Intrusion Component Scoresheet			
Factor Categories and Factors	**Maximum Value**	**Value Assigned**	
Subsurface Intrusion Component			
Likelihood of Exposure:			
1. Observed Exposure	550	0	
2. Potential for Exposure:			
2a. Structure Containment	10	10	
2b. Depth to contamination	10	10	
2c. Vertical Migration	15	15	
2d. Vapor Migration Potential	25	25	
3. Potential for Exposure (lines 2a * (2b+2c+2d), subject to a maximum of 500)	500	500	
4. Likelihood of Exposure (higher of lines 1 or 3)	550		500
Waste Characteristics:			
5. Toxicity/Degradation	(a)	10,000	
6. Hazardous Waste Quantity	(a)	10,000	
7. Waste Characteristics (subject to a maximum of 100)	100		100
Targets:			
8. Exposed Individual	50	20	
9. Population:			
9a. Level I Concentrations	(b)	NS	
9b. Level II Concentrations	(b)	NS	
9c. Population within an Area of Subsurface Contamination	(b)	176.09	
9d. Total Population (lines 9a + 9b +9c)	(b)	176.09	
10. Resources	5	NS	
11. Targets (lines 8 + 9d + 10)	(b)		196.09
Subsurface Intrusion Component Score:			
12. Subsurface Intrusion Component (lines 4 × 7 × 11)/82,500[c] (subject to a maximum of 100)	100		100
Soil Exposure and Subsurface Intrusion Pathway Score:			
13. Soil Exposure Component + Subsurface Intrusion Component (subject to a maximum of 100)	100		100

Notes:

a Maximum value applies to waste characteristics category.
b Maximum value not applicable.
c Do not round to the nearest integer.
NS Not scored



Note: Square feet of area of subsurface contamination calculated by GIS map intepolation using NAD 1983 StatePlane Minnesota South FIPS 2203 Feet.



Legend

- Sample Location
- Area of Subsurface Contamination A Boundary (approximately 3,949,000 square feet)

See Figure 3 for sample locations
Source: USGS 7.5 Minute Topographic Quads New Brighton, 1997 and St. Paul West, 1993

Southeast Hennepin Area Groundwater and Vapor Site
Minneapolis, Hennepin County, Minnesota

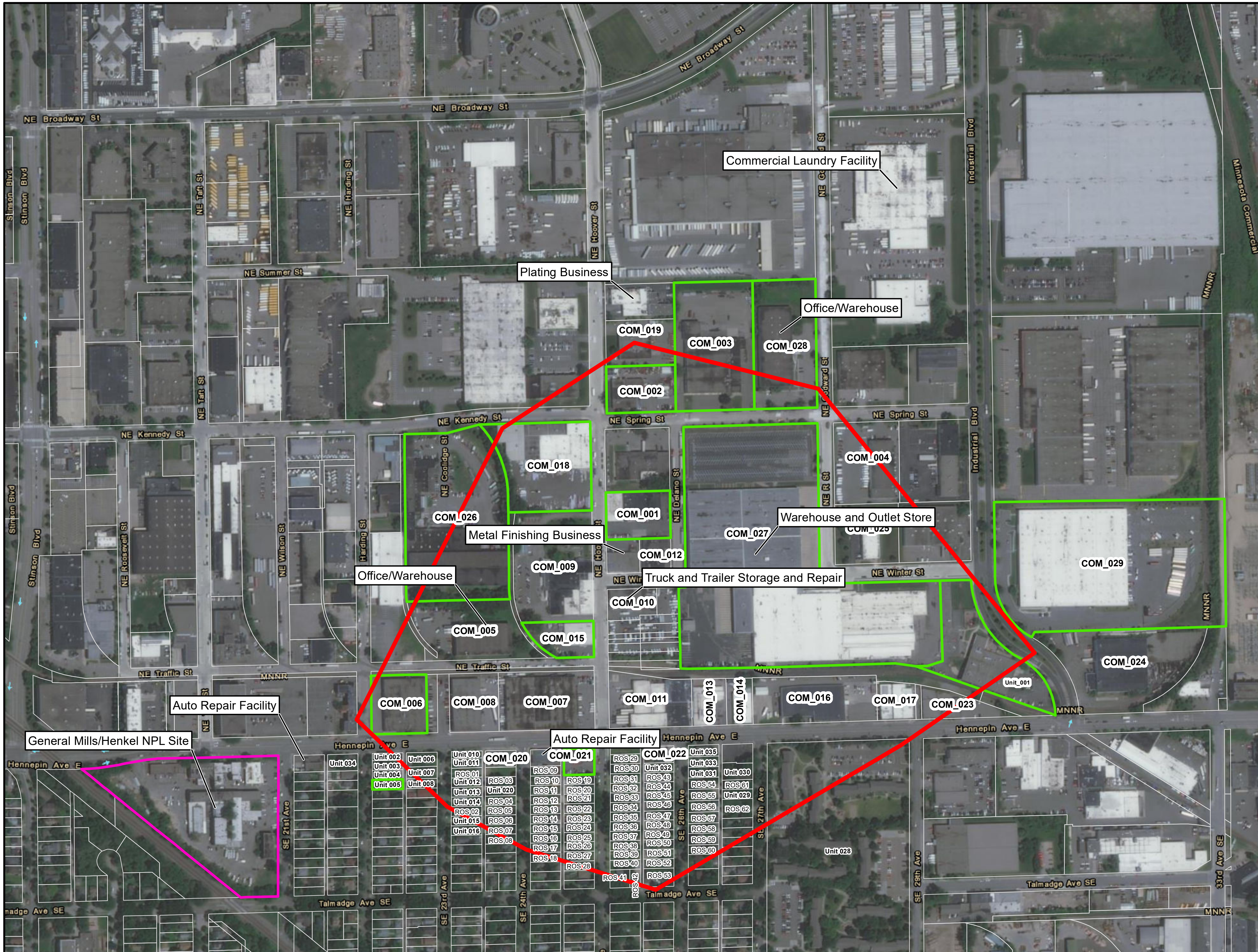
Figure 1

Area of Subsurface Contamination

TETRA TECH

Prepared For: 903100720001AI026 | Prepared By: Clayton Hayes

Date Saved: 7/15/2021



Legend

ASC A Boundary

General Mills/Henkel NPL Site

Hennepin County Parcel Boundary

Vapor Mitigation System Installed

Acronyms

ASC - Area of subsurface contamination

NPL - National priority list

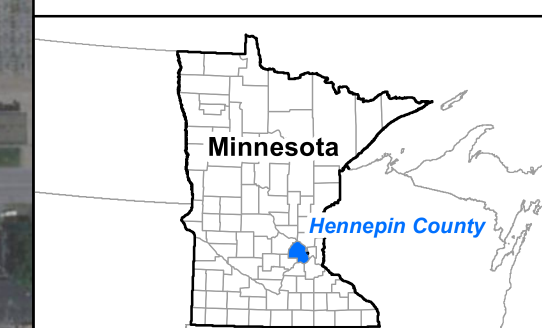
ROS - Regularly occupied structure

N

200 0 200

Feet

Source: The source of this image is ESRI, used by the EPA with ERSI's permission; Minnesota Pollution Control Agency, Figure 2 Site Map, 2019; References 7, p. 10; 8, p. 2; Reference 58



Southeast Hennepin Area Groundwater and Vapor Site
Minneapolis, Hennepin County, Minnesota

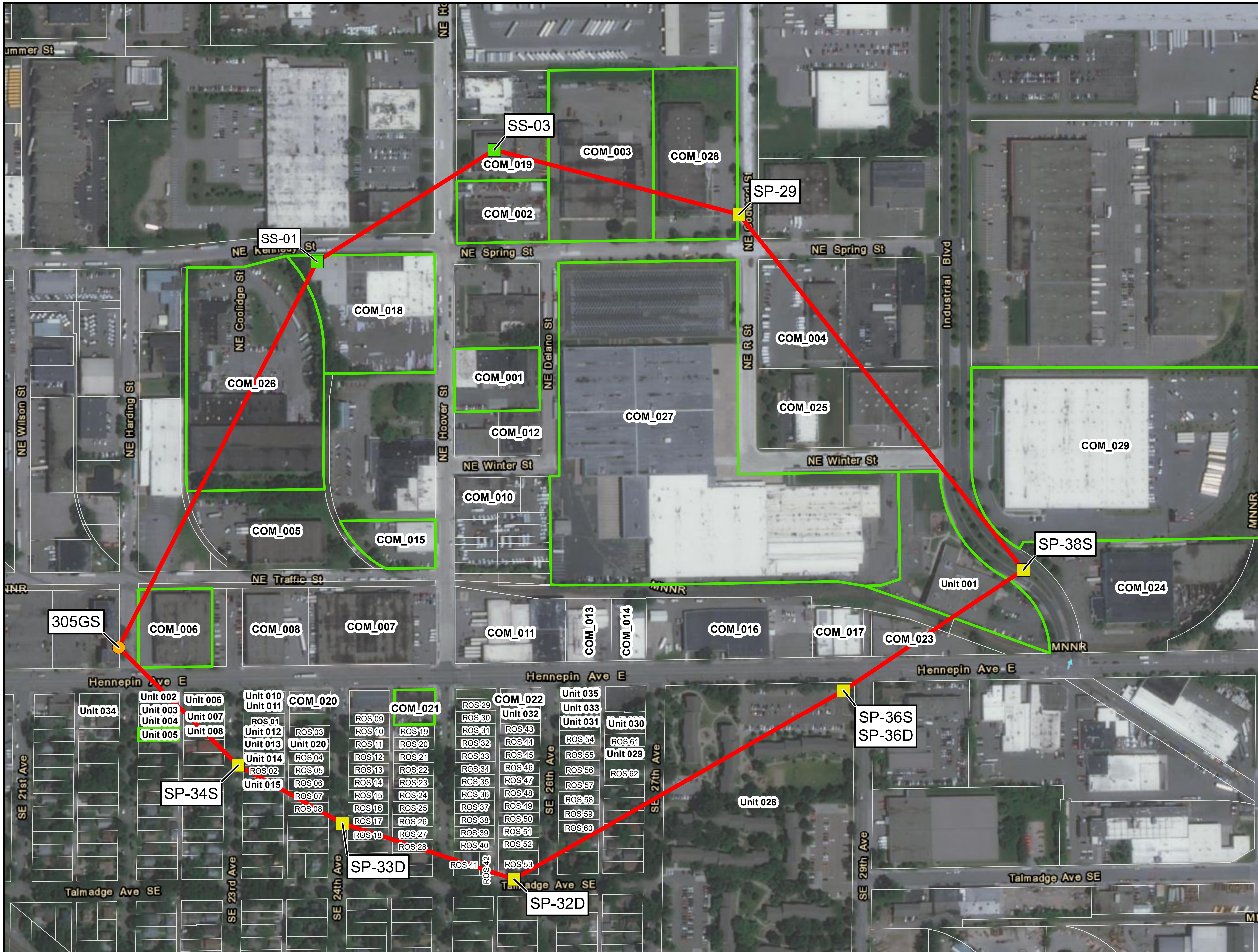
Figure 2

ASC Layout and Vicinity

TETRA TECH

Prepared For: 903100720001AI026 | Prepared By: Clayton Hayes

Date Saved: 7/15/2021



Legend

Groundwater Sampling Location

- Release Permanent Well
- Release Temporary Well

Sub-slab Gas Sample Location

- 2018 Release Sub-Slab Soil Gas
- ASC A Boundary
- Hennepin County Parcel Boundary
- Vapor Mitigation System Installed

Acronyms

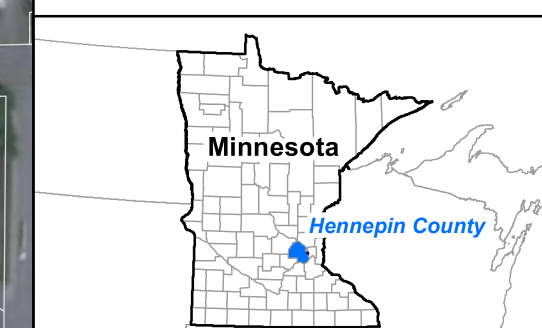
ASC - Area of subsurface contamination
D - Deep well
ROS - Regularly occupied structure
S - Shallow well
SP - Soil probe (temporary well installed in soil probe boring)
SS - Sub-slab soil gas

N

150 0 150

Feet

Source: The source of this image is ESRI, used by the EPA with ERSI's permission; Minnesota Pollution Control Agency, Figure 2 Site Map, 2019 References 8, pp. 28 to 32; 13, pp. 37 to 45.



Southeast Hennepin Area Groundwater and Vapor Site
Minneapolis, Hennepin County, Minnesota

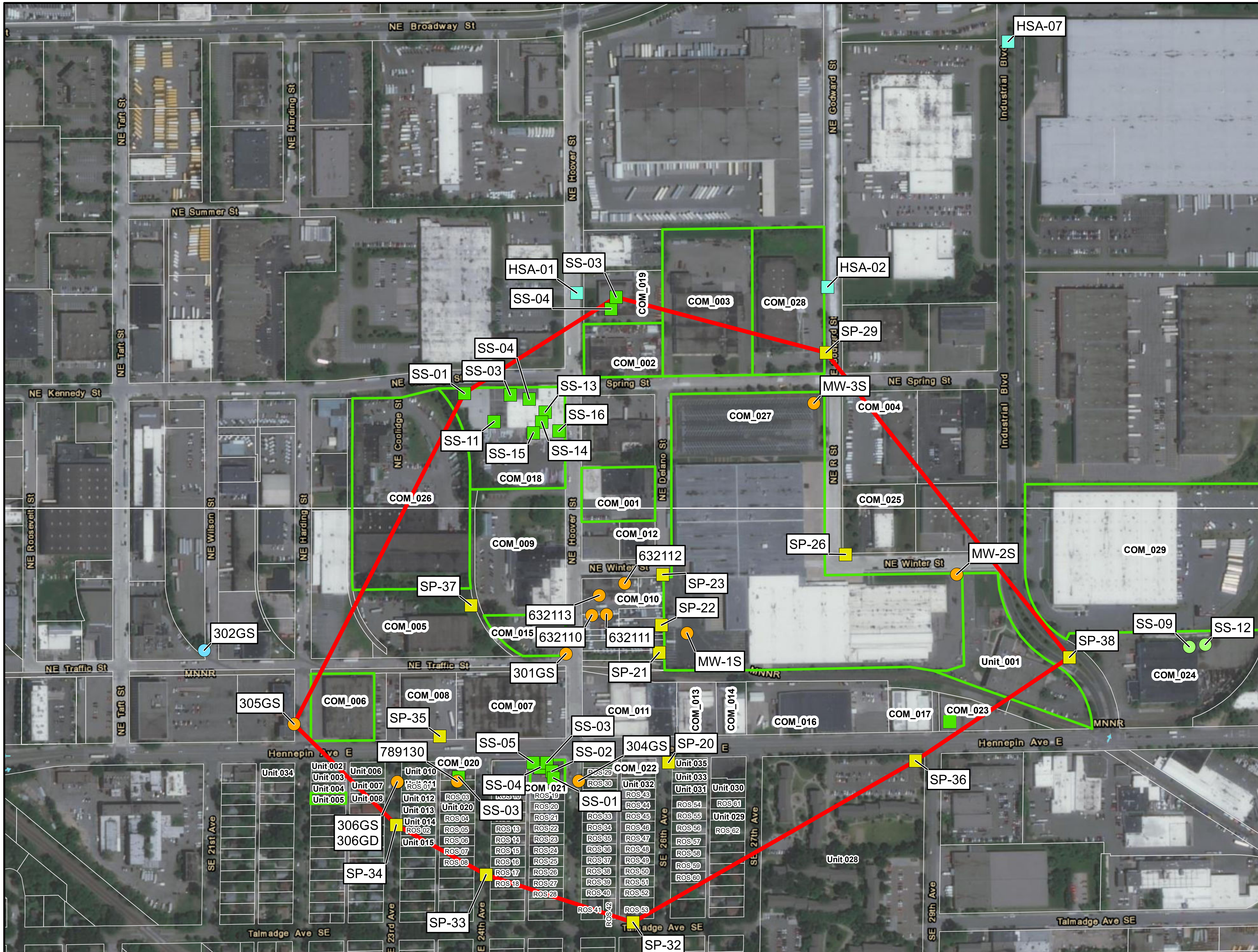
Figure 3

Area of Subsurface Contamination

TETRA TECH

Prepared For: 903100720001AI026 | Prepared By: Clayton Hayes

Date Saved: 7/15/2021



Legend

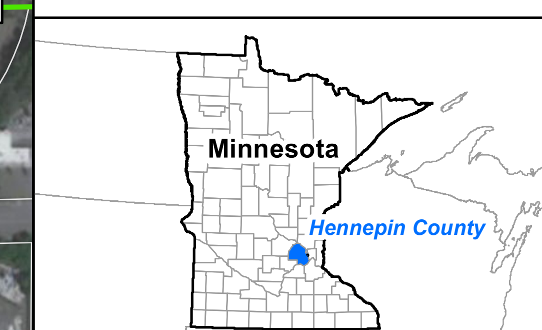
Groundwater Sampling Location
- Background Permanent Well
- Background Temporary Well
- Release Permanent Well
- Release Temporary Well

Sub-Slab Soil Gas Sample Location
- 2018 Background Sub-Slab Soil Gas
- 2018 Release Sub-Slab Soil Gas
- ASC A Boundary
- Hennepin County Parcel Boundary
- Vapor Mitigation System Installed

Acronyms
ASC – Area of subsurface contamination
D – Duplicate sample
ROS – Regularly occupied structure
S – Shallow sample
SP – Soil prode (temporary well installed in soil probe boring)
SS – Sub-slab soil gas sample

N
175 0 175
Feet

Source: The source of this image is ESRI, used by the EPA with ERSI's permission; Minnesota Pollution Control Agency, Figure 2 Site Map, 2019; References 8, pp. 28 to 32; 13, pp. 37 to 45.



Southeast Hennepin Area Groundwater and Vapor Site
Minneapolis, Hennepin County, Minnesota

Figure 4

All Observed Release Samples

TETRA TECH

Prepared For: 903100720001AI026 | Prepared By: Clayton Hayes

Date Saved: 7/15/2021

REFERENCES

1. U.S. Environmental Protection Agency (EPA). Hazard Ranking System, Title 40 Code of Federal Regulations (CFR) Part 300, Appendix A (55 Federal Register [FR] 51583, Dec. 14, 1990, as amended at 82 FR 2779, Jan. 9, 2017; 83 FR 38037, Aug. 3, 2018), as published in the Code of Federal Regulations on July 1, 2019, with two attachments. Attachment A: Federal Register Vol. 55, No. 241. December 14, 1990. Hazard Ranking System Preamble. Attachment B: Federal Register Vol. 82, No. 5, January 9, 2017. Addition of a Subsurface Intrusion Component to the Hazard Ranking System Preamble. Available at https://semspub.epa.gov/src/document/HQ/100002489. 197 Pages.

2. EPA. Superfund Chemical Data Matrix (SCDM). Data Extracted on January 18, 2021. Available on-line at: https://www.epa.gov/superfund/superfund-chemical-data-matrix-scdm-query. 5 Pages.

3. U.S. Department of the Interior, U.S. Geological Survey (USGS). 7.5 Minute Series Topographic Quadrangle of Saint Paul West, Minnesota. Scale, 1:24,000. 2019. 1 Map. Note: Modified by Tetra Tech, Inc. (Tetra Tech) on February 28, 2020 to add the location of the Southeast Hennepin Area Groundwater and Vapor Site.

4. Tetra Tech. Project Note to File with Attachments. Subject: Coordinates for Southeast Hennepin Area Groundwater and Vapor Site. Attachments: Google Map and Coordinates Converter. May 15 2020. 5 Pages.

5. EPA. Superfund Site Information. Southeast Hennepin Area Groundwater and Vapor. April 15, 2021. Available on-line at: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0506043. 2 Pages.

6. Minnesota Pollution Control Agency (MPCA). Minneapolis: SE Hennepin Area Groundwater and Vapor Site. Accessed on November 7, 2019. Available on-line at: https://www.pca.state.mn.us/waste/minneapolis-se-hennepin-area-groundwater-and-vapor-site. 6 Pages.

7. MPCA. Preliminary Assessment Report. Southeast Hennepin Area Groundwater and Vapor Site – SA249. Minneapolis, Hennepin County, Minnesota. November 1, 2016. 22 Pages.

8. MPCA. Site Inspection (SI) Report. Southeast Hennepin Area Groundwater and Vapor Site – SA249. Minneapolis, Hennepin County, Minnesota. March 15, 2018. 696 Pages.

9. MPCA. SI Work Plan for Southeast Hennepin Area Site – SA249. Minneapolis, Hennepin County, Minnesota. November 1, 2016. 44 Pages.

10. MPCA. Site Assessment Program Quality Assurance Project Plan. Prepared by AECOM for MPCA. September 2014. 179 Pages.

11. Tetra Tech. Project Note with Attachments. Subject: Data Validation Checklists (DVC) Prepared by Bay West for SI and ESI Soil and Groundwater Samples. Attachments: DVCs. April 23, 2020. 101 Pages.

12. Minnesota Geological Survey, University of Minnesota. Bedrock Hydrogeology. Prairie Du Chien-Jordan Aquifer. Plate 6 of 9. 1989. 1 Page.

13. MPCA. Expanded Site Inspection (ESI) Report. Southeast Hennepin Area Groundwater and Vapor Site – SA249. Minneapolis, Hennepin County, Minnesota. February 14, 2020. Due to its large size, this document was broken into the following parts:
    Part 1 of 6. Includes Sections 1.0 through 7.0, Figures, and Tables. Pages 1 to 154.
    Part 2 of 6. Includes Appendices A and B. Pages 155 to 191.
    Part 3 of 6. Includes Appendix C. Pages 192 to 2693.
    Part 4 of 6. Includes Appendix C. Pages 2694 to 5197.
    Part 5 of 6. Includes Appendix C. Pages 5198 to 7628.
    Part 6 of 6. Includes Appendices D, E, and F. Pages 7629 to 8272.

14. MPCA. ESI Work Plan for Southeast Hennepin Area Groundwater and Vapor Site – SA249. Minneapolis, Hennepin County, Minnesota. March 21, 2018. 77 Pages.

15. Tetra Tech. Project Note with Attachments. Subject: Field Documentation for Vapor Intrusion Assessments. Attachments: Field Sample Collection Sheets, Building Surveys, and Photograph Logs. April 23, 2020. 1,530 Pages.

16. Tetra Tech. Project Note with Attachments. Subject: Pace Analytical (Pace) Data Packages for Vapor Intrusion Assessments at Commercial Properties. Attachments: Redacted Analytical Data Packages for Commercial Properties. April 23, 2020. 3,486 Pages.

17. Tetra Tech. Project Note with Attachments. Subject: Pace Analytical (Pace) Data Packages for Vapor Intrusion Assessments at Residential Properties. Attachments: Redacted Analytical Data Packages for Residential Properties. April 23, 2020. 1,563 Pages.

18. Tetra Tech. Project Note with Attachments. Subject: DVCs Prepared by Bay West for Vapor Intrusion Assessments. Attachments: DVCs for Vapor Intrusion Assessments Results. May 17, 2020. 385 Pages.

19. Tetra Tech. Electronic Mail Correspondence Between Sandra Harrigan, Project Manager and Sylvia Hunter, Project Manager II, Pace Analytical Services LLC. Subject: Pace Labs Definition of Reporting Limit and Practical Quantitation Limit. October 8, 2019. 8 Pages.

20. Tetra Tech. Project Note to File with Attachment. Subject: EPA Contract Laboratory Program Universal Supersets for Case Numbers 47593 and 48021. Attachments: CLP Supersets for Southeast Hennepin Area Groundwater and Vapor Site. April 20, 2020. 181 Pages.

21. EPA. Office of Solid Waste and Emergency Response. Using Qualified Data to Document an Observed Release and Observed Contamination. EPA 540-F-94-028. Office of Solid Waste and Emergency Response (OSWER) 9285.7-14FS. PB94-963311. November 1996. 18 Pages.

22. Tetra Tech. Project Note. Subject: Summary of Information About MPCA Groundwater Sampling Events. Southeast Hennepin Area Groundwater and Vapor Site. May 22, 2020. 2 Pages.

23. EPA. Office of Research and Development. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. September 1998. 248 Pages.

24. Agency for Toxic Substances and Disease Registry (ATSDR). Trichloroethylene – ToxFAQs. July 2003. 2 Pages.

25. ATSDR. Vinyl Chloride – ToxFAQs. July 2006. 2 Pages.

26. New Hampshire Department of Environmental Services. Environmental Fact Sheet. 1,2-Dichloroethene: Health Information Summary. ARD-EHP-8. 2005. 2 Pages.

27. U.S. Department of Health and Human Services, ATSDR. Toxicological Profile for Tetrachloroethylene. June 2019. 435 Pages.

28. MPCA. Supplemental ESI Report (SESI) for Southeast Hennepin Area Groundwater and Vapor Site – SA249. Minneapolis, Hennepin County, Minnesota. August 28, 2020. EPA Approved April 9, 2021. Due to its large size, this document was broken into the following volumes:
    Volume 1 of 2. Includes Sections 1.0 through 7.0, Figures, Tables, and Appendices A and B. Pages 1 to 187.
    Volume 2 of 2. Includes Appendices Cand D. Pages 188 to 2196.

29. Tetra Tech. Project Note with Attachments. Subject: SE Hennepin - Mitigation Systems Installed. Attachment: Vapor Mitigation Decisions: SE Hennepin Area Groundwater and Vapor Site. Attachment Dated 04/08/2021. July 8, 2021. 2 Pages.

30. Bay West, LLC. Letter Report with Enclosures. Regarding: FY16 Investigation Work Summary, SE Hennepin Area Groundwater and Vapor – SA249. Minneapolis, MN. Enclosures: Figures, Tables and Appendices. June 30, 2016. 802 Pages.

31. Sara Gaffin, Barr Engineering and Environmental Consultants (Barr). Transmittal Letter with Attachments. Regarding: Vapor Intrusion Pathway Investigation Report. East Hennepin Avenue Site. Attachment: Mercer Report Dated June 26, 2014, and GIS Files for Plate 4 Figure. November 24, 2015. 98 Pages.

32. U.S. Census Bureau. QuickFacts, Hennepin County, Minnesota. Accessed on May 15, 2020. Available on-line at: https://www.census.gov/quickfacts/hennepincountyminnesota. 3 Pages.

33. Wenck Associates. Technical Memo with Attachments. From Jeff Ellerd, Senior Project Engineer to Ms. Michelle Liberati, Executive Vice President, CSDC. Subject: Summary of Soil Gas Sampling, 300 Industrial Boulevard, Minneapolis, Minnesota. Attachments: Figures, Tables, and Analytical Results. May 12, 2016. 48 Pages.

34. American Engineering Testing, Inc. Report of Subsurface Investigation and Proposed Corrective Action. East Hennepin Auto. December 13, 1994. 63 Pages.

35. Dennis P. McComas, P.G., Vice President, Thatcher Engineering, Inc. Letter with Enclosures to Ms. Sarah Larsen – Project Leader, Petroleum Remediation Program, MPCA – Petroleum and Closed Landfill Section. RE: Investigation Report Form Guidance Document 4-06 for Frank's Auto Repair, Located at 2314 Hennepin Avenue, Minneapolis, Minnesota, 55414. Enclosures: Project Files. December 14, 2009. 211 Pages.

36. AECOM. Site Investigation Report. Former Franks Auto Repair. 2314 East Hennepin Avenue. Minneapolis, Minnesota. June 2012. 180 Pages.

37. Peer Environmental & Engineering Resources, Inc. (Peer). Phase I Environmental Site Assessment (ESA). Anne Gendein Trust Properties, 345 and 359 Hoover Street NE. August 7, 2000. 196 Pages.

38. Peer. Investigation Results. Anne Gendein Trust Properties, Hoover Street and Winter Street Northeast. May 24, 2001. 107 Pages.

39. Tetra Tech. Project Note. Subject: Summary of Information About MPCA Soil Gas (Sub-slab and External) Sampling Events. Southeast Hennepin Area Groundwater and Vapor Site. May 22, 2020. 3 Pages.

40. Tetra Tech. Project Note. Subject: Summary of Information About MPCA Sampling Events and Mitigation Systems. Southeast Hennepin Area Groundwater and Vapor Site. May 22, 2020. 2 Pages.

41. Delta Consultants. Phase II ESA. AmeriPride Services, Inc. September 21, 2007. 156 Pages.

42. Patricia M. Terhaar, PG, Senior Consultant. Braun Intertec. Letter with Attachments. To Mr. Bob Cutshall c/o Ryan Companies. RE: Groundwater Assessment, Northwestern Warehouse, 3255 Spring Street, Minneapolis, Minnesota. Attachments: Figures, Field Documentation, and Laboratory Results. August 3, 2000. 22 Pages.

43. EPA Envirofacts Facility Registry Services. Facility Detail Report for Vitasyn. Accessed On-line at: https://ofmpub.epa.gov/frs_public2/fii_query_dtl.disp_program_facility?pgm_sys_id_in=MND051441731&pgm_sys_acrnm_in=SEMS. Accessed on February 7, 2020. 2 pages.

44. Barr. Vapor Intrusion Pathway Investigation and Feasibility Study Work Plan. Sampling and Monitoring Work Plan. East Hennepin Avenue Site. Prepared for General Mills, Inc. August 2014. 242 Pages.

45. Barr. Vapor Intrusion Pathway Investigation Report. East Hennepin Avenue Site. Prepared for General Mills, Inc. July 2015. 2,995 Pages.

46. Barr. Groundwater Pump-out System Shutdown Summary Report and 2011 Annual Report. East Hennepin Avenue Site. Prepared for General Mills, Inc. March 2012. 323 Pages.

47. Minnesota Geological Survey, University of Minnesota, Saint Paul. Hydrogeology of the Paleozoic Bedrock in Southeastern Minnesota. 2003. 113 Pages.

48. Minnesota Geological Survey, University of Minnesota. Geologic Atlas of Hennepin County, Minnesota. Bedrock Geology. Plate 2. 2018. 1 Page.

49. Minnesota Geological Survey, University of Minnesota. Geologic Atlas of Hennepin County, Minnesota. Surficial Geology. Plate 3. 2018. 1 Page.

50. EPA. What is Vapor Intrusion? Accessed On-line at: https://www.epa.gov/vaporintrusion/what-vapor-intrusion. Accessed on January 18, 2021. 2 Pages.

51. EPA. Multisystem Search Results. Envirofacts. Accessed On-line at: https://enviro.epa.gov/facts/multisystem.html Accessed on January 18, 2021. 97 Pages.

52. Tetra Tech. Origins of Possible Chlorinated Compound Contamination. February 24, 2021. 1 Page.

53. Tetra Tech. Groundwater Sample Elevations. February 2, 2021. 4 Pages.

54. Minnesota Department of Health. Well and Boring Report. Unique Well Numbers 632110, 632111, 632112, 632113, 789130. Entry Date: August 25, 2000. Update Date: January 3, 2008. 5 Pages.

55. Tetra Tech. Surface Geology. Southeast Hennepin Area Groundwater and Vapor Site Minneapolis, Hennepin County, Minnesota. February 25, 2021. 1 page.

56. Tetra Tech. Bedrock Geology. Southeast Hennepin Area Groundwater and Vapor Site Minneapolis, Hennepin County, Minnesota. February 25, 2021. 1 page.

57. Agency for Toxic Substances and Disease Registry (ATSDR). 2019. Toxicological profile for Trichloroethylene (TCE). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. June 2019. 511 Pages.

58. EPA. Office of Solid Waste and Emergency Response. Conceptual Model Scenarios for the Vapor Intrusion Pathway. EPA 530-R-10-003. February 24, 2012. 154 Pages.

59. Antea Group. Potential Responsible Party Search Report. SE Hennepin Area, Minneapolis, Minnesota. Volume I of IV. January 2018. Excerpt. 61 Pages. (Review of the complete document is available upon request to Patrick Hamblin, EPA, NPL Coordinator, Site Assessment and Grants Section, Superfund & Emergency Management Division, hamblin.patrick@epa.gov).

60. EPA. Office of Solid Waste and Emergency Response (OSWER). OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air. OSWER Publication 9200.2-154. June 2015. 267 Pages.

61. Tetra Tech. Project Note with an Attachment Regarding Structure Descriptions and UNIT_001 Population. July 14, 2021. 3 Pages.

62. Tetra Tech. 2017 Sub-Slab Soil Gas Sampling Locations. July 15, 2021. 1 Page.

SUMMARY OF TABLES

TABLE		PAGE
TABLE 1:	Summary of Most Recent/Relevant Previous Investigations	16
TABLE 1A:	Hydrogeologic Units--Rock Units and Aquifer Systems	24
TABLE 2:	List of Regularly Occupied Structures Within ASC A	26
TABLE 3:	Background Well Depths and Sample Interval	31
TABLE 4:	Background Groundwater Samples	32
TABLE 5:	Background Groundwater Concentrations	33
TABLE 6:	Highest Background Groundwater Concentrations	35
TABLE 7:	Release Well Depth and Sampled Interval	36
TABLE 8:	Release Groundwater Samples	37
TABLE 9:	Release Groundwater Concentrations	41
TABLE 10:	2018 Commercial Sub-slab Samples	46
TABLE 11:	2018 Commercial Sub-slab Soil Gas Concentrations	48
TABLE 12:	Other Supporting Documentation (2017 Commercial Sub-slab Soil Gas Samples)	50
TABLE 13:	Other Supporting Documentation (2017 Commercial Sub-slab Soil Gas Concentrations)	53
TABLE 14:	ASC A Structure Containment	60
TABLE 15:	List of Regularly Occupied Structures	66
TABLE 16:	ASC A - Hazardous Waste Quantity	69
TABLE 17:	ASC A Structure Containment	71
TABLE 18:	ASC A Toxicity Factor Value	78
TABLE 19:	ASC A Degradation Factor Value	79
TABLE 20:	Subsurface Intrusion Toxicity/Degradation	80
TABLE 21:	Hazardous Waste Quantity	80
TABLE 22:	Regularly Occupied Structures Within ASC A	83
TABLE 23:	Populations in ASC A	87

SITE DESCRIPTION

The Southeast Hennepin Area Groundwater and Vapor (SE Hennepin) site is located in the area surrounding the intersection of Hoover Street NE and Spring Street NE in Minneapolis, Hennepin County, Minnesota (Refs. 3; 5, p. 1) (see Figures 1 and 2 of this HRS documentation record). Specifically, the geographic coordinates as measured from the intersection of Hoover Street NE and Spring Street NE are latitude 44° 59' 42.19" north and longitude 93° 13' 3.92" west (Refs. 4, pp. 1, 4; 5). The EPA identification number (ID), as recorded in the Superfund Enterprise Management System, is MNN000506043 (Ref. 5).

For HRS scoring purposes, the SE Hennepin site includes an approximately 94-acre area of subsurface contamination (ASC) affecting 218 residents and 822 full time and 69 part-time workers (see Table 23 and Figures 1, 3, and 4 of this HRS documentation record). Chlorinated volatile organic compounds (VOCs) including tetrachloroethylene (PCE), trichloroethylene (TCE), and their degradation products of cis-1,2-dichloroethylene (DCE), trans-1,2-DCE, and vinyl chloride were detected in groundwater underlying the ASC, and PCE, TCE, cis-1,2-DCE, and trans-1,2-DCE were detected in sub-slab soil gas samples collected under residential and commercial, regularly-occupied structures at concentrations meeting observed release criteria and documenting a release of volatile chlorinated compounds to the subsurface, groundwater, and sub-slab soil gas. The volatile compounds in groundwater have volatilized and the vapors have accumulated under residential and commercial buildings. The volatile compounds have the potential to enter the buildings through cracks or other openings (Refs. 8, pp. 64 to 86; 13, pp. 99 to 144; 27, pp. 263, 265) (see Figures 3 and 4 and Tables 9 and 11 of this HRS documentation record). Therefore, the subsurface intrusion component of the soil exposure and subsurface intrusion pathway was evaluated as documented in Section 5.2 of this HRS documentation record.

Groundwater investigations document a release of chlorinated VOCs to groundwater as documented in Table 9 of this HRS documentation record. The highest concentrations of chlorinated VOCs are at the interface of the highly permeable sand and gravel aquifer and the underlying confining layer of Decorah Shale composed chiefly of the fine clastic component, with subordinate interbeds of carbonate rock and Platteville Formation composed of fine-grained limestone containing shale partings near the top and the base. PCE and TCE are heavier than water and PCE and TCE cannot migrate vertically through the shale and limestone, a probable aquitard, resulting in the accumulation of PCE and TCE over this confining layer (Refs. 13, pp. 10, 11, 14 to 18, 51 to 54; 24, p. 1; 27, pp. 9, 255, 263, 279; 47, pp. 89, 92, 94; 48; see Table 9 of this HRS documentation record). Both PCE and TCE can remain in groundwater for an extended period which may lead to a large accumulation of PCE and TCE and their breakdown products in groundwater over time (Ref. 24, p. 1; 27, pp. 2, 263). PCE and TCE evaporates less easily from the soil than from surface water but may stick to particles and remain for a long time (Ref. 24, p. 1; 27, pp. 272, 274, 275). PCE and TCE contaminated groundwater, above the underlying bedrock, diffuse to the surface of the groundwater or water table. PCE and TCE vapors from the water table can enter the unsaturated pore spaces around and between the sand and gravel column above the water table (referred to as the vadose zone) and finally migrate to the surface. The vapors at the surface can enter structures by migrating through cracks, seams, interstices, and gaps in walls or foundations as evidenced by the detection of the VOCs in indoor air samples collected from the site (Refs. 13, pp. 6, 19, 27, 66, 145, 146; 33, pp. 2, 3, 28, 42; 50; Table 9 of this HRS documentation record document the presence of chlorinated VOCs in groundwater and Table 11 of this HRS documentation record document the presence of chlorinated VOCs in sand and gravel pore spaces [sub-slab samples]).

Indoor air samples collected from buildings within the ASC contain PCE and TCE indicating that PCE and TCE vapors from contaminated groundwater have entered the building through vapor intrusion (Ref. 13, pp. 6, 19, 27, 66, 145, 146). However, no background indoor air samples were collected. Therefore, an area of observed exposure (AOE) cannot be documented at this time (Refs. 1, Section 5.2.0; 13, p. 19).

Environmental investigations by the Minnesota Pollution Control Agency (MPCA) identified several possible origins of the subsurface chlorinated solvent contamination within and surrounding the SE Hennepin site including: potential dumping at a former gravel pit, a former foundry and outboard motor manufacturer, former metal finishing businesses, a truck trailer storage and repair business, a former metal plating facility, and current and former auto repair and dry cleaner businesses (Refs. 7, pp. 2, 3, 10, 11; 8, pp. 2, 3, 4, 26, 27; 13, pp. 8, 35, 36) (see Figure 2 of this HRS documentation record). Past and present operational activities at commercial and industrial facilities within the ASC used chlorinated solvents including PCE and TCE as documented in Reference 51. Reference 51 shows search results for the SE Hennepin site area conducted using the EPA Multisystem Search which searches multiple environmental databases for facility information, including toxic chemical releases, water discharge permit compliance, hazardous waste handling processes, Superfund status, and air emission estimates. PCE and TCE use in the area of the site is also documented in additional site investigation reports (Refs. 6, p. 1; 7, pp. 2, 3, 10, 11; 8, pp. 3, 4, 89, 90; 13, pp. 6, 7 157, 158). Chlorinated solvents (such as PCE and TCE) are man-made compounds commonly used in commercial/industrial operations, such as dry cleaning and metal degreasing, while other contaminants, such as cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride, are common breakdown products of PCE and TCE (Refs. 23, p. 24; 24; 25; 26; 27, pp. 1, 2).

Environmental investigations by MPCA and private property owners within the ASC documented releases of chlorinated VOCs in groundwater, soil gas, sub-slab soil gas, and indoor air samples (Ref. 13, pp. 156 through 159). These releases may be attributable to past operations where chlorinated solvents were used and/or where contaminated soil and contaminated groundwater have been detected, and where vapor intrusion from the subsurface was found based on detections of chlorinated VOCs in soil gas and indoor air (Ref. 13, p. 6, 7, 8, 19, 23, 27, 29, 30). While several possible origins of the release were identified, specific releases documented in monitoring wells and sub-slab and external soil gas cannot reasonably be attributed to one or more specific releases —including disposal activities in the former gravel pit, foundry, outboard motor manufacturer, dry cleaners, metal finishing and plating facilities, and auto repair and storage businesses, and other commercial and industrial facilities (Refs. 8, pp. 26 through 47, 60 through 91; 13, pp. 35 through 66, 77 through 159).

Structures within the ASC have residential and commercial uses (see Table 23 and Figures 3 and 4 of this HRS documentation record). There is the potential for chlorinated VOCs in the groundwater to continue to vaporize and enter structures posing a threat to residents and workers.

PREVIOUS INVESTIGATIONS

Several investigations have been conducted within and surrounding the SE Hennepin site to delineate the extent of the subsurface volatile chlorinated compound contamination and the possible origin of the subsurface contamination. Table 1 lists previous investigations, including those resulting in detections of hazardous substances in samples collected (Refs. 8, pp. 88 through 91; 13, pp. 157, through 159; 28, pp. 13, 14, 80 through 165).

TABLE 1: Summary of Most Recent/Relevant Previous Investigations					
Company/ Agency	**Investigation**	**Sampling Year**	**Samples Collected**	**Hazardous Substances Detected**	**References**
AET for property owner	LUST at auto repair facility	1994	Groundwater	TCE	13, p. 158
Braun for MPCA	Property transaction subsurface investigation	2000	Groundwater	TCE	13, p. 157
Property Owners through Peer for MPCA	LUST at truck trailer storage and repair facility	2001	Groundwater	TCE	13, pp. 157, 158
Delta for MPCA	Subsurface investigation at commercial dry cleaner	2007	Groundwater	TCE	13, p. 157
AECOM for MPCA	LUST investigation at former auto repair facility	2009, 2012	Groundwater	TCE	13, p. 158
Barr Engineering for MPCA	Site Characterization and Remedial Action Plan	1983, 2012, 2014	Soil and groundwater	TCE	13, p. 158, 159
Wenck for MPCA	Vapor intrusion assessment at school	2016	Sub-slab soil gas	TCE	13, p. 158
MPCA	Preliminary assessment at the Southeast Hennepin Area	2016	None	NA	7, pp. i, 2, 5, 7
MPCA	Site inspection at the Southeast Hennepin Area	2017	Soil, groundwater, sub-slab soil gas and external soil gas	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	8, pp. 1, 5, 6, 40, 41, 42, 60 through 86
MPCA	Expanded site inspection for Southeast Hennepin Area Groundwater and Vapor Site – SA249	2018	Soil, groundwater, sub-slab soil gas and external soil gas, indoor air	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	13, pp. 11, 12, 19, 20, 77 through 154
MPCA	Supplemental site inspection for Southeast Hennepin Area Groundwater and Vapor Site – SA249	2018	Soil, groundwater, sub-slab soil gas	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	28, pp. 13, 80 through 165

Notes:

AET	American Engineering and Testing
DCE	Dichloroethylene
LUST	Leaking underground storage tank
TCE	Trichloroethylene
MPCA	Minnesota Pollution Control Agency
NR	Not recorded
PCE	Tetrachloroethylene

From 2014 to 2016, MPCA conducted vapor intrusion and subsurface soil, soil gas, and groundwater assessment activities at the SE Hennepin site (Ref. 30, pp. 1, 11, 12). In 2015, MPCA advanced soil probes within the SE Hennepin site to investigate historical TCE and PCE groundwater detections and to evaluate site conditions related to vapor intrusion and potential risks to building receptors (Ref. 30, pp. 1, 2). Analytical results of the soil samples showed concentrations of PCE between 0.0561 milligrams per kilogram (mg/kg) and 0.174 mg/kg, TCE between 0.0937 mg/kg and 4.13 mg/kg, and cis-1,2-DCE at 0.108 mg/kg at depths that ranged from 5 feet below ground surface (bgs) to 54.5 feet bgs (Ref. 30, pp. 12, 13 through 19, 26). Groundwater samples contained PCE between 1.1 micrograms per liter (µg/L) and 64 µg/L, and TCE between 1.2 µg/L and 1,810 µg/L, cis-1,2-DCE between 1.2 and 694 µg/L, and trans-1,2-DCE between 2.5 and 14.9 µg/L at depths that ranged from 12.5 to 70 feet bgs (Ref. 30, pp. 12, 13 through 19, 27 through 34). The highest concentrations in groundwater were detected in the right of way (ROW) of Winter Street NE at Hoover Street NE and includes sample SP-09 (Ref. 30, pp. 4, 15, 28, 286). Groundwater samples were collected from temporary wells and from permanent monitoring wells (Refs. 13, pp. 95, 96, 97, 98; 30, pp. 2, 3, 13 through 19, 27, 32). Groundwater samples were collected from multiple depths (Ref. 30, pp. 27 to 31). Soil gas samples contained PCE between 3.3 micrograms per cubic meter (µg/m^3) and 5,580 µg/m^3, TCE between 0.71 µg/m^3 and 44,500 µg/m^3, cis-1,2-DCE between 2.3 and 1,650 µg/m^3, and trans-1,2-DCE at 56.3 µg/m^3 at depths that ranged from 7 to 8 feet bgs (Ref. 30, pp. 4, 5, 20, 36). The highest concentrations of chlorinated solvents in the soil gas samples were detected in the ROW of Hoover Street NE, north of Traffic Street NE and includes sample VP-02 (Ref. 30, pp. 20, 36, 675).

The 2016 investigation also included the subsurface soil, soil gas, groundwater, and sub-slab soil gas samples collected from residential properties south of Hennepin Avenue E and commercial properties north of Hennepin Avenue E (Ref. 30, pp. 1, 7, 11, 13, 19). The sub-slab soil gas samples collected from the residential properties contained PCE between 1.9 and 30.5 µg/m^3 and TCE between 0.99 and 109 µg/m^3; sub-slab soil gas samples collected from the commercial properties contained PCE between 8.6 and 477 µg/m^3 and TCE between 1.5 and 3,640 µg/m^3; and outdoor air samples contained TCE at 1.4 µg/m^3 (Ref. 30, pp. 21, 22, 23).

A brief summary of the two investigations yielding data used in the HRS scoring of the SE Hennepin site follows.

In 2017, MPCA conducted a site inspection (SI) at the SE Hennepin site to identify the extent and magnitude of TCE contamination in the Quaternary aquifer, and the possible origin of the subsurface contamination (Ref. 8, p. 5). During the SI, MPCA collected samples of soil, groundwater from monitoring wells, and sub-slab soil gas at residential and commercial properties (Ref. 8, pp. 5, 6, 10, 11). The highest concentrations of chlorinated VOCs detected in the samples by media are as follows: soil samples contained PCE up to 0.141 mg/kg, TCE up to 0.227 mg/kg, and cis-1,2-DCE up to 0.0456 mg/kg; groundwater samples contained PCE up to 102 µg/L, TCE up to 4,970 µg/L, cis-1,2-DCE up to 1,390 µg/L, trans-1,2-DCE up to 44.9 µg/L, and vinyl chloride up to 47.7 µg/L; and sub-slab soil gas samples contained PCE up to 3,030 µg/m^3, TCE up to 11,400 µg/m^3, cis-1,2-DCE up to 64.4 µg/m^3, and trans-1,2-DCE up to 29.1 µg/m^3 (Ref. 8, pp. 10, 11, 60, 61, 65, 67, 68, 69 to 74, 75, 76).

In 2018, MPCA conducted an expanded site inspection (ESI) at the SE Hennepin site. Primary purposes of the ESI were to further investigate the extent and magnitude of the TCE contamination in the Quaternary aquifer, and to identify potential receptors of TCE-impacted groundwater and TCE-impacted soil vapors (Ref. 13, p. 11). During the ESI, MPCA collected samples of soil, groundwater from temporary and permanent monitoring wells, and sub-slab soil gas at residential and commercial properties (Ref. 13, pp. 11, 12, 95 to 98). The concentrations of chlorinated VOCs detected in the samples by media are as follows: soil samples contained TCE up to 0.072 mg/kg and cis-1,2-DCE up to 0.03 mg/kg; groundwater samples contained PCE up to 100 µg/L, TCE up to 5,300 µg/L, cis-1,2-DCE up to 1,240 µg/L, trans-1,2-DCE up to 65.8 µg/L, and vinyl chloride up to 29.0 µg/L; and sub-slab soil gas samples contained cis-1,2-DCE up to 24.6 µg/m^3, trans-1,2-DCE up to 29.1 µg/m^3, PCE up to 3,030 µg/m^3, and TCE up to 28,800 µg/m^3 (Ref. 13, pp. 84, 88, 92, 99-106, 107, 108, 110, 112, 129, 130, Figure 3 of this HRS documentation record).

ADDITIONAL SUPPORTING INFORMATION

During the Supplemental ESI in 2018, MPCA collected sub-slab vapor samples from 37 residential and 29 commercial properties. The sampling primarily consisted of sub-slab soil gas and on a more limited basis, indoor air, and outdoor air sampling (Ref. 28, pp. 19, 20, 21). Results for indoor air samples collected from commercial regularly occupied structures show PCE concentrations up to 42.4 $\mu g/m^3$ and TCE concentrations up to 92.7 $\mu g/m^3$ (Refs. 13, pp. 145 to 148; 30, p. 23; 33, pp. 1-3, 6, 10). However, no background indoor air samples were collected. Therefore, an area of observed exposure (AOE) cannot be documented at this time (Refs. 1, Section 5.2.0; 13, p. 19). Outdoor air samples collected in the vicinity of some regularly occupied structures contained low concentrations of PCE and TCE (Refs. 13, pp. 19, 57, 58, 62, 145 to 148; 30, p. 23). Analytical results of the samples collected were compared to the MPCA sub-slab and indoor air Intrusion Screening Values (ISV) for residential and commercial properties (Refs. 8, pp. 69 to 86; 13, pp. 115 to 154; 28, pp. 20, 21, 138 to 165).

Some residential and commercial property owners (including a school) conducted vapor intrusion assessments and installed sub-slab depressurization systems (SSDS). The SSDS has outdoor venting to vent vapors from the sub-slab from under the building to the outdoors (Ref. 40, pp. 1, 2). The mitigation systems are considered temporary actions (Ref. 29, p. 1). Mitigation systems have been installed at the following locations: COM_001, COM_002, COM_003, COM_006, COM_015, COM_018, COM_021, COM_026, COM_027, COM_028, COM_029, UNIT_001, and UNIT_005 (Ref. 29, pp. 1, 2). COM_029 and UNIT_005 are not within the ASC. See Figures 3 and 4 of this HRS documentation record.

5.0 SOIL EXPOSURE AND SUBSURFACE INTRUSION PATHWAY

5.2 SUBSURFACE INTRUSION COMPONENT

Several elements indicate that the site may pose a risk to human health via subsurface intrusion: (1) a subsurface source of vapor-forming chemicals is present beneath and near the building; (2) vapors form and have a route along which to migrate toward the building; (3) the building is susceptible to soil gas entry, which means openings exist for the vapors to enter the building; (4) vapor-forming chemicals comprising the subsurface vapor source are present in the indoor environment; and (5) the building is occupied when these chemicals are present indoors.

As documented in the sections below, there are many possible origins of PCE and TCE contamination identified at the SE Hennepin site. Table 9 of this HRS documentation record, documents that groundwater underlying the SE Hennepin Site is contaminated with PCE and TCE and associated break-down products. Table 11 documents that sub-slab soil gas samples collected from under the buildings at the site also contain these VOCs indicating that the VOCs in groundwater have migrated from the contaminated groundwater to the surface. Further, indoor air samples contain these VOCs providing evidence that VOCs have migrated into the buildings (Ref. 13, pp. 6, 19, 27, 66, 145-148). This detection of VOCs in indoor air samples has led to the installation of vapor mitigation systems in 13 buildings (Ref. 29, pp. 1 to 2). Table 14 documents that there is the potential for VOCs in groundwater to migrate through soil and preferential pathways into buildings at the Hennepin site.

The VOCs detected within the ASC are eligible to be scored in the subsurface intrusion component because these substances meet the criteria for observed release and are eligible to be evaluated because the VOCs detected have vapor pressures of greater than or equal to one torr and Henry's constant greater than or equal to 10^{-5} atm-m^3/mol (Ref. 1, Section 5.2.0).

Possible Origins of the Subsurface Volatile Organic Compound Subsurface Contamination

The origin of TCE and PCE contamination in groundwater is not yet known. As documented in sections below, properties that have been identified as having significant TCE and PCE impacts include the Sears Outlet/former Scott-Atwater Manufacturing property, AmeriPride Services property, and the Anne Gendein Trust property. Based on current or past property uses, the Excel Metal Finishing and Twin City Plating operations may use or have used TCE (Ref. 59, p. 9).

Historic environmental investigations near SE Hennepin ASC A identified possible origins of chlorinated compound contamination including Ann Gendein Trust Properties (VP13270); AmeriPride Services (VP24750); East Hennepin Auto Service (LS2477); Franks Auto Repair (LS17726); Northwest Warehouse (VP13100); Sears/Former Scott-Atwater Manufacturing (LS 7905 and LS 7043), Excel Metal Finishing, and Twin City Plating (Refs. 7, pp. 3, 10, 11; 59, p. 5, 6). Each of these entities are discussed below.

Facilities that currently use or generate waste chlorinated solvents near SE Hennepin ASC A (Ref. 52) include:

- The AmeriPride located at 700 Industrial Boulevard NE (Ref. 51, p. 57); chlorinated organic solvent wastes are generated at this location from degreasing (Ref. 51, p. 86)
- Astleford International Trucks Inc at 3000 Broadway St NE (Ref. 51, pp. 10, 12)
- Federal Express Corp at 2425 Kennedy St NE (Ref. 51, pp. 13, 21)
- Hallmark Building Supplies Inc. at 640 Taft St NE (Ref. 51, pp. 23, 25)
- Kolstad Co Inc at 3001 NE Broadway St (Ref. 51, pp. 27, 41)
- NCR Comten Inc at 2700 Summer St NE (Ref. 51, pp. 44, 46)
- North Star Truck Rental & Leasing at 3000 Broadway St NE (Ref. 51, pp. 47, 55)
- Prospect Foundry LLC at 1225 Winter St NE (Ref. 51, pp. 63, 72)

- The United Parcel Service – Minneapolis located at 3312 Broadway St NE (Ref. 51, pp. 87, 95)

These facilities may have released chlorinated solvents in the past. Although there is no record of any releases from the facilities to the ground, the facilities are near SE Hennepin ASC A and use and dispose of chlorinated solvents. Therefore, these facilities are suspected origins of subsurface chlorinated organic compound contamination (Ref. 51, pp. 10, 12, 13, 21, 23, 25, 27, 41, 44, 46, 47, 55, 57, 63, 72, 87, 89, 95).

Anne Gendein Trust Properties

The Former Anne Gendein Trust property was historically residential until 1961, when the existing commercial building was built. The Anne Gendein Trust Properties include residential housing, warehouse, general storage, and truck trailer storage (Refs. 7, p. 10; 37, pp. 6, 13 to 16, 18, 19, 29, 86 to 93; 59, p. 6). Cedar Towing & Auction operated at the property from approximately 2003 through 2012. Hazardous wastes generated by Cedar Towing & Auction included automotive-related wastes and parts washing solvent. Approximately 20 gallons of waste parts washing solvent (waste codes D001, D006, D039, and D040) was generated annually (Ref. 59, p. 6, 56). In 2006 Cedar Towing & Auction plead guilty and paid a fine for failing to stop, contain, cleanup, and properly manage used oil releases. Photos taken during an August 2006 hazardous waste inspection showed dark staining on the bare ground beneath towed vehicles, an oily sheen on standing water on the property, and stressed vegetation (Ref. 59, p. 6).

In 2001, an environmental investigation was conducted at the Anne Gendein Trust Property at 359 Hoover Street Building which was used as a former truck storage and maintenance area. The investigation included the collection of soil and groundwater samples. The investigation determined that groundwater flows south to southwest. The analytical results from the investigation found TCE in one soil sample at 51 µg/kg, in groundwater probe samples up to 1,800 µg/L, and in monitoring well samples up to 3,600 µg/L (Ref. 38, pp. 3, 8, 9, 16 to 18). The pattern of TCE contamination in groundwater suggest that the 359 Hoover Street Building located on Anne Gendein Trust Properties released TCE to groundwater because the upgradient monitoring well northeast of the building (MW-2) contained only 1 µg/L of TCE and the downgradient monitoring wells on the southern part of the property (MW-4 and MW-3) contained significantly higher TCE concentrations (2,700 and 3,600 µg/L) (Ref. 38, pp. 14, 18, 92, 94, 96). Additionally, the same pattern is seen in the groundwater probe samples indicating that the 359 Hoover Street Building may be a source of TCE (Ref. 7, p. 13; 38, pp. 14, 17). (Note: The TCE concentration provided on Figure 3 of Reference 38 provides the incorrect TCE concentration for MW-3. The correct concentration is provided on the analytical data sheets, page 94 of Reference 38).

AmeriPride Services

Dry cleaning occurred at this location from approximately 1969 until 1995 (Ref. 41, p. 4). Portions of the dry cleaners' property are within the footprint of a former sand and gravel pit that was filled and operated from approximately the 1930s through the 1960s (Ref. 41, p. 5). In 2007, an environmental investigation was completed for the AmeriPride Services located at 700 Industrial Boulevard, NE (Ref. 41, pp. 1, 4; 7, p. 10). Soil samples collected during the environmental investigation did not contain chlorinated organics (Ref. 41, p. 15). Groundwater samples contained TCE up to 6.8 µg/L (Ref. 41, p. 16). Groundwater flows from the east to the west across the property. The upgradient or background well groundwater sample from MW-6 did not contain TCE, however downgradient well samples contained TCE suggesting that the former dry cleaner may have released TCE to the ground (Ref. 41, pp. 16, 20). TCE was known to be used in the dry-cleaning industry (Ref. 57, pp. 9, 302, 311). A 500-gallon AST containing PCE was likely part of the dry-cleaning equipment and was removed from the building interior in 1996 (Ref. 59, p. 55).

Waste sludge was generated by the dry-cleaning process at the AmeriPride Services property. Waste sludge was disposed into the dumpster as regular trash prior to the 1980s, when it was recognized as a hazardous waste. Starting in the early 1980s, PCE-containing sludge waste was shipped and manifested as hazardous waste (F001) (Ref. 59, p. 55).

East Hennepin Auto Service
In 1994, a subsurface investigation was conducted at the East Hennepin Auto Service located at 2100 East Hennepin Avenue (Ref. 34, p. 2). TCE was detected in background wells suggesting an offsite origin of TCE (Ref. 34, pp. 12, 22, 37 to 41). However, historically TCE has been used for vapor degreasing of metal parts, which is associated with the automobile industry (Ref. 57, p. 302).

Franks Auto Repair
An environmental investigation completed in 2009 at Franks Auto Repair, located at 2314 East Hennepin Avenue, identified TCE up to 1,620 µg/L, PCE up to 50.6 µg/L, cis-1,2-dichloroethylene up to 1,000 µg/L and vinyl chloride up to 4.1 µg/L in groundwater samples collected from soil borings. The investigation stated that products were either improperly stored or dumped in the small gravel area on the west side of the property (Ref. 35, pp. 1, 12, 24). In 2012, a site investigation was conducted at Franks Auto Repair to investigate the groundwater contamination because the highest contaminant concentrations were downgradient of the repair shop that may have used solvents to clean parts (Ref. 36, p. 2). Again TCE up to 78.9 µg/L, PCE up to 7.8 µg/L, cis-1,2-DCE up to 54 µg/L and vinyl chloride up to 0.4 µg/L were detected in groundwater samples downgradient of the repair shop (Ref. 36, pp. 7, 8, 13, 14, 18). Historically, TCE use is associated with the automobile industry as a vapor degreaser for metal parts (Ref. 57, p. 302).

Northwest Warehouse
The property was used as a sand and gravel pit from at least 1938 through 1974. The current building was constructed in 1978 and has been used as a warehouse. Historic aerial photographs suggest possible disposal areas prior to development. Analytical results from an investigation conducted in 2000 indicate that TCE was present in the groundwater at 610 µg/L (Refs. 7, p. 3, 10; 42, pp. 2, 17). Previous investigations detected PCE and TCE in soil (Ref. 42, pp. 1, 2, 4). Groundwater flow across the property is from the east to the west (Ref. 42, p. 5). TCE was detected in upgradient and downgradient wells suggesting an on- and off-site origin of TCE (Ref. 42, pp. 2, 5).

Sears/Former Scott-Atwater Manufacturing
Sears/Former Scott-Atwater Manufacturing Company (Scott-Atwater) was located north of Hennepin Avenue on the eastern part of the SE Hennepin site at 2600 and 2700 Winter Street NE. Scott-Atwater manufactured outboard marine motors from 1938 to approximately 1966. Sears conducted parts washing at this location from approximate 1987 to 2012 as part of its auto service center. Historic aerial photographs from the 1930s and 1940s suggest that there may be areas where dumping or disposal occurred to the north and west of the Scott–Atwater facility. Since 1966 a warehouse occupied by Sears has been present at the former Scott-Atwater facility (Refs. 7, pp. 2, 3, 10; 59, pp. 5, 15, 55). Modular Office Solutions and Omni Remanufacturing was a tenant of the Sears building and used disposable solvent wipes, waste codes D001 and F003, from 1994 through 2009; parts washer solvent (D001, F003, F005) from 1992 through 1994; and, paint stripper (F002, F008) from 1990 through 1995. Disposal of the waste solvent wipes, parts washer solvent and paint stripper were handled by waste disposal company (Ref. 59, p. 55).

Excel Metal Finishing
Waste paint sludge at the Excel Metal Finishing property has been transported under waste code F002, although there is no specific reference to TCE or PCE as an ingredient of the waste paint sludge. An undated description of processes at the facility noted a "PCE vapor degreasing step". Also, the facility utilized a solvent distiller on site through 1994 (Ref. 59, p. 56).

Twin City Plating
The Twin City Plating property was historically part of a large gravel pit active until the late 1950s or early 1960s. While it appears the ground surface was disturbed, it does not appear that the property was actually mined for gravel. In 1967 the existing commercial building was constructed, and it has been occupied by Twin City Plating or Twin City Chromium Plating Company since then. TCE was used on

the property as a degreasing solvent through 1997. Used TCE was distilled on the property to recover the product, which generated TCE waste sludge. Waste TCE solution was batch-discharged to the sanitary sewer in the past. A 1987 industrial wastewater discharge permit application noted batch discharges of 50 gallons of TCE (solution), five to six times per year. The TCE was pretreated via distillation prior to discharge to remove much of the TCE content from the solution. It is not known how early TCE discharges to the sewer began (Ref. 59, p. 6, 7).

Subsurface Migration Route

There are two vapor intrusion transport mechanisms: vapor intrusion from volatile organics in the unsaturated zone (vadose zone) and vapor intrusion of VOCs in shallow groundwater. Intrusion from the unsaturated zone occurs because of a concentration gradient between the soil source and the surrounding area. Because significant levels of TCE have not been identified in the unsaturated soil, this mechanism does not have significant potential to affect vapor intrusion. However, diffusion of VOC vapors in shallow groundwater occurs because of a concentration gradient between the groundwater source and the surrounding area (Ref. 50, p. 1; 58, pp. 2, 3, 9, 11 to 14). Because dissolved TCE concentrations in the shallow Quaternary aquifer (groundwater) have been identified as documented below, this mechanism has potential to affect vapor intrusion.

The most recent investigation conducted at the SE Hennepin site was from April 23, 2018 through May 24, 2018 which included the collection and analysis of groundwater samples. The groundwater samples document a release of PCE and TCE into the Quaternary aquifer with the highest concentrations at the interface of the aquifer and Decorah Shale and Platteville and Glenwood limestone formations (Ref. 13, pp. 11, 14 to 18, 51 to 54; 56; see Table 9 of this HRS documentation record). Subsurface vapors from the chlorinated VOCs in the aquifer have emanated from the contaminated groundwater and entered the pore space around and between the subsurface sand and gravel column above the groundwater table as documented by the sub-slab soil gas concentrations in Table 11 of this HRS documentation record. From there, the hazardous vapors in the vadose zone (the unsaturated space between the surface and the groundwater table) have the potential to enter structures by migrating through cracks, seams, interstices, and gaps in walls or foundations (Ref. 50, p. 1; 58, p. 1; 60, pp. 26, 27, 28; Tables 14, 17). Most of the commercial structures within ASC A are slab on grade construction. Most of the residential structures contain full basements (Ref. 13, pp. 28; 28, pp. 27, 28, 29, 30; 39, p. 2).

The geology and hydrogeology underlying Hennepin site affect the vertical migration of PCE and TCE, and degradation products, from the surface to groundwater and the vapor migration of PCE and TCE and degradation products to the surface and buildings. The geology and hydrogeology are discussed in the sections below.

Geology

Before 1957, a portion of the SE Hennepin ASC A in the northeast was a large gravel pit (Refs. 7, p. 11; 37, p. 99; see Figure 1 of this HRS documentation record). (In 1967 the gravel pit does not appear on topographic maps [Ref. 37, p. 100]). This part of ASC A is likely to be fill, formerly sand and gravel. The origin of the sand and gravel in the pit is the Des Moines Lobe glacial outwash deposits consisting of sand, loamy sand and gravel located in the northeast portion of the SE Hennepin site (Refs. 28, p. 11; 49; 55). The southwest portion of the SE Hennepin site lies on the upper terrace deposits consisting of sand, gravely sand and loamy sand (Ref. 28, p. 11; 55). The deposits range from 30 feet bgs on the southern portion of the SE Hennepin site to 90 feet bgs in the northern portion of the site (Ref. 28, pp. 52 to 58). The deposits comprise the Quaternary shallow water table and the Quaternary Aquifer (Ref. 28, pp. 11, 12). Site specific soil borings show that beneath the topsoil the lithology of the unsaturated vadose zone is comprised of sand with silt and gravel with pockets of clay and sandy silt (Refs. 28, pp. 52 to 58; 49). The surface geology of ASC A includes outwash and upper terrace deposits of the Des Moines Lobe (Ref. 55).

Underlying the deposits is Paleozoic bedrock (Ref. 47, p. 14; 48). The uppermost bedrock in the northeast and southeast part of the SE Hennepin site is Decorah Shale composed chiefly of the fine clastic component, with subordinate interbeds of carbonate rock. Decorah Shale is over 90 feet thick in the Minneapolis area, and thins to less than 30 feet at the Iowa border. Most of the Decorah Shale is shale, with a vertical permeability that ranges from 10^{-5} to 10^{-4} millidarcies (md) (Refs. 47, p. 92; 48). The carbonate interbeds in the Decorah Shale have low matrix permeabilities. Decorah Shale serves as an effective confining bed. Perched water-table aquifers are common above the Decorah Shale (Ref. 47, p. 92, 94). The Decorah Shale occurs in the north and south half of ASC A (Ref. 48).

To the southwest, the Platteville and Glenwood Formations are uppermost bedrock units at the SE Hennepin site (Refs. 48; 56). The Platteville Formation consists of fine-grained limestone containing shale partings near the top and the base (Ref. 13, p. 10). The Platteville Formation is composed chiefly of the carbonate rock component. Thin shale laminae are common, including regionally traceable bentonites. Plug tests of the carbonate rock indicate a very low to low permeability ranging from 10^{-7} to 10^{-4} md. In shallow bedrock conditions the Platteville Formation contains discrete intervals with relatively well-developed secondary porosity, separated by intervals with much lower porosity. The Platteville Formation contains bedding plane and vertical fractures typical of stress-relief conditions, and it also has vertical, flat fractures that are part of a large-scale, orthogonal system. Individual fractures commonly cut across the entire formation vertically and are open as much as a few inches. Dissolution-enlarged fractures and cavities lead to the development of sinkholes. At locations where the Platteville Formation is the uppermost bedrock, an extensive epikarst system is commonly developed (Ref. 47, p. 89). The Platteville Formation covers the northern halve of the area of subsurface contamination (Ref. 56).

The Glenwood formation is a thin sandy shale unit (Ref. 48). The Glenwood Formation is composed chiefly of the fine clastic component, mostly shale and siltstone with vertical permeability of 10^{-5} to 10^{-4} md. Open fractures are common in the Glenwood Formation in shallow bedrock conditions, and some fractures extend vertically across the entire formation (Ref. 47, p. 89).

Hennepin County is underlain in descending stratigraphic order by all or some of the following units: the Des Moines Lobe glacial outwash, Platteville Formation, Glenwood Formation, St. Peter Sandstone, Prairie Du Chien Group, Jordan Sandstone, St. Lawrence Formation, Franconia Formation, Ironton and Galesville Sandstones, Eau Clair Formation, and Mt. Simon Sandstone (Refs. 12; 48; 49).

Hydrogeologic Units

The hydrogeologic units at the SE Hennepin site in descending order include the Quaternary Aquifer in the glacial outwash and terrace deposits including Quaternary shallow water table aquifer (the portion of the Quaternary Aquifer that is not saturated), St. Peter Aquifer, and Prairie du Chien-Jordan Aquifer (Refs. 28, p. 11; 48; 49). Observed depth to groundwater in the Quaternary shallow water table is 40.3 ft below ground surface (bgs) in the northeast part of the SE Hennepin site, and 14.5 ft bgs in the southwest part of the SE Hennepin site. Groundwater flow in the Quaternary Aquifer flows to the south and southwest, generally toward the Mississippi River, located 1.5 miles to the southwest of the SE Hennepin site (Ref. 28, pp. 11). The Decorah Shale, where it is present in the northeast and southeast part the SE Hennepin site is a confining layer. Glenwood and Platteville formations, where they are present in the remaining portions of the SE Hennepin site are confining layers (Refs. 48; 49). Groundwater flow in the Prairie du Chien-Jordan Aquifer is to the southwest, towards the Mississippi River (Ref. 12). The rock units and aquifers underlying the SE Hennepin site are summarized in Table 1A.

TABLE 1A: Hydrogeologic Units--Rock Units and Aquifer Systems		
Rock Unit	**Aquifer System**	**References**
Quaternary Drift (Des Moines Lobe glacial outwash)	Unconsolidated	28, pp. 11, 12; 49; 55
Decorah Shale Platteville-Glenwood Glenwood Formation	Confining Layer	12; 48
St. Peter Sandstone	St. Peter Aquifer with and underlying confining layer	12; 48
Shakopee Formation	Prairie du Chien-Jordan	12; 48
Oneota Dolomite		
Jordan Sandstone		
St Lawrence Formation	Confining Layer	12
Franconia Formation	Franconia-Ironton-Galesville	12
Ironton and Galesville Sandstones		12
Eau Claire Formation	Confining Unit	12
Mt. Simon and Hinckley Sandstones	Mt. Simon Hickley	12
Precambrian	Unknown	12

Shallow Groundwater

Shallow groundwater underlying the SE Hennepin site is present in the Quaternary Aquifer composed of glacial outwash and terrace deposits comprised of sand with silt and gravel with pockets of clay and sandy silt and within fill material used to fill a former gravel pit formerly located within the SE Hennepin site (Refs. 7, p. 13; 13, pp. 51 to 54; 28, pp. 52 to 58; 37, p. 99; 49; see Figure 1 of this HRS documentation record). Observed depth to groundwater is 40.3 ft below ground surface (bgs) in the northeast part of the SE Hennepin site, and 14.5 ft bgs in the southwest part of the SE Hennepin site (Ref. 13, pp. 10, 51 to 54, 95 to 98; 28, pp. 11, 52 to 58, 103 to 108). Groundwater flow in the Quaternary Aquifer flows to the south and southwest, generally toward the Mississippi River (Ref. 28, p. 11). The hydraulic conductivity is estimated at 10^{-4} centimeters per second (Ref. 1, Table 3-6). The vertical hydraulic gradient was calculated at the nested monitoring wells within the Quaternary aquifer at the site. The vertical hydraulic gradients ranged from -0.31 to 0.020. The well nest MW-3S/MW-3D located on the property of the warehouse/former foundry/outboard motor manufacturer, southwest of Spring Street NE and Godward Street NE, had a downward vertical hydraulic gradient of 0.31. The well nest 306GS/306GD, located at 23rd Ave SE and Hennepin Ave E, had an upward vertical hydraulic gradient of 0.20 (Ref. 28, pp. 16, 167).

PCE and TCE are heavier than water and have consequently collected at the interface of bedrock and permeable deposits of the Quaternary Aquifer creating a source of vapor intrusive compounds within 14.5 to 40.3 ft bgs as evidenced by the detection of PCE and TCE at the interface (Ref. 13, pp. 51 to 54; 24, p. 1; 27, pp. 9, 255, 263, 279; 28, pp. 52 to 58). Bedrock acts as a confining layer preventing the downward migration of PCE and TCE as well as groundwater (Ref. 33, p. 22; 47, pp. 89, 94). PCE and TCE have a higher density than water, relatively low water solubility, remain in groundwater for a long time, and are mobile in soil (Ref. 24, p. 1; 27, p. 255). The hydraulic conductivity of the glacial outwash and terrace deposits is estimated at 10^{-4} centimeters per second (Ref. 1, Table 3-6). The high hydraulic conductivity of the glacial outwash and terrace deposits provides rapid migration of the chlorinated compounds through the Quaternary Aquifer collecting on top of the underlying confining unit, shale bedrock as depicted in cross-sections (Ref. 13, pp. 51 to 54). The PCE and TCE confined to the shallow aquifer is an underground source of vapor-forming contamination (Ref. 24, p. 1; 27, pp. 9, 255, 263, 279). These vapor-forming chlorinated compounds collected on bedrock and diffuse to overlying deposits and to the surface. This is evidenced by the vapor-forming chlorinated organics detected in the upper reaches of the Quaternary Aquifer and in sub-slab soil gas samples (Ref. 13, pp. 51 to 54; 28, pp. 52 to 58; See Table 11 of this HRS documentation record). The high permeability of the Quaternary aquifer provides a good medium for vapor migration. Water passing over and around the PCE and TCE at the bedrock interface solubilizes the PCE and TCE and can spread PCE and TCE throughout the aquifer and to the surface.

MPCA conducted an SI and ESI to investigate the extent and magnitude of the TCE contamination in the Quaternary aquifer, and to identify possible origins of contamination (Ref. 8, p. 5; 13, p. 11). During the SI and ESI, MPCA collected groundwater samples from temporary and permanent monitoring wells installed in the Quaternary aquifer, and sub-slab soil gas samples from residential and regularly occupied commercial properties (Ref. 8, pp. 5, 6, 28 through 46; 13, pp. 5, 11, 12, 37, 55 through 64). Analytical results showed chlorinated VOC contamination in the Quaternary aquifer and sub-slab soil gas samples at concentrations significantly above background levels (see Tables 9 and 11 of this HRS documentation record). The highest concentrations detected in groundwater above background include: PCE up to 102 µg/L, cis-1,2-DCE up to 1,390 µg/L, trans-1,2-DCE up to 44.9 µg/L, TCE up to 2,020 µg/L and vinyl chloride up to 25.3 µg/L (See Table 9 of this HRS documentation record). The highest concentrations detected in sub-slab soil gas above background include: PCE up to 1,180,000 $\mu g/m^3$, cis-1,2-DCE up to 113,000 $\mu g/m^3$, trans-1,2-DCE up to 31,700 $\mu g/m^3$ and TCE up to 8,240,000 $\mu g/m^3$ (see Table 13 of this HRS documentation record).

5.2.0 GENERAL CONSIDERATIONS

Groundwater and sub-slab soil gas samples collected within ASC A contained concentrations of PCE, TCE, cis 1,2 DCE, trans-1,2-DCE, and vinyl chloride (no vinyl chloride in gas samples) above background levels. The sub-slab soil gas samples were collected at locations within the SE Hennepin site's TCE groundwater contamination which has been delineated by site investigations (Ref. 13, p. 50). The hazardous substances in the site groundwater contamination have released to the surface as documented by the presence of these same hazardous substances in sub-slab soil gas collected within the footprint of the groundwater contamination. The presence of these hazardous substances in soil gas underlying occupied structures indicate potential for migration of hazardous substances into indoor air via subsurface intrusion. To assign containment factors for occupied structures that overlie ASC A, the following were evaluated: preferential pathways for subsurface intrusion including cracks in foundations and walls near foundations, unsealed utility lines, sumps, earthen or incompetent floors, and crawl spaces; and need for vapor mitigation systems. MPCA installed SSDS in two of the occupied residential structures assessed (Refs. 1, Section 5.2.1.1.2.1; 13, p. 19; 28, pp. 20, 21, 27, 28, 29, 30; 29, pp. 1, 2) (see Ref. 1, Section 5.2.1.1.2.1). Although samples collected of indoor air have detected PCE concentrations up to 42.4 $\mu g/m^3$ and TCE concentrations up to 92.7 $\mu g/m^3$, an area of observed exposure was not documented because background samples of the same type required to document background levels were not collected (Refs. 1, Sections 2.3 and 5.2.1.1.1; 13, pp. 19, 20, 145 to 148; 30, p. 23; 33, pp. 1-3, 6, 10).

There is one area of subsurface contamination (an area with structures above subsurface contamination) as presented in Tables 8 to 11 of this HRS documentation record.

ASC A consists of regularly occupied residential and commercial structures (see Figures 3 and 4 of this HRS documentation record).

As documented in the section Subsurface Migration Route, there is evidence that hazardous substances could migrate into commercial and residential regularly occupied structures from the subsurface. According to the HRS, the subsurface intrusion component of the soil exposure and subsurface intrusion pathway evaluation is based on areas of observed exposure and areas of subsurface contamination (Ref. 1, Section 5.2.0). The delineation of ASC A is based on analytical results from groundwater and sub-slab soil gas samples collected during investigations that MPCA conducted in 2017 and 2018. Analytical results for hazardous substances (VOCs) in the groundwater and sub-slab soil gas samples are present at concentrations greater than three times the designated background levels as documented in Tables 9 and 11, and at concentrations exceeding the corresponding contract-required quantitation limits (CRQL) or reporting limits (RL), which are equivalent to sample quantitation limits (SQL). CRQLs and SQLs are defined in HRS Section 1.1, Definitions (Refs. 1, Section 1.1; 19, p. 2). The structures are shown on Figure 3 of this HRS documentation record. VOCs detected in groundwater and sub-slab soil gas are summarized in Tables 9 and 11. As documented in Tables 14 and 17, the structures have structure containment values greater than zero and are in an ASC as shown Figure 3. Subunits have not been identified in structures and are not being scored and only those regularly occupied units on the lowest level within the ASC were evaluated (Ref. 1, Section 5.2.0, last bullet under Area of Subsurface Contamination). As presented above, the ASC is documented by groundwater and sub-slab soil gas samples. Most of the commercial structures have slab on grade construction. Some have partial basements for utility rooms. (Ref. 13, pp. 28; 28, pp. 27, 28; 39, p. 2). Sampling in commercial structures was conducted in areas near workplaces in the slab on grade portions of the structures. If basements were present, a representative number of sub-slab samples were collected beneath the structure slab. Most of the residential structures have basements. The basements are regularly occupied and used as bedrooms, laundry rooms, utilities, closets, and extra storage (Ref. 39, p. 2).

Table 2 below documents the presence of basements in regularly occupied structures within ASC A. The notes in Table 2 provide reference to field documentation taken during sample collection. The references show the structure plans providing information on the presence or absence of a basement. In some cases, photographs are cited in the notes to document that the commercial work areas are on slab when the building survey does not clearly identify the absence of a basement. The lowest occupied level was considered for purposes of HRS scorings.

TABLE 2: List of Regularly Occupied Structures Within ASC A

Type of Structure	Number(s) of Specific Type of Structure	Regularly Occupied Structure ID	Notes
Commercial	1 - slab on grade	COM_001	See Figure 3 of this HRS documentation record. Refs. 15, pp. 2, 4, 7, 12, 20; 28, p. 27
Commercial	1 - slab on grade	COM_002	See Figure 3 of this HRS documentation record. Refs. 15, pp. 35, 36, 38, 43; 28, p. 27
Commercial	1 - slab on grade	COM_003	See Figure 3 of this HRS documentation record. Ref. 28, p. 27
Commercial	1 - slab on grade	COM_004	See Figure 3 of this HRS documentation record. Refs. 15, pp. 49, 51, 52, 54, 55, 63; 28, p. 27
Commercial	1 - slab on grade	COM_005	See Figure 3 of this HRS documentation record. Refs. 15, pp. 92, 93, 95, 99; 28, p. 27
Commercial	1 - slab on grade	COM_006	See Figure 3 of this HRS documentation record. Refs. 15, pp. 121, 122, 125, 126, 131; 28, p. 27
Commercial	1 - slab on grade	COM_007	See Figure 3 of this HRS documentation record. Refs. 15,

TABLE 2: List of Regularly Occupied Structures Within ASC A			
Type of Structure	**Number(s) of Specific Type of Structure**	**Regularly Occupied Structure ID**	**Notes**
			pp. 147, 149, 151, 152, 171; 28, p. 27
Commercial	1 - slab on grade	COM_008	See Figure 3 of this HRS documentation record. Refs. 15, pp. 179, 181, 186, 188; 28, p. 27
Commercial	1 - slab on grade, partial basement	COM_009	See Figure 3 of this HRS documentation record. Ref. 15, pp. 191, 193, 195, 196, 197, 215 to 223 (pictures show work area on slab); 28, p. 28
Commercial	1 - slab on grade	COM_010	See Figure 3 of this HRS documentation record. Refs. 15, p. 224, 226, 229, 230, 235; 28, p. 28
Commercial	1– partial basement used for utilities, containers, sump, and old boiler	COM_011	See Figure 3 of this HRS documentation record. Refs. 15, pp. 250, 251, 256, 257, 262; 28, p. 28; 61, p. 1
Commercial	1 - slab on grade	COM_012	See Figure 3 of this HRS documentation record. Refs. 15, pp. 270, 271, 272, 292, 295; 28, p. 28
Commercial	1 - partial basement used for utilities, containers, sump, and old boiler	COM_013	See Figure 3 of this HRS documentation record. Refs. 15, pp. 304, 306, 313; 28, p. 28; 61, p. 1
Commercial	1 - slab on grade	COM_014	See Figure 3 of this HRS documentation record. Refs. 15, pp. 344, 345, 346; 28, p. 28;
Commercial	1 - slab on grade	COM_015	See Figure 3 of this HRS documentation record. Ref. 28, p. 28
Commercial	1 - slab on grade	COM_016	See Figure 3 of this HRS documentation record. Refs. 15, pp. 390, 392, 397, 398; 28, p. 28
Commercial	1 - slab on grade	COM_017	See Figure 3 of this HRS documentation record. Refs. 15, pp. 459, 460, 462, 463; 28, p. 28
Commercial	1 – partial basement	COM_018	See Figure 3 of this HRS documentation record. Refs. 15, pp. 504, 505, 506, 530 to 537; 28, p. 28; 61, p. 2
Commercial	1 - slab on grade	COM_019	See Figure 3 of this HRS documentation record. Refs. 15, pp. 538, 539, 540; 28, p. 28;
Commercial	1 –slab on grade occupied full time	COM_020	See Figure 3 of this HRS documentation record. Ref. 15, pp. 565, 566, 567
Commercial	1 – basement occupied full time	COM_021	See Figure 3 of this HRS documentation record. Refs. 15, pp. 588, 589, 595; 28, p. 28

TABLE 2: List of Regularly Occupied Structures Within ASC A			
Type of Structure	**Number(s) of Specific Type of Structure**	**Regularly Occupied Structure ID**	**Notes**
Commercial	1 – basement, occupied full time	COM_022	See Figure 3 of this HRS documentation record. Refs. 15, pp. 613, 614, 617; 28, p. 28
Commercial	1 – mostly slab on grade, partial basement	COM_023	See Figure 3 of this HRS documentation record. Refs. 15, pp. 634, 635, 646, 652, 653, 655 to 658 (pictures show work areas are on slab); 28, p. 28
Commercial	1 - slab on grade	COM_025	See Figure 3 of this HRS documentation record. Refs. 15, pp. 730, 731, 732; 28, p. 28
Commercial	1 - slab on grade	COM_026	See Figure 3 of this HRS documentation record. Refs. 15, pp. 752, 754, 755; 28, p. 28
Commercial	1 - slab on grade	COM_027	See Figure 3 of this HRS documentation record. Refs. 15, pp. 799, 801, 804, 867, 873, 886; 28, p. 28
Commercial	1 - slab on grade	COM_028	See Figure 3 of this HRS documentation record. Refs. 15, pp. 908, 910, 913, 924; 28, p. 28
School	1 - Full Basement (parking garage)	UNIT_001	See Figure 3 of this HRS documentation record. Ref. 28, p. 29; 61, p. 1
Residential	1 - Basement	UNIT_002	See Figure 3 of this HRS documentation record. Ref. 28, p. 29
Residential	1 - Basement	UNIT_006	See Figure 3 of this HRS documentation record. Ref. 28, p. 29
Residential	1 - Slab on grade	UNIT_007	See Figure 3 of this HRS documentation record. Ref. 28, p. 29
Residential	1 - Basement	UNIT_008	See Figure 3 of this HRS documentation record. Refs. 15, p. 992, 994; 28, p. 29
Residential	1 - Basement	UNIT_010	See Figure 3 of this HRS documentation record. Refs. 15, p. 1041, 1043; 28, p. 29
Residential	1 - Basement	UNIT_011	See Figure 3 of this HRS documentation record. Ref. 28, p. 29
Residential	1 - Basement	UNIT_012	See Figure 3 of this HRS documentation record. Refs. 15, p. 1058, 1062, 1062; 28, p. 29
Residential	1 - Basement	UNIT_013	See Figure 3 of this HRS documentation record. Refs. 15, p. 1080, 1082, 1083; 28, p. 29
Residential	1 - Basement	UNIT_014	See Figure 3 of this HRS documentation record. Ref. 28, p. 29

TABLE 2: List of Regularly Occupied Structures Within ASC A			
Type of Structure	**Number(s) of Specific Type of Structure**	**Regularly Occupied Structure ID**	**Notes**
Residential	1 - Basement	UNIT_015	See Figure 3 of this HRS documentation record. Refs. 15, p. 1103, 1105, 1106; 28, p. 29
Residential	1 - Basement	UNIT_020	See Figure 3 of this HRS documentation record. Refs. 15, p. 1120, 1121, 1122; 28, p. 29
Residential	1 – Slab on grade	UNIT_028	See Figure 3 of this HRS documentation record. Refs. 15, p. 1256, 1277, 1298, 1299, 1313, 1317, 1318, 1319;
Residential	1 - Basement	UNIT_030	See Figure 3 of this HRS documentation record. Ref. 15, pp. 1339, 1343, 1344, 1366, 1367, 1375 (pictures show basement regularly used)
Residential	1 - Basement	UNIT_031	See Figure 3 of this HRS documentation record. Refs. 15, p. 1378, 1382, 1383, 1403; 28, p. 30
Residential	1 - Basement	UNIT_032	See Figure 3 of this HRS documentation record. Refs. 15, p. 1408, 1412, 1413; 28, p. 30
Residential	1 - Basement	UNIT_033	See Figure 3 of this HRS documentation record. Refs. 15, p. 1426, 1430, 1431; 28, p. 30
Residential	1 - Basement	UNIT_035	See Figure 3 of this HRS documentation record. Refs. 15, p. 1469, 1473, 1474; 28, p. 30
Residential	62 - Basement	ROS 1 through ROS 62	See Figure 3 of this HRS documentation record. Basements assumed to be regularly occupied.

Area of Subsurface Contamination (ASC)

Letter by which this area is to be identified: A

Name of ASC: ASC A

Location and Delineation of ASC (with reference to a map of the site):

The ASC at the SE Hennepin site covers about 94 acres in southeast Hennepin County, Minnesota. ASC A is currently defined as the area that underlies regularly occupied structures bounded north by Broadway Street NE, east by 33rd Avenue SE, south by Talmage Avenue SE, and west by 22nd Avenue SE and Harding Street NE (see Figures 1 through 4; Ref. 28, p. 38). The approximate boundary of ASC A is delineated according to results from: (1) groundwater samples collected from temporary and permanent monitoring wells installed in the Quaternary aquifer, and (2) sub-slab soil gas samples collected at commercial and residential regularly occupied structures, and found to contain chlorinated VOCs at concentrations exceeding background levels (see Tables 8 through 11 of this HRS documentation record). Chlorinated VOCs detected at ASC A include cis-1,2-DCE, trans-1,2-DCE, PCE, TCE and vinyl chloride (see Tables 9 and 11 of this HRS documentation record). The volatile chlorinated compounds meet the criteria for observed release in soil gas and groundwater samples and have a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-3} atm-m^3/mol and therefore meet the volatility requirements of subsurface intrusion component (Refs. 1, Section 5.2; 2, pp. 1 to 5; see Tables 9 and 11 of this HRS documentation record).

Observed Release by Chemical Analysis

ASC A is characterized by groundwater and sub-slab soil gas samples that meet observed release criteria. For this HRS documentation record, wells and properties from which sampling results were collected were used to identify a boundary of the ASC and include: sub-slab (SS) sample SS-03 (at COM_019); groundwater sample SP-29; groundwater sample SP-38S; groundwater sample SP-36S and SP-36D (collected from the same location, shallow and deep well nest); groundwater sample SP-32D; groundwater sample SP-33D; groundwater sample SP-34S; groundwater sample 305GS; and SS-01 (at COM_018) as shown in Figure 3 and documented in Tables 9 and 11 of this HRS documentation record.

Both shallow "S" and deep "D" groundwater samples were collected from the adjacent or nested wells [Ref. 13, pp. 12, 16, 17]). Residential and commercial properties not sampled but within ASC A were inferred to be within the ASC (see Figures 3 and 4 of this HRS documentation record).

2017 and 2018 Background Groundwater Samples

To document groundwater levels significantly above background levels, groundwater samples were collected that established background concentrations for the Quaternary aquifer. During the 2017 SI and 2018 ESI, MPCA collected groundwater samples from temporary and permanent monitoring wells listed in Tables 3 and 7 (Refs. 8, pp. 5, 62, 63; 13, pp. 10, 11, 95 through 98) (also see Figure 4 of this HRS documentation record). The background and release well depths and sampled intervals are provided in Tables 3 and 7 which document that background and release wells were collected from similar depths.

Background and release groundwater samples were collected in accordance with the approved SI work plan dated November 2016, the approved ESI work plan dated March 2018, and the MPCA Site Assessment (SA) Program quality assurance project plan (QAPP) dated September 2014 (Refs. 8, pp. 1, 5, 6; 9, pp. 1, 2, 5; 10, pp. 2, 8, 13; 13, pp. 2, 6, 11, 12; 14, pp. 1, 2, 5). The background and release temporary and permanent monitoring well samples were collected from wells of similar types, depths, and screened intervals, selected to establish releases within the Quaternary aquifer by year and sampled depths. Background wells are either upgradient or cross-gradient of the release wells (Refs. 8, pp. 30, 31, 62, 63; 13, pp. 37, 95) (also see Figure 4 of this HRS documentation record). Groundwater flows in the

Quaternary Aquifer to the south and southwest, generally towards the Mississippi River (Ref. 8, p. 5). The background wells BW-HSA-01, BW-HSA-02, and BW-HSA-07 are north of ASC A and the background well 302 is west of ASC A (see Figure 4 of this HRS documentation record). The background and release samples were collected during the same time period, by application of similar sampling techniques, from the same depth of the Quaternary Aquifer and were analyzed via similar methods (Refs. 8, pp. 62, 63; 9, pp. 12, 13, 14; 10, pp. 13, 73 through 90; 13, pp. 11, 14, 15, 16, 17, 95 through 98; 14, pp. 11 through 14) (also see Tables 3 and 7 of this HRS documentation record). Groundwater samples were analyzed for Volatile Organic Analysis (VOAs) using the U.S. EPA Contract Laboratory Program (CLP). Natural water geochemical parameters were monitored in the field using a flow-cell to verify samples were representative of aquifer conditions. These parameters included pH, oxidation-reduction potential, specific conductance, dissolved oxygen, and temperature. All groundwater samples were also analyzed by a Minnesota State Contract Laboratory (Refs. 8, p. 6; 9, p. 14).

Table 3 provides the background well depths and sampled interval elevations. Table 4 summarizes the background well sample locations and sampled interval elevations. The sample locations are shown on Figure 4 of this HRS documentation record. Table 5 summarizes the concentrations of hazardous substances detected in the background wells. Chain-of-custody forms, which provide the well numbers, sample identification numbers (ID), and the date and time of sampling, are provided in References 8 and 13; specific pages are included in Table 5.

TABLE 3: Background Well Depths and Sample Interval				
Location ID (Sample Depth feet bgs)	**Inner Well Casing Elevation (feet amsl)**	**Completed Well Depth Elevation (feet amsl)**	**Sampled Interval Elevation (feet amsl)**	**References**
Temporary Monitoring Wells				
HSA-01 (43-48)	894.64	820.64	851.65-846.64	8, pp. 62, 116, 117, 299, 347;13, p. 95; 53, p. 4
HSA-01 (57-62)	894.64	820.64	837.64-832.64	8, pp. 62, 116, 117, 299, 347;13, p. 95; 53, p. 4
HSA-01 (68-73)	894.64	820.64	826.64-821.64	8, pp. 62, 116, 117, 299; 13, p. 95; 53, p. 4
HSA-02 (47-52)	899.70	803.70	852.7-847.7	8, pp. 62, 118, 119, 120, 351, 390; 13, p. 95; 53, p. 4
HSA-02 (61-66)	899.70	803.70	838.7-833.7	8, pp. 62, 118, 119, 120, 351, 390; 13, p. 95; 53, p. 4
HSA-07 (29-34)	912.99	813.99	883.99-878.99	13, pp. 95, 176, 177, 178; 53, p. 4
HSA-07 (57-62)	912.99	813.99	855.99-850.99	13, pp. 95, 176, 177, 178; 53, p. 4
Permanent Monitoring Wells				
302-GS (12.5-22.5)	861.9	839.4	849.40-839.40	8, p. 63, 269; 13, p. 97; 45, pp. 47, 50, 157, 158; 53, p. 4

Notes:

amsl Above mean sea level
bgs Below ground surface
Elevations are given in National Geodeic Vertical Datum 29 (NGVD) (Ref. 45, p. 49).
Per Standard Operating Procedures, the depth to groundwater or sample depth is measured from the top of the inner casing and the elevation recorded on logs is from the surveyed elevation (Ref. 10, p. 78).

TABLE 4: Background Groundwater Samples				
Sample ID (feet bgs)/ Laboratory ID/ Location ID	**Sample Location**	**Sampled Interval Elevations[1] (feet amsl)**	**Date Collected**	**References**
Temporary Monitoring Wells				
BW-HSA-01 (43-48)/ 10386487005/ HSA-01	HSA-01, ROW of Hoover Street NE, northwest of ASC A	851.65-846.64	04/26/2017	8, pp. 62, 299, 347; 13, pp. 37, 95; 53, p. 4
BW-HSA-01 (57-62)/ 10386487006/ HSA-01		837.64-832.64	04/26/2017	8, pp. 62, 299, 347; 13, pp. 37, 95; 53, p. 4
BW-HSA-01 (68-73) 10386487007 HSA-01		826.64-821.64	04/26/2017	8, pp. 62, 299, 347; 13, pp. 37. 95; 53, p. 4
BW-HSA-02 (47-52) 10386331005 HSA-02	HSA-02, ROW of Godward Street NE, northern portion of ASC A	852.7-847.7	04/25/2017	8, pp. 62, 351, 390; 13, pp. 37, 95; 53, p. 4
BW-HSA-02 (61-66) 10386331006 HSA-02		838.7-833.7	04/25/2017	8, pp. 62, 351, 390; 13, pp. 37, 95; 53, p. 4
HSA-07S ESZ97 HSA-07	HSA-07, ROW of Industrial Boulevard NE, north of ASC A	883.99-878.99	05/01/2018	13, pp. 37, 95, 2068; 53, p. 4
HSA-07M ESZ98 HSA-07		855.99-850.99	05/01/2018	13, pp. 37, 95, 2068; 53, p. 4
Permanent Monitoring Wells				
BW-302-GS 10387174003 302GS	ROW of Wilson Street NE, west of ASC A	849.4-839.4	05/02/2017	8, pp. 63, 233, 269; 13, pp. 37, 97; 45, pp. 47, 50; 53, p. 4
302-GS ESZB7 302GS		849.4-839.4	05/21/2018	13, pp. 37, 97, 4277; 20, pp. 28, 29; 45, pp. 47, 50; 53, p. 4

Notes:

1	Elevations are given in NGVD 29, feet above mean sea level (Ref. 45, p. 49)
amsl	Above mean sea level
ASC	Area of subsurface contamination
bgs	Below ground surface
BW	Bay West
HSA	Hollow stem auger (temporary well)
ID	Identification number
NE	Northeast
ROW	Right-of-way

2017 and 2018 Background Groundwater Concentrations

The background groundwater samples listed in Table 4 of this HRS documentation record were collected by MPCA during the 2017 SI and 2018 ESI. Background groundwater samples collected during the 2017 SI and the 2018 ESI were analyzed by Pace Analytical Services (Pace) for VOCs via EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) Method 8260B (Ref. 8, p. 305). MPCA conducted a Stage 2A validation of the analytical data packages; the data validation reports are provided in Reference 11; specific page numbers are listed in Table 5. The reporting limits are listed on the analytical data sheets contained in Reference 8. The reporting limits are equivalent to sample quantitation limits (SQL) as defined in Section 1.1, Definitions of the HRS (Refs. 1, Section 1.1; 19, p. 2, 3).

Background groundwater samples collected during the 2018 ESI were analyzed for VOCs under the EPA Contract Laboratory Program (CLP) in accordance with the CLP Statement of Work (SOW) for Organic Superfund Methods, SOM02.4, and were reviewed according to the National Functional Guidelines (NFG) for SOM02.4 (including changes from SOM02.2 to SOM02.3) and the Environmental Services Assistance Team (ESAT) standard operating procedures (SOP) for Organic CLP Data Validation (Ref. 13, pp. 12, 13, 195, 1986, 1987, 4223, 4224). The sample-adjusted, contract-required quantitation limits (CRQLs) are provided in Reference 20; these CRQLs are equivalent to CRQLs as defined in Section 1.1, Definitions of the HRS Rule (Ref. 1, Section 1.1).

TABLE 5: Background Groundwater Concentrations

Sample ID Laboratory ID (Analytical Lab)	Hazardous Substance	Hazardous Substance Concentration (µg/L)	RL/CRQL (µg/L)	References
2017 – Temporary Wells				
BW-HSA-01 (43-48) 10386487005 (PACE)	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	1.0ND 1.0ND 1.0ND 3.5 0.20ND	1.0 1.0 1.0 0.40 0.20	8, pp. 29, 62, 315, 316, 345; 11, p. 26-30
BW-HSA-01 (57-62) 10386487006 (PACE)	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	1.0ND 1.0ND 1.0ND 0.95 0.20ND	1.0 1.0 1.0 0.40 0.20	8, pp. 29, 62, 317, 318, 345; 11, p. 26-30
BW-HSA-01 (68-73) 10386487007 (PACE)	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	1.0ND 1.0ND 1.0ND 0.72 0.20ND	1.0 1.0 1.0 0.40 0.20	8, pp. 29, 62, 319, 320, 345; 11, p. 26-30
BW-HSA-02 (47-52) 10386331005 (PACE)	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	1.0ND 1.0ND **1.9** 35.6 0.20ND	1.0 1.0 1.0 0.40 0.20	8, pp. 29, 62, 364, 365, 388; 11, p. 30-33
BW-HSA-02 (61-66) 10386331006 (PACE)	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	**1.0** 1.0ND 1.0ND **36.5** 0.20ND	1.0 1.0 1.0 0.40 0.20	8, pp. 29, 62, 366, 367, 388; 11, p. 30-33

TABLE 5: Background Groundwater Concentrations				
Sample ID Laboratory ID (Analytical Lab)	**Hazardous Substance**	**Hazardous Substance Concentration (µg/L)**	**RL/CRQL (µg/L)**	**References**
2018 – Temporary Wells				
HSA-07S ESZ97 (CLP)	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	0.50U 0.50U 0.50U 0.50U 0.50U	0.50 0.50 0.50 0.50 0.50	13, pp. 1986 to 1994, 2000, 2001, 2068; 20, p. 97
HSA-07M ESZ98 (CLP)	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	0.50U 0.50U 0.50U 0.36J 0.50U	0.50 0.50 0.50 0.50 0.50	13, pp. 1986 to 1994, 2002, 2003, 2068; 20, p. 98
2017 – Permanent Monitoring Well				
BW-302-GS 10387174003 (PACE)	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	0.50ND 0.50ND 0.50ND 0.40ND 0.20ND	0.50 0.50 0.50 0.40 0.20	8, pp. 32, 63, 244, 245, 267; 11, p. 38 to 41
2018 – Permanent Monitoring Well				
302-GS ESZB7 (CLP)	cis-1,2-DCE trans-1,2-DCE PCE TCE Vinyl chloride	0.50U 0.50U 0.50U 0.50U 0.50U	0.50 0.50 0.50 0.40 0.20	13, pp. 4223 to 4232, 4234, 4235, 4277; 20, pp. 28, 29

Notes:

µg/L Micrograms per liter
( ) The parenthetical value is the result after applying Reference 21, pages 8 and 12.
Bold Highest background concentration
BW Bay West
CRQL Contract required quantitation limit
DCE Dichloroethylene
HSA Hollow stem auger (temporary well)
ID Identification number
J The analyte result is greater than or equal to method detection limit (MDL) and below contract required quantitation limit (CRQL). Detects are qualified as estimated J (Ref. 13, p. 1991).
Lab Laboratory
ND Not Detected at or above adjusted reporting limit (Ref. 8, p. 298)
PCE Tetrachloroethylene
RL Reporting limit. The RLs are equivalent to sample quantitation limits as defined in Section 1.1, Definitions of the HRS (Refs. 1, Section 1.1; 19, pp. 6, 7).
TCE Trichloroethylene
U The analyte was analyzed for but was not detected above the reported sample quantitation limit. (Ref. 13, p. 1994).

The highest background concentration for each hazardous substance from the background samples presented in Table 5 was used to establish background levels and to identify groundwater release samples. Table 6 summarizes the highest concentrations of hazardous substances detected among the possible background wells.

TABLE 6: Highest Background Groundwater Concentrations			
Hazardous Substance	**Concentration (µg/L)**	**Three Times Concentration (µg/L)**	**Sample ID/ Laboratory ID**
2017 Sampling Event			
cis-1,2-DCE	1.0	3.0	BW-HSA-02 (61-66)/ 10386331006
trans-1,2-DCE	1.0ND	NA	BW-HSA-02 (61-66)/ 10386331006
PCE	1.9	5.7	BW-HSA-02 (47-52)/ 10386331005
TCE	36.5	109.5	BW-HSA-02 (61-66)/ 10386331006
Vinyl Chloride	0.20ND	NA	BW-HSA-02 (61-66)/ 10386331006

Notes:
µg/L Micrograms per liter
BW Bay West
DCE Dichloroethylene
HSA Hollow stem auger (temporary well)
ID Identification number
NA Not Applicable
ND Not Detected at or above adjusted reporting limit (Ref. 8, p. 298)
PCE Tetrachloroethylene
TCE Trichloroethylene

2017 and 2018 Release Groundwater Samples

The background and release monitoring well sample depths which document background and release wells were collected from similar depths are provided in Tables 3 and 7. The release monitoring well samples are listed in Table 8 and were collected by MPCA during the 2017 SI and 2018 ESI. The release samples were collected from temporary and permanent monitoring wells that withdraw water from the Quaternary aquifer. Many of the monitoring wells were constructed as nested pairs to measure concentrations of hazardous substances at varied depths within the Quaternary Aquifer (Ref. 28, p. 167). A well identification followed by an "S" indicates the well is completed in the shallow fraction of the aquifer, and a well identification followed by a "D" indicates the well is completed in the deeper fraction of the aquifer. The well logs completed by MPCA include depth measurements from the ground surface (Ref. 28, pp. 174 to 186). Reference 53 converts the measurements from the ground surface to a fixed datum and presents elevations as above mean sea level.

Release groundwater samples were collected in accordance with the approved SI work plan dated November 2016, the approved ESI work plan dated March 2018, and the MPCA SA Program QAPP dated September 2014 (Refs. 8, pp. 1, 6; 9, pp. 1, 2, 5; 10, pp. 2, 8, 13; 13, pp. 2, 6, 11, 12; 14, pp. 1, 2, 5). The background and release samples were collected by application of the same sampling techniques, and were analyzed via similar methods (Refs. 8, pp. 62, 63; 9, pp. 12, 13, 14; 10, pp. 13, 73 through 90; 13, pp. 11, 14, 16, 95 through 98; 14, pp. 11 through 14).

Locations of background groundwater samples are listed in Table 4 and depicted on Figure 4 of this HRS documentation record. Chain-of-custody forms, which provide the well numbers, sample IDs, and the date and time of sampling, are provided in References 8 and 13; specific pages are listed in Table 5. Depths of groundwater samples are conveyed in the 2017 SI and 2018 ESI (Refs. 8, pp. 62, 63; 13, pp. 95, 96, 97, 98).

TABLE 7: Release Well Depth and Sampled Interval				
Monitoring Well ID	**Inner Well Casing Elevation (feet amsl)**	**Completed Well Depth Elevation (feet amsl)**	**Sampled Interval Elevation (feet amsl)**	**References**
SP-20	863.04	824.04	828.04-824.04	8, pp. 94, 95; 13, p. 96; 53, p. 1
SP-21-shallow	871.01	828.01	849.01-844.01	8, pp. 96, 97; 13, p. 96; 53, p. 1
SP-21-deep	871.01	828.01	830.01-826.01	8, pp. 96, 97; 13, p. 96; 53, p. 1
SP-22-shallow	871.69	836.69	847.69-842.69	8, pp. 98, 99; 13, p. 96; 53, p. 1
SP-22-deep	871.69	836.69	839.19-835.19	8, pp. 98, 99; 13, p. 96; 53, p. 1
SP-23-shallow	871.98	828.48	844.98-839.98	8, pp. 100, 101; 13, p. 96; 53, p. 1
SP-23-deep	871.98	828.48	832.48-828.48	8, pp. 100, 101; 13, p. 96; 53, p. 1
SP-26	876.18	838.68	842.18-838.18	8, pp. 106, 107; 13, p. 96; 53, p. 1
SP-29	891.66	833.16	826.66-822.66	8, pp. 112, 113; 13, p. 96; 53, p. 1
SP-32D	858.43	824.43	830.93-826.93	13, p. 180; 13, p. 96; 53, p. 1
SP-33D	859.36	819.36	825.36-821.36	13, p. 181; 13, p. 96; 53, p. 1
SP-34S	859.65	814.65	844.65-839.65	13, p. 182; 13, p. 96; 53, p. 1
SP-35S	860.74	827.74	845.74-840.74	13, pp. 97, 183; 53, p. 1
SP-35D	860.74	827.74	821.74-817.74	13, pp. 97, 183; 53, p. 1
SP-36S	870.02	843.52	852.02-847.02	13, pp. 97, 184; 53, p. 1
SP-36D	870.02	843.52	845.02-840.02	13, pp. 97, 184; 53, p. 1
SP-37S	867.19	820.19	846.19-844.19	13, pp. 97,185, 186; 53, p. 1
SP-37D	867.19	820.19	827.19-822.19	13, pp. 97, 185, 186; 53, p. 1
SP-38S	885.99	846.99	858.99-852.99	13, p. 97, 187; 53, p. 2
MW-1S[1]	870.91	842.91	860.41-850.41	8, p. 63; 13, pp. 97,162; 53, pp. 2
MW-1S[1]	870.91	842.91	852.91-842.91	13, pp. 37, 97, 162
MW-2S	884.69	849.92	858.69-848.69	13, pp. 98, 165; 53, p. 3
MW-3S	881.68	843.49	845.68	13, pp. 98, 170; 53, p. 3
301GS	865.1	807.30	851.10-840.60	45, p. 47; 53, pp. 2, 3
304GS	860.7	809.60	850.20-840.20	45, p. 47; 53, pp. 2, 3
305GS	862.5	807.50	850.00-840.00	45, p. 47; 53, p. 2
306GS	860.2	824.20	849.20-848.20	45, p. 47; 53, p. 2
306GD	860.2	824.20	829.20-824.20	45, p. 47; 53, p. 2
632110	875	845	855-845	28, pp. 53, 107; 53, p. 2; 54, p. 1
632111	875	845	855-845	28, pp. 53, 107; 53, p. 2; 54, p. 2
632112	876	846	857-847	28, pp. 53, 107; 53, p. 2; 54, p. 3
632113	875	845	855-845	28, p. 107; 53, p. 2; 54, p. 4
789130[2]	870	849.5	859.50-849.50	28, p. 106; 53, p. 3; 54, p. 5

Notes

1 MW-1S was sampled in 2017 and 2018 at different samples depths 10.5-20.5 and 18-28 feet bgs, respectively.
2 Elevation estimated from the cross-section C in Reference 13, pages 50, 53
amsl Above mean sea level
D Deep
ID Identification
HSA Hollow steam auger
MW Monitoring well
S Shallow
SP Soil probe (temporary well installed in soil probe boring)
Elevations are given in NGVD 29 (Ref. 45, p. 49)
Per Standard Operating Procedures, the depth to groundwater or sample depth is measured from the top of the inner casing and the elevation recorded on logs is from the surveyed elevation (Ref. 10, p. 78).

TABLE 8: Release Groundwater Samples				
Sample ID/ Laboratory ID	**Sample Location**	**Sampled Depth (feet bgs) / Elevation (feet amsl)[1]**	**Date Collected**	**References**
2017 Temporary Wells				
ESZC0 10385339005	**SP-20**, ROW of SE 26th Ave south of Hennepin Avenue E	35-39/ 828.04-824.04	04/17/2017	8, pp. 31, 63, 604, 671; 13, p. 37; 53, p. 1
ESZC1 10385339007	**SP-21**, parking lot southwest of Com_27 north of Hennepin Avenue E	22-27/ 849.01-844.01	04/18/2017	8, pp. 31, 63, 604, 671; 13, pp. 50, 51; 53, p. 1
ESZC2 10385339009		41-45/ 830.01-826.01	04/18/2017	8, pp. 31, 63, 65, 604, 671; 53, p. 1
ESZC3 10385432002	**SP-22**, parking lot southwest of Com_27 north of Hennepin Avenue E	24-29/ 847.69-842.69	04/18/2017	8, pp. 31, 63, 572, 600; 13, pp. 50, 51; 53, p. 1
ESZC4 10385432003		32.5-36.5/ 839.19-835.19	04/18/2017	8, pp. 31, 63, 65, 572, 600; 53, p. 1
ESZC5 10385584006	**SP-23**, south of intersection of NE Delano Street and NE Winter Street	27-32/ 844.98-839.98	04/19/2017	8, pp. 31, 63, 524, 568; 13, pp. 37, 40; 53, p. 1
ESZC6 10385584007		39.5-43.5/ 832.48-828.48	04/19/2017	8, pp. 31, 63, 524, 568; 53, p. 1
ESZD2 10385768010	**SP-26**, ROW on west end of NE Winter Street	34-38/ 842.18-838.18	04/20/2017	8, pp. 30, 63, 66, 469, 520; 53, p. 1
BW-SP29 (65-69)[1] 10386116010	**SP-29**, ROW of Godward Street NE in northern portion of ASC A	65-69/ 826.66-822.66	04/24/2017	8, pp. 29, 63, 66, 394, 432; 53, p. 1
2018 – Temporary Wells				
SP-32D ET002	**SP-32**, ROW of SE Talmage Avenue at intersection with SE 26th Avenue	27.5-31.5/ 830.93-826.93	04/24/2018	13, pp. 37, 44, 96, 5760; 53, p. 1
SP-33D ET004	**SP-33**, ROW of SE 24th Avenue, south of ASC A	34-38/ 825.36-821.36	04/24/2018	13, pp. 15, 37, 44, 96, 5760; 53, p. 1
SP-34S ET013	**SP-34**, ROW of 23rd Avenue, between SE Talmage Avenue and E Hennepin Avenue	15-20/ 844.65-839.65	04/24/2018	13, pp. 15, 37, 41, 96, 6635; 53, p. 1
SP-35S 10428698002	**SP-35**, lot east of intersection between SE 23rd Avenue and E Hennepin Avenue, southwestern portion of ASC A	15-20/ 845.74-840.74	04/25/2018	13, pp. 14, 15, 37, 41, 97, 7803; 53, p. 1
SP-35D ET016		39-43/ 821.74-817.74	04/25/2018	13, pp. 14, 15, 37, 41, 97, 41,5761,7040; 53, p. 1
SP-36S ET005	**SP-36**, lot at intersection between E Hennepin Avenue and SE 29th Avenue, southeastern portion of ASC A	18-23/ 852.02-847.02	04/23/2018	13, pp. 15, 16, 37, 39, 97, 5759; 53, p. 1
SP-36D ET006		25-30/ 845.02-840.02	04/23/2018	13, pp. 13, 15, 16, 37, 39, 97, 5759; 53, p. 1
SP-37S ET007	**SP-37**, lot northwest of intersection between NE	18-23/ 849.19-844.19	05/16/2018	13, pp. 13, 15, 37, 41, 97, 3640; 53, p. 1

TABLE 8: Release Groundwater Samples				
Sample ID/ Laboratory ID	**Sample Location**	**Sampled Depth (feet bgs) / Elevation (feet amsl)[1]**	**Date Collected**	**References**
SP-37D ET008	Traffic Street and SE 25th Avenue, southwestern portion of ASC A	40-45/ 827.19-822.19	05/16/2018	13, pp. 13, 15, 37, 41, 97, 3640; 53, p. 1
SP-38S ET009	**SP-38**, ROW of Industrial Blvd, north of intersection with E Hennepin Avenue, southeastern portion of ASC A	27-33/ 858.99-852.99	04/25/2018	13, pp. 15, 16, 37, 39, 97, 5761; 53, p. 2
2017 – Permanent Monitoring Wells				
BW-MW1S[2] 10387334002	**MW-1S**, lot at E Hennepin Avenue between SE 23rd Avenue and SE 24th Avenue, southwestern portion of ASC A	10.5-20.5/ 860.41-850.41	05/03/2017	8, pp. 63, 131, 138, 187, 229; 53, p. 2
BW-301GS 10387334006	**301GS**, lot at intersection of NE Traffic Street and SE 25th Avenue, southern portion of ASC A	14-24.5/ 851.10-840.60	05/03/2017	8, pp. 31, 187, 229; 53, p. 2
BW-304GS 10387174004	**304GS**, lot south of intersection between SE 25th Avenue and E Hennepin Avenue, southwestern portion of ASC A	10.5-20.5/ 850.20-840.20	05/02/2017	8, pp. 233, 269; 53, p. 2
BW-305-GS 10387174005	**305GS**, lot north of intersection between NE Harding Street and E Hennepin Avenue, southwestern portion of ASC A	12.5-22.5/ 850.40-840.40	05/02/2017	8, pp. 63, 233, 269; 53, p. 2
BW-306GS 10387334003	**306GS**, lot south of intersection between SE 23rd Avenue and E Hennepin Avenue, southwestern portion of ASC A	11-21/ 849.20-848.20	05/03/2017	8, pp. 63, 187, 229; 53, p. 2
BW-306GD 10387334004	**306GD**, lot south of intersection between SE 23rd Avenue and E Hennepin Avenue, southwestern portion of ASC A	31-36/ 829.20-824.20	05/03/2017	8, pp. 63, 187, 229; 53, p. 2
632110-060817 10391745005	**632110**, lot northeast of intersection between NE Hoover Street and NE Traffic Street, southern portion of ASC A	20-30/ 855-845	06/08/2017	8, pp. 31, 63, 152, 183; 53, p. 2

TABLE 8: Release Groundwater Samples				
Sample ID/ Laboratory ID	**Sample Location**	**Sampled Depth (feet bgs) / Elevation (feet amsl)[1]**	**Date Collected**	**References**
632111-060817 10391745004	**632111**, lot southeast of intersection between NE Hoover Street and NE Delano Street, southern portion of ASC A	20-30/ 855-845	06/08/2017	8, pp. 31, 63, 152, 183; 53, p. 2
2018 – Permanent Monitoring Wells				
301-GS ESZB5	**301GS**, lot at intersection of NE Traffic Street and NE Hoover Street, southern portion of ASC A	14-24.5/ 851.10-840.60	05/22/2018	13, pp. 37, 97, 864; 53, p. 3
304-GS ESZB9	**304GS**, lot south of intersection between SE 25th Avenue and E Hennepin Avenue, southern portion of ASC A	10.5-20.5/ 850.20-840.20	05/22/2018	13, pp. 37, 40, 97, 864; 53, p. 3
MW-2S ESZA2	**MW-2S**, lot west of intersection between Industrial Blvd and NE Winter Street, southeastern portion of ASC A	26-36/ 858.69-848.69	05/24/2018	13, pp. 37, 39, 98, 865; 53, p. 3
MW-3S ESZA4	**MW-3S**, lot at intersection between NE Godward Street and NE Kennedy Street, eastern portion of ASC A	26-36/ 855.49-845.49	05/23/2018	13, pp. 37, 38, 98, 865; 53, p. 3
632110 ESZC4	**632110**, lot south of intersection between NE Winter Street and NE Hoover Street, southern portion of ASC A	20-30/ 855-845	05/23/2018	13, pp. 37, 40, 97, 865; 53, p. 3
632111 ESZC5	**632111**, lot southeast of intersection between NE Hoover Street and NE Delano Street, southern portion of ASC A	20-30/ 855-845	05/23/2018	13, pp. 37, 40, 97, 865; 53, p. 3
632112 ESZC6	**632112**, lot east of intersection between NE Hoover Street and NE Delano Street, southern portion of ASC A	19-29/ 857-847	05/22/2018	13, pp. 37, 40, 97, 864; 53, p. 3
632113 ESZC7	**632113**, lot south of intersection between NE Hoover Street and NE Delano Street, southern portion of ASC A	20-30/ 855-845	05/22/2018	13, pp. 37, 40, 97, 864; 53, p. 3

TABLE 8: Release Groundwater Samples				
Sample ID/ Laboratory ID	**Sample Location**	**Sampled Depth (feet bgs) / Elevation (feet amsl)[1]**	**Date Collected**	**References**
789130 ESZ89	**789130**, lot at E Hennepin Avenue, between SE 23 Avenue and SE 24th Avenue, southwestern portion of ASC A	10.5-20.5/ 859.50-849.50	05/22/2018	13, pp. 37, 41, 97, 864; 53, p. 3

Notes:

1 Elevations are given in NGVD 29, feet above mean sea level (Ref. 45, p. 49).
2 Laboratory inadvertently labeled this sampled as MW-15. The sample is labeled as MS-1S on the chain of custody form.

amsl	Above mean sea level
ASC	Area of subsurface contamination
bgs	Below ground surface
BW	Bay West
D	Deep well
E	East
HSA	Hollow stem auger (temporary well installed in HSA soil boring)
ID	Identification number
NE	Northeast
ROW	Right-of-way
S	Shallow well
SE	Southeast
SP	Soil probe (temporary well installed in soil probe boring)

2017 and 2018 Release Groundwater Concentrations

The release groundwater samples listed in Table 9 of this HRS documentation record were collected by MPCA during the 2017 SI and 2018 ESI. Samples collected during the 2017 SI and during the 2018 ESI were analyzed by Pace for VOCs via EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) Method 8260B (Refs. 8, pp. 11, 155; 13, pp. 12, 13, 7633). MPCA conducted a Stage 2A validation of the analytical data packages; the data validation reports are provided in Reference 11; specific pages are listed in Table 9. The reporting limits are listed on the analytical data sheets contained in Reference 8. The reporting limits are equivalent to SQLs as defined in Section 1.1, Definitions, of the HRS (Refs. 1, Section 1.1; 19, pp. 6, 7).

Selected release samples collected during the MPCA 2018 ESI were analyzed for VOCs under the EPA CLP in accordance with the CLP SOW for Organic Superfund Methods, SOM02.4 and were reviewed according to the NFG for SOM02.4 (including changes from SOM02.2 to SOM02.3) and the Region 5 ESAT SOP for Organic CLP Data Validation (Refs. 13, pp. 12, 13, 195; 20, p. 1). The sample-adjusted, contract-required quantitation limits (CRQLs) are provided in Reference 20; these CRQLs are equivalent to CRQLs as defined in Section 1.1, Definitions of the HRS Rule (Ref. 1, Section 1.1).

TABLE 9:Release Groundwater Concentrations

Location ID Sample ID Laboratory ID	Hazardous Substance	Release Concentration (µg/L)	Background Concentration (µg/L)[1]	Release Well RL/CRQL (µg/L)	References
2017 Temporary Wells					
SP-20 ESZC0 10385339005	PCE	11.2	5.96	1.0	8, p. 31, 619; 11, pp. 10-13
SP-21 ESZC1 10385339007	cis-1,2-DCE trans-1,2-DCE TCE VC	54.6 1.8 112 1.5	1.0 1.0ND 109.5 1.0ND	1.0 1.0 0.40 0.20	8, p. 31, 622, 623; 11, pp. 10-13
SP-21 ESZC2 10385339009	cis-1,2-DCE trans-1,2-DCE TCE VC	234 5.4 437 9.7	1.0 1.0ND 109.5 1.0ND	1.0 1.0 0.40 0.20	8, p. 31, 626, 627; 11, pp. 10-13
SP-22 ESZC3 10385432002	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	1,390 44.9 71.3 2,020 24.9	1.0 1.0ND 5.96 109.5 1.0ND	1.0 1.0 1.0 0.40 0.20	8, pp. 31, 579, 580; 11, pp. 6-9
SP-22 ESZC4 10385432003	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	757 26.9 37.6 1,140 25.3	1.0 1.0ND 5.96 109.5 1.0ND	1.0 1.0 1.0 0.40 0.20	8, pp. 31, 581, 582; 11, pp. 6-9
SP-23 ESZC5 10385584006	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	532 12.2 15.3 462 4.5	1.0 1.0ND 5.96 109.5 1.0ND	1.0 1.0 1.0 0.40 0.20	8, pp. 31, 539, 540; 11, pp. 2-5

TABLE 9:Release Groundwater Concentrations					
Location ID Sample ID Laboratory ID	**Hazardous Substance**	**Release Concentration (µg/L)**	**Background Concentration (µg/L)[1]**	**Release Well RL/CRQL (µg/L)**	**References**
SP-23 ESZC6 10385584007	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	1,060 37.6 74.6 1,470 13.1	1.0 1.0ND 5.96 109.5 1.0ND	1.0 1.0 1.0 0.40 0.20	8, pp. 31, 541, 542; 11, pp. 2-5
SP-26 ESZD2 10385768010	cis-1,2-DCE trans-1,2-DCE TCE	17.2 9.4 184	1.0 1.0ND 109.5	1.0 1.0 0.40	8, pp. 30, 495, 496; 11, pp. 14-17
BW-SP29 (65-69)[1] 10386116010	cis-1,2-DCE trans-1,2-DCE TCE	12.5 2.6 128	1.0 1.0ND 109.5	1.0 1.0 0.40	8, pp. 29, 416, 417; 11, pp. 22-25
2018 – Temporary Wells					
SP-32D ET002	cis-1,2-DCE trans-1,2-DCE	9.7 2.0	1.0 1.0ND	0.50 0.50	13, pp. 5697, 5699, 5700, 5701, 5707, 5760; 20, p. 131, 132
SP-34S ET013	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	230J- (230) 8.3 22 430J (430) 2.0	1.0 1.0ND 5.96 109.5 1.0ND	0.50 0.50 0.50 0.50 0.50	13, pp. 6601 to 6608, 6635
SP-35S 10428698002	cis-1,2-DCE trans-1,2-DCE PCE TCE	38.5 4.0 6.8 156	1.0 1.0ND 5.96 109.5	1.0 1.0 1.0 0.40	11, pp. 54-57; 13, pp. 7780, 7786, 7787, 7803
SP-35D ET016	cis-1,2-DCE trans-1,2-DCE TCE	120 3.6J (3.6) 220	1.0 1.0ND 109.5	0.50 0.50 0.50	13, pp. 6601 to 6607, 6613, 6727, 6728, 6742
SP-36S ET005	PCE	19J (19)	5.96	2.0	13, pp. 5695 to 5702, 5710, 5759; 20, p. 134
SP-36D ET006	PCE	11	5.96	0.50000	13, pp. 5695 to 5702, 5711, 5759; 20, p. 135
SP-37S ET007	cis-1,2-DCE TCE	34 100J (100)	1.0 109.5	5.0 5.0	13, pp. 3590 to 3598, 3607, 3640; 20, pp. 15, 16
SP-37D ET008	cis-1,2-DCE trans-1,2-DCE TCE VC	230J- (230) 5.6J- (5.6) 1,400 3.4	1.0 1.0ND 109.5 1.0ND	25 0.50 50 0.50	13, pp. 3590 to 3598, 3610, 3640; 20, p. 16

TABLE 9:Release Groundwater Concentrations					
Location ID Sample ID Laboratory ID	**Hazardous Substance**	**Release Concentration (µg/L)**	**Background Concentration (µg/L)[1]**	**Release Well RL/CRQL (µg/L)**	**References**
SP-38S ET009	cis-1,2-DCE trans-1,2-DCE TCE	3.4J- (3.4) 1.3J- (1.3) 21	1.0 1.0ND 5.96	0.50 0.50 2.0	13, pp. 5695 to 5702, 5713, 5761; 20, p. 136
2017 – Permanent Monitoring Wells					
BW-MW1S[1] 10387334002	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	249 5.2 9.0 381 1.3	1.0 1.0ND 5.96 109.5 1.0ND	1.0 1.0 1.0 2.0 0.20	8, pp. 188, 194, 195; 11, pp. 42-45
BW-301GS 10387334006	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	721 19.3 51.7 1,280 0.64	1.0 1.0ND 5.96 109.5 1.0ND	25.0 1.0 1.0 10.0 0.20	8, pp. 188. 202, 203; 11, pp. 42-45
BW-304GS 10387174004	cis-1,2-DCE PCE TCE	3.1 7.0 27.4	ND ND 3.5 (10.5)	1.0 1.0 0.40	8, pp. 234, 246, 247; 11, pp. 38-41
BW-305-GS 10387174005	cis-1,2-DCE trans-1,2-DCE TCE	44.6 1.2 247	1.0 1.0ND 109.5	1.0 1.0 0.40	8, pp. 234, 248, 249, 274; 11, pp. 38-41
BW-306GS 10387334003	cis-1,2-DCE trans-1,2-DCE PCE TCE	165 3.9 6.8 383	1.0 1.0ND 5.96 109.5	1.0 1.0 1.0 2.0	8, pp. 188, 196, 197, 11, pp. 42-45
BW-306GD 10387334004	cis-1,2-DCE trans-1,2-DCE PCE TCE	236 6.7 8.9 493	1.0 1.0ND 5.96 109.5	5.0 1.0 1.0 2.0	8, pp. 188, 198, 199, ; 11, pp. 42-45
632110-060817 10391745005	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	550 13.3 102 1,270 9.6	1.0 1.0ND 5.96 109.5 1.0ND	25.0 1.0 1.0 10.0 0.20	8, pp. 165, 166, ; 11, pp. 46-49
632111-060817 10391745004	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	725 17.2 54.5 1,260 10.8	1.0 1.0ND 5.96 109.5 1.0ND	25.0 1.0 1.0 10.0 0.20	8, pp. 163, 164, ; 11, pp. 46-49

TABLE 9:Release Groundwater Concentrations					
Location ID Sample ID Laboratory ID	**Hazardous Substance**	**Release Concentration (µg/L)**	**Background Concentration (µg/L)[1]**	**Release Well RL/CRQL (µg/L)**	**References**
2018 – Permanent Monitoring Wells					
301-GS ESZB5	cis-1,2-DCE PCE TCE	330 62 910J (910)	1.0 5.96 109.5	25 25 25	13, pp. 804 to 811, 819, 864; 20, pp. 59, 60
304-GS ESZB9	cis-1,2-DCE PCE	11 28	1.0 5.96	5.0 5.0	13, pp. 804 to 811, 824, 864; 20, p. 62
MW-1S ESZA0	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	900 23 36 1,000 19	1.0 1.0ND 5.96 109.5 1.0ND	100 5.0 5.0 100 5.0	13, pp. 804 to 811, 813, 865; 20, pp. 54, 55
MW-2S ESZA2	cis-1,2-DCE TCE	8.7 56	1.0 5.96	5.0 5.0	13, pp. 804 to 811, 815, 865; 20, p. 56
632110 ESZC4	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	400 11 100 960 7.8	1.0 1.0ND 5.96 109.5 1.0ND	100 5.0 5.0 100 5.0	13, pp. 804 to 811, 828, 865; 20, p. 65
632111 ESZC5	cis-1,2-DCE trans-1,2-DCE PCE TCE VC	470 13 97 1,000 5.6	1.0 1.0ND 5.96 109.5 1.0ND	100 5.0 5.0 100 5.0	13, pp. 804 to 811, 829, 865; 20, p. 66
789130 ESZ89	cis-1,2-DCE trans-1,2-DCE PCE TCE	240J- (240) 6.1 12 400J- (400)	1.0 1.0ND 5.96 109.5	50 5.0 5.0 50	13, pp. 804 to 813, 864; 20, p. 54

Notes:

[1] Laboratory inadvertently labeled this sampled as BW-SP28. The sample is labeled as BW-SP29 (65-69) with laboratory identification number 10386116010 on the chain-of-custody form.

( ) The parenthetical value is the result after applying Reference 21, page 8
µg/L Micrograms per liter
Conc. Concentration
CRQL Contract required quantitation limit
DCE Dichloroethylene
ID Identification number
J The result is an estimated quantity. The associated numerical value is the approximated concentration of the analyte in the sample. No bias is associated with this estimated value (Ref. 13, pp. 5702, 6607). Therefore, no adjustment is required (Ref. 21, p. 8).
J- The result is an estimated quantity, but results may be biased low; therefore, no adjustment is required (Refs. 13, pp. 805 to 811; 3590 to 3598; 5695 to 5702; 21, p. 8).
PCE Tetrachloroethylene
RL Reporting limit. The RLs are equivalent to sample quantitation limits as defined in Section 1.1, Definitions of the HRS (Refs. 1, Section 1.1; 19, pp. 6, 7).
TCE Trichloroethylene
VC Vinyl Chloride

2018 Commercial Sub-slab Soil Gas Samples

Sub-slab soil gas samples listed in Table 10 were collected during the 2018 MPCA ESI. The sub-slab soil gas samples were collected from regularly occupied commercial properties (Ref. 13, pp. 12, 18, 19, 20, 28, 55 through 65) (see Figure 4 and Table 13 of this HRS documentation record). Sub-slab soil gas sample collected from a commercial building east (COM_024) of ASC A was evaluated as background sub-slab soil gas samples for comparison of results to release sub-slab samples collected from nearby commercial buildings (Ref. 13, pp. 59, 61) (see Table 11 and Figure 4 of this HRS documentation record). COM_024 was selected as the background location because the building is hydraulically side gradient and within the outer fringe of the groundwater contamination where the concentrations of TCE begin to decrease (Refs. 8, pp. 37, 38; 13, pp. 50, 59) (COM_024 is located at the intersection between Hennepin Ave E and Industrial Blvd. See Figure 3 of this HRS documentation record).

Based on the direction of groundwater flow (northeast to southwest), the location of the commercial sub-slab soil gas sample chosen to represent background levels is side gradient of the release samples collected within ASC A (Refs. 13, pp. 57, 58; 28, pp. 49, 50) (also see Figure 4 of this HRS documentation record). Most structures within ASC A and the structure where the background sample was collected are one-level structures constructed as slab on grade. Most of the commercial structures have slab on grade construction and some partial basements; all are occupied and are not considered subunits (Refs. 13, p. 28; 39, pp. 2).

Background and release sub-slab samples were collected in accordance with the approved ESI work plan dated March 2018 and the MPCA Site Assessment Program QAPP dated September 2014 (Refs. 10, pp. 8, 12; 13, pp. 6, 11, 12, 18, 19, 20; 14, pp. 5, 13, 14). The background and release sub-slab soil gas samples were collected in accordance with the Supplemental Expanded Site Inspection Work Plan and the samples were collected during the same time period by application of same sampling techniques and were analyzed via the same analytical methods as outlined in the MPCA Site Assessment Program Quality Assurance Project Plan (QAPP) (Refs. 13, pp. 11, 12 ; 14, pp. 12, 14) (also see Tables 10 and 11 of this HRS documentation record). All samples were collected from individual sampling locations in accordance with the MPCA Site Assessment Program QAPP. Standard operating procedures (SOP) for the sampling event were derived from the MPCA Site Assessment Program QAPP. Soil gas samples were analyzed for VOCs by a Minnesota contract laboratory. Analyses was conducted using EPA Method TO-15 for the complete Minnesota list of volatiles for soil gas samples (Ref. 14, p. 14).

Locations of the background and release samples are listed in Table 10 and depicted on Figure 4 of this HRS documentation record. Chain-of-custody forms, which provide the sample and laboratory ID numbers, date and time of sampling, and sample duration are provided in References 15, 16, and 17; specific pages are listed in Table 11.

TABLE 10: 2018 Commercial Sub-slab Samples						
Sample ID Laboratory ID	**Sample Location ID and Description**	**Sample Depth [2] (inches bss)**	**Volume of Air (liters)**	**Duration (minutes) Start/End Time**	**Date Collected**	**References**
Background Samples						
SS-09 10434229017	COM_024, intersection of Industrial Blvd. and Hennepin E Avenue	12	1	9 9:54AM/ 10:03AM	06/06/18	13, p. 59; 15, p. 659, 661, 680, 681; 16, pp. 2176, 2276
SS-12 10434229023	COM_024, intersection of Industrial Blvd. and Hennepin E Avenue	12	1	7 11:54AM/ 12:01PM	06/06/18	13, p. 59; 15, p. 659, 661, 684, 685; 16, pp. 2176, 2276
Release Samples						
SS-01 10431941001	COM_018, NE Kennedy Street between NE Hover and NE Coolidge Streets	24	1	7 11:29AM/ 11:36AM	05/18/18	13, p. 57; 15, pp. 504, 505, 513, 514, 515, 516, 523, 524, 525, 526, 527, 528; 16, pp. 1620, 1700, 1701
SS-03 10431941005		6	1	7 10:55AM/ 11:02AM		
SS-04 10431941007		6	1	7 10:40AM/ 10:47AM		
SS-11 10431941021		NR	1	7 1:11PM/ 1:18PM		
SS-13 10431941025		NR	1	7 2:47PM/ 2:54PM		
SS-14 10431941027		NR	1	7 3:01PM/ 3:08PM		
SS-15 10431941029		NR	1	8 2:21PM/ 2:29PM		
SS-16 10431941031		NR	1	7 3:03PM/ 3:10PM		
SS-03 10432470005	COM_019, NE Hoover Street near NE Spring Street intersection	8	1	7 1156/ 1206	05/23/18	13, p. 56; 15, pp. 538, 539, 549;16, pp. 1769, 1810
SS-04 10432470007	COM_019, NE Hoover Street near NE Spring Street intersection	8	1	7 1204/ 1211	05/23/18	13, p. 56; 15, pp. 538, 539, 549; 16, pp. 1769, 1810
SS-03[1] 10434421005	COM_020, E Hennepin Avenue between SE 23rd Avenue and SE 24th Avenue	5	1	8 1:34PM/ 1:42PM	06/07/18	13, p. 63; 15, pp. 565, 566, 576, 577; 16, pp. 1879, 1911

TABLE 10: 2018 Commercial Sub-slab Samples						
Sample ID Laboratory ID	**Sample Location ID and Description**	**Sample Depth [2] (inches bss)**	**Volume of Air (liters)**	**Duration (minutes) Start/End Time**	**Date Collected**	**References**
SS-01 10424218001	COM_021, E Hennepin Avenue at NE Hoover Street Intersection	4	1	7 10:15AM/ 10:22AM	03/20/18	13, p. 61; 15, pp. 588, 589, 601, 602; 16, pp. 1931, 1963
SS-02 10424218003		4	1	8 12:21PM/ 12:29PM	03/20/18	13, p. 61; 15, pp. 588, 589, 601, 602; 16, pp. 1931, 1963
SS-03 10424218005		4	1	7 12:59PM/ 1:06PM	03/20/18	13, p. 61; 15, pp. 588, 589, 603, 604; 16, pp. 1931, 1963
SS-04 10424218007		4	1	7 12:18PM/ 12:25PM	03/20/18	13, p. 61; 15, pp. 588, 589, 603, 604; 16, pp. 1931, 1963
SS-05 10424218009		4	1	11 1:12PM/ 1:23PM	03/20/18	13, p. 62; 15, pp. 588, 589, 605, 606; 16, pp. 1931, 1963
SS-05 10423667009	COM_023, E Hennepin Avenue at SE 29th Avenue	4	1	8 10:55AM/ 11:03AM	03/13/18	13, p. 60; 15, pp. 634, 635, 651, 652; 16, pp. 2110, 2148

Notes:

[1] The sample date used is the date on the chain of custody form

[2] The sub-slab samples are collected below the concrete slab and therefore determines the depth of the sample.

bss Below slab surface
COM Commercial property
ID Identification number
E East
NE Northeast
NR Not recorded
SE Southeast
SS Sub-slab

2018 Commercial Sub-slab Soil Gas Concentrations

The sub-slab soil gas samples listed in Table 11 of this HRS documentation record were collected during the MPCA 2018 ESI. The samples were analyzed by Pace for VOCs via EPA Method TO-15. MPCA conducted a Stage 2A validation of the analytical data packages; the data validation reports are provided in Reference 18; specific pages are listed in Table 11. Reporting limits are listed on the analytical data sheets contained in References 16 and 17. The reporting limits are equivalent to SQLs as defined in Section 1.1, Definitions of the HRS (Refs. 1, Section 1.1; 19).

TABLE 11: 2018 Commercial Sub-slab Soil Gas Concentrations				
Location ID Sample ID Laboratory ID	**Hazardous Substance**	**Concentration ($\mu g/m^3$)**	**RL ($\mu g/m^3$)**	**References**
2018 Sub-slab Soil Gas Background Concentrations				
COM_024 SS-09 10434229017	cis-1,2-DCE trans-1,2-DCE PCE TCE	1.5ND 1.5ND 339 2.2	1.5 1.5 1.2 0.98	16, pp. 2219, 2220; 18, pp. 158-162
COM_24 SS-12 10434229023	cis-1,2-DCE trans-1,2-DCE PCE TCE	1.5ND 1.5ND 10.2 2.7	1.5 1.5 1.2 0.98	16, pp. 2231, 2232; 18, pp. 158-162
2018 Release Sub-slab Soil Gas Concentrations				
COM_018 SS-01 10431941001	cis-1,2-DCE trans-1,2-DCE TCE	2.8 1.6 10.4	1.5 1.5 1.0	16, pp. 1627, 1628; 18, pp. 126-129
COM_018 SS-03 10431941005	TCE	436	46.3	16, p. 1636; 18, pp. 126-129
COM_018 SS-04 10431941007	PCE TCE	1,150 28,880	1.3 980	16, p. 1640; 18, pp. 126-129
COM_018 SS-11 10431941021	TCE	368	17.4	16, p. 1668; 18, pp. 126-129
COM_018 SS-13 10431941025	TCE	12,900	1260	16, p. 1676; 18, pp. 126-129
COM_018 SS-14 10431941027	cis-1,2-DCE trans-1,2-DCE TCE	24.6 24.1 10,300	1.5 1.5 653	16, pp. 1679, 1680; 18, pp. 126-129
COM_018 SS-15 10431941029	cis-1,2-DCE trans-1,2-DCE TCE	22.2 23.9 5,210	1.5 1.5 629	16, pp. 1683, 1684; 18, pp. 126-129
COM_018 SS-16 10431941031	trans-1,2-DCE TCE	9.0 5,190	1.5 664	16, pp. 1687, 1688; 18, pp. 126-129
COM_019 SS-03 10432470005	PCE	1,540	206	16, p. 1784; 18, pp. 130-133
COM_019 SS-04 10432470007	PCE	1,210	99.2	16, p. 1788; 18, pp. 130-133

TABLE 11: 2018 Commercial Sub-slab Soil Gas Concentrations				
Location ID **Sample ID** **Laboratory ID**	**Hazardous Substance**	**Concentration ($\mu g/m^3$)**	**RL ($\mu g/m^3$)**	**References**
COM_020 SS-03 10434421005	cis-1,2-DCE TCE	5.6 23.3	1.5 1.0	16, pp. 1893, 1894; 18, pp. 138-141
COM_021 SS-01 10424218001	cis-1,2-DCE trans-1,2-DCE TCE	1.7 1.5 761	1.5 1.5 16.5	16, pp. 1936, 1937; 18, pp. 142-145
COM_021 SS-02 10424218003	TCE	292	0.98	16, p. 1941; 18, pp. 142-145
COM_021 SS-03 10424218005	TCE	148	0.98	16, p. 1945; 18, pp. 142-145
COM_021 SS-04 10424218007	TCE	10.4	0.98	16, p. 1949; 18, pp. 142-145
COM_021 SS-05 10424218009	TCE	10.3	0.97	16, p. 1953; 18, pp. 142-145
COM_023 SS-05 10423667009	TCE	25.3	0.97	16, p. 2132; 18, pp. 154-157

Notes:

$\mu g/m^3$ Micrograms per cubic meter
COM Commercial property
DCE Dichloroethylene
ID Identification number
ND Not detected at or above the reporting limit
PCE Tetrachloroethylene
RL Reporting limit
SS Sub-slab
TCE Trichloroethylene

Other Supporting Documentation

Sub-slab soil gas samples collected in 2017 also show levels of PCE and TCE and associated breakdown projects. However, no background sub slab soil gas sample was collected of adequate similarity. Therefore, the data was not used do document observed releases but is summarized below to provide additional evidence of releases to the subsurface environment.

2017 Commercial Sub-slab Soil Gas Samples

The sub-slab soil gas samples listed in Table 12 were collected during the 2017 MPCA SI. The samples were collected from regularly occupied commercial properties, mostly north of Hennepin Avenue (see Reference 62). The sub-slab soil gas samples collected within ASC A contained concentrations of PCE, TCE, cis-1,2-DCE, and trans-1,2-DCE. These same hazardous substances were detected in the site's groundwater contamination which has been delineated by site investigations (Ref. 13, p. 50) (See Table 9 of the HRS documentation record). The hazardous substances in the site groundwater contamination have released to the surface as documented by the presence of these same hazardous substances in sub-slab soil gas collected within the footprint of the groundwater contamination. The presence of these hazardous substances in soil gas underlying occupied structures indicate potential for migration of hazardous substances into indoor air via subsurface intrusion.

Structures within ASC A and the structures where samples were collected are one-level structures constructed as slab on grade, partial basements, and basements (Ref. 39, p. 2).

Locations of the sub-slab soil gas samples are listed in Table 12 and depicted on Reference 62. Chain-of-custody forms, which provide the sample and laboratory ID numbers, date and time of sampling, and sample duration are provided in References 15 and 16; specific page numbers are listed in Tables 12 and 13.

TABLE 12: Other Supporting Documentation (2017 Commercial Sub-slab Soil Gas Samples)

Sample ID Laboratory ID	Sample Location ID and Description	Sample Depth (inches bss)	Volume of Air (liters)	Duration (minutes)	Date Collected	References
SS-02 10398231003	COM_001, NE Hoover Street between Winter and Spring Streets	8	1	6	08/03/2017	15, pp. 2, 4, 23, 24, 25, 26; 16, pp. 44, 95
SS-03 10398231005		8	1	7		
SS-01 10391184003	COM_002, intersection of NE Spring Street and NE Hoover Street	6	1	7	06/06/2017	8, p. 40; 15, pp. 35, 36, 43, 44; 16, pp. 127, 147
SS-02 10391184001		6	1	7		
SS-02[1] 10404055003	COM-004, intersection of NE Spring Street and NE Godward Street	6	1	6	09/20/2017	13, p. 58; 15, pp. 49, 52, 67, 68, 79, 80; 16, pp. 159, 210
SS-07 10404055013		6	1	8	09/20/2017	
2205_SS-1 10392282001	COM_006, NE Traffic Street, between NE Coolidge Street and SE 22nd Avenue	5	1	8	6/12/2017	8, pp. 41; 15, pp. 121, 122, 123, 136, 137; 16, pp. 464, 499
2205_SS-2 10392282007		5	1	7		

TABLE 12: Other Supporting Documentation (2017 Commercial Sub-slab Soil Gas Samples)						
Sample ID Laboratory ID	**Sample Location ID and Description**	**Sample Depth (inches bss)**	**Volume of Air (liters)**	**Duration (minutes)**	**Date Collected**	**References**
SS-01 10403599001	COM_010, intersection of NE Winter Street and NE Hoover Street	10	1	7	09/18/2017	13, p. 57; 15, pp. 224, 237, 238, 239, 240, 241, 242; 16, pp. 771, 803
SS-02 10403599003		10	1	7		
SS-03 10403599005		10	1	7		
SS-04 10403599007		10	1	7		
SS-05 10403599009		10	1	7		
SS-03 10401904005	COM_014, E Hennepin Avenue at SE 27th Avenue	6	1	9	08/31/2017	15, pp. 344, 356, 357, 370; 16, pp. 1160, 1197
SS-01[2] 10384724001	COM_016, E Hennepin Avenue, between SE 29th Avenue and SE 27th Avenue	8	1	8	04/12/2017	8, p. 43; 15, pp. 390, 392, 415, 416; 16, pp. 1274, 1304
SS-05 10406608009	COM_023, E Hennepin Avenue at SE 29th Avenue	4	1	7	10/10/2017	13, p. 60; 15, pp. 634, 635, 645, 646; 16, pp. 2044, 2080
SS-01 10407354001	COM_025, intersection of NE Godward Street and NE Winter Street	4	1	6	10/17/2017	13, p. 58; 15, pp. 730, 731, 739, 740; 16, pp. 2500, 2534
SS-02 10407354003		8	1	7		
SS-15 10406951029	COM_026, intersection of NE Coolidge Street and NE Kennedy Street	10	1	8	10/11/2017	13, p. 57; 15, pp. 752, 754, 755, 779, 780, 785, 786; 16, pp. 2562, 2563, 2702
SS-21 10406951041		8	1	7	10/12/2017	

TABLE 12: Other Supporting Documentation (2017 Commercial Sub-slab Soil Gas Samples)						
Sample ID Laboratory ID	**Sample Location ID and Description**	**Sample Depth (inches bss)**	**Volume of Air (liters)**	**Duration (minutes)**	**Date Collected**	**References**
SS-09 10408838001	COM_027, NE Spring Street, between NE Delano Street and NE Godward Street	8	1	7	10/26/2017	13, p. 58; 15, pp. 799, 801, 802, 811, 812, 813, 814, 817, 818, 821, 822, 823, 824, 825, 826, 827, 828, 831, 832, 833, 834, 835, 836, 837, 838, 841, 842, 845, 846;16, pp. 2811, 2870, 3106, 3263, 3264, 3265
SS-11 10408838005		8	1	7	10/27/2017	
SS-12 10408838007		8	1	6		
SS-25 10408838015		8	1	7		
SS-12 10412103010		8	1	7	11/21/2017	
SS-16 10412103012		8	1	6		
SS-21 10412103017		8	1	7		
SS-22 10412103018		10	1	7		
SS-24 10412103032		8	1	8		
SS-28 10412103022		10	1	7		
SS-32 10412103026		8	1	10		
SS-02 10412103002		6	1	10	11/22/2017	
SS-06 10412103006		6	1	7		
SS-07 10412103007		6	1	8		
SS-19 10412103015		6	1	7		

Notes:

[1] Based on the chain-of-custody form and the sample collection form, this sample was collected on September 20, 2017 (Ref. 15, p. 54; 16, p. 159).

[2] Based on the sample collection form, the sample was collected on April 12, 2017 (Ref. 15, pp. 393 to 397)

bss Below slab surface
COM Commercial property
ID Identification number
E East
NE Northeast
SE Southeast
SS Sub-slab

2017 Commercial Sub-slab Soil Gas Concentrations

The sub-slab soil gas samples listed in Table 13 of this HRS documentation record were collected during the 2017 MPCA SI. The samples were analyzed by Pace for VOCs via EPA Method TO-15. MPCA conducted a Stage 2A validation of the analytical data packages; the data validation reports are provided in Reference 18. The reporting limits are listed on the analytical data sheets contained in Reference 16. Reporting limits are equivalent to SQLs as defined in Section 1.1, Definitions of the HRS (Refs. 1, Section 1.1; 19).

TABLE 13: Other Supporting Documentation (2017 Commercial Sub-slab Soil Gas Concentrations)

Location ID Sample ID Laboratory ID	Hazardous Substance	Concentration ($\mu g/m^3$)	RL ($\mu g/m^3$)	References
COM_001 SS-02 10398231003	PCE TCE	368 13,800	1.2 83.2	16, p. 54; 18, p. 6-9
COM_001 SS-03 10398231005	PCE	232	1.2	16, p. 58; 18, p. 6-9
COM_002 SS-01 10391184003	cis-1,2-DCE trans-1,2-DCE PCE	64.4 29.1 2,160	1.5 1.5 49.6	16, pp. 136, 137; 18, p. 10-13
COM_002 SS-02 10391184001	PCE	3,030	83.4	16, p. 133; 18, p. 10-13
COM_004 SS-02 10404055003	PCE	282	1.2	16, p. 169; 18, p. 18-21
COM_004 SS-07 10404055013	trans-1,2-DCE PCE	9.8 1,320	1.4 94.1	16, p. 188, 189; 18, p. 18-21
COM_006 SS-01 10392282001	TCE	1,070	22.2	16, p. 471; 18, p. 34-37
COM_006 SS-02 10392282007	TCE	3,400	21.3	16, p. 483; 18, p. 34-37
COM_010 SS-01 10403599001	TCE	1,020	15.5	16, p. 777; 18, p. 62-65
COM_010 SS-02 10403599003	PCE	336	1.2	16, p. 781; 18, p. 62-65
COM_010 SS-03 10403599005	PCE	249	1.2	16, p. 785; 18, p. 62-65
COM_010 SS-04 10403599007	PCE	250	1.2	16, p. 789; 18, p. 62-65
COM_010 SS-05 10403599009	PCE	168	1.2	16, p. 793; 18, p. 62-65

TABLE 13: Other Supporting Documentation (2017 Commercial Sub-slab Soil Gas Concentrations)				
Location ID Sample ID Laboratory ID	**Hazardous Substance**	**Concentration ($\mu g/m^3$)**	**RL ($\mu g/m^3$)**	**References**
COM_014 SS-03 10401904005	cis-1,2-DCE PCE	18.2 715	1.4 80.6	16, pp. 1173, 1174; 18, p. 94-97
COM_016 SS-01 10384724001	PCE	200	1.2	16, p. 1281; 18, p. 102-105
COM_023 SS-05 10406608009	PCE	298	4.3	16, p. 2066; 18, p. 150-153
COM_025 SS-01 10407354001	trans-1,2-DCE	13.9	1.5	16, p. 2505; 18, p. 167-170
COM_025 SS-02 10407354003	TCE	1,260	83.2	16, p. 2510; 18, p. 167-170
COM_026 SS-15 10406951029	PCE	217	1.2	16, p. 2629; 18, p. 171-175
COM_026 SS-21 10406951041	PCE	597	9.7	16, p. 2653; 18, p. 171-175
COM_027 SS-09 10408838001	cis-1,2-DCE trans-1,2-DCE PCE TCE	39,400 3,500 251,000 1,920,000	233 233 31,800 25,200	16, p. 2817, 2818; 18, p. 176-180
COM_027 SS-11 10408838005	cis-1,2-DCE trans-1,2-DCE PCE TCE	482 661 23,100 691,000	117 117 199 10,100	16, p. 2825, 2826; 18, p. 176-180
COM_027 SS-12 10408838007	cis-1,2-DCE trans-1,2-DCE PCE TCE	49,800 3,480 414,000 5,050,000	2,010 2,010 3,420 27,100	16, p. 2829, 2830; 18, p. 176-180
COM_027 SS-25 10408838015	TCE	260	1	16, p. 2846, 2870; 18, p. 176-180
COM_027 SS-12 10412103010	cis-1,2-DCE trans-1,2-DCE PCE TCE	113,000 8,080 1,090,000 8,240,000	7,460 93.3 6,350 5,070	16, p. 3134, 3135; 18, p. 189-193
COM_027 SS-16 10412103012	TCE	1,420	51.4	16, p. 3139; 18, p. 189-193
COM_027 SS-21 10412103017	cis-1,2-DCE trans-1,2-DCE PCE TCE	90.1 26.0 8,220 10,000	1.4 1.4 384 306	16, p. 3148, 3149; 18, p. 189-193

TABLE 13: Other Supporting Documentation (2017 Commercial Sub-slab Soil Gas Concentrations)				
Location ID Sample ID Laboratory ID	**Hazardous Substance**	**Concentration (μg/m^3)**	**RL (μg/m^3)**	**References**
COM_027 SS-22 10412103018	cis-1,2-DCE PCE TCE	200 25,400 69,200	1.4 767 612	16, p. 3150, 3151; 18, p. 189-193
COM_027 SS-24 10412103032	cis-1,2-DCE trans-1,2-DCE TCE	45.9 10.5 11,900	1.5 1.5 634	16, p. 3178, 3179; 18, p. 189-193
COM_027 SS-28 10412103022	cis-1,2-DCE trans-1,2-DCE PCE TCE	54.2 78.8 15,200 21,400	1.5 1.5 412 329	16, p. 3158, 3159; 18, p. 189-193
COM_027 SS-32 10412103026	cis-1,2-DCE trans-1,2-DCE PCE TCE	18.9 1.9 3,270 3,110	1.4 1.4 85.7 68.4	16, p. 3166, 3167; 18, p. 189-193
COM_027 SS-02 10412103002	cis-1,2-DCE trans-1,2-DCE PCE TCE	68.4 69.4 32,500 112,000	1.5 1.5 825 658	16, p 3118, 3319; 18, p. 189-193
COM_027 SS-06 10412103006	cis-1,2-DCE trans-1,2-DCE PCE TCE	81.9 1,140 6,860 68,300	1.5 933 794 634	16, p. 3126, 3127; 18, p. 189-193
COM_027 SS-07 10412103007	PCE TCE	14,100 3,780,000	6,600 5,270	16, p. 3129; 18, p. 189-193
COM_027 SS-19 10412103015	cis-1,2-DCE trans-1,2-DCE PCE TCE	101,000 31,700 1,180,000 939,000	3,730 3,730 3,170 2,530	16, p. 3144, 3145; 18, p. 189-193

Notes:

μg/m^3	Micrograms per cubic meter
COM	Commercial property
DCE	Dichloroethylene
ID	Identification number
ND	Not detected at or above the reporting limit
PCE	Tetrachloroethylene
RL	Reporting limit
SS	Sub-slab
TCE	Trichloroethylene

Attribution of Subsurface Contamination

ASC A is characterized by groundwater and sub-slab soil gas samples that meet observed release criteria. As presented in Tables 9 and 11 of this HRS documentation record, chlorinated VOCs including PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride were found present above background levels in groundwater and/or sub-slab samples collected from ASC A. The concentrations of chlorinated VOCs detected in the samples by media are as follows:

- soil samples contained TCE up to 0.072 mg/kg and cis-1,2-DCE up to 0.0073 mg/kg;
- groundwater observed release samples contained PCE up to 100 µg/L, TCE up to 5,300 µg/L, cis-1,2-DCE up to 1,240 µg/L, trans-1,2-DCE up to 65.8 µg/L, and vinyl chloride up to 29.0 µg/L;
- and sub-slab soil gas observed release samples contained cis-1,2-DCE up to 24.6 µg/m^3, trans-1,2-DCE up to 29.1 µg/m^3, PCE up to 3,030 µg/m^3, and TCE up to 28,800 µg/m^3 (Ref. 13, pp. 77-94, 99-106, 107, 108, 110, 112, 129, 130).

These releases are likely due to past operations at commercial and industrial facilities within and surrounding ASC A that used chlorinated solvents. This is evidenced by (1) high concentrations of chlorinated organic compound contaminants in groundwater beneath and in the immediate vicinity of these properties, (2) high concentrations of chlorinated organic compounds in sub-slab soil gas beneath the foundations of commercial and residential structures, (3) presence of chlorinated organic compounds in indoor air and preferential subsurface intrusion pathways in the form of cracks/gaps/holes in building floors, and (4) evidence of chlorinated organic compound migration from the subsurface below structures. Information on each of these items is presented below.

High Concentrations of Chlorinated Organic Compounds in Groundwater Beneath and in the Immediate Vicinity of Possible Origins of Chlorinated Organic Compound Subsurface Contamination

Environmental investigations by the MPCA and private property owners within ASC A documented releases of chlorinated VOCs in soil, groundwater, soil gas, sub-slab soil gas, and indoor air samples (Refs. 8, pp. 2, 3, 4; 13, pp. 156 through 159). The investigations were conducted under the MPCA and EPA Superfund programs, or MPCA Volunteer Cleanup and Investigation (VIC) and Leaking Underground Storage Tank (LUST) programs (Ref. 8, p. 2). These releases may be attributable to past operations that used chlorinated solvents where contaminated groundwater contamination was detected and where vapor intrusion from the subsurface was found based on detections of chlorinated VOCs in soil gas and indoor air (Ref. 13, p. 6, 7, 8, 19, 23, 27, 29, 30). While several likely possible origins of subsurface contamination were identified, specific releases documented in temporary and permanent monitoring wells, sub-slab and external soil gas, and outdoor and indoor air samples cannot reasonably be attributed to one or more origins. Environmental investigations identified facilities and operations that used or may have used chlorinated solvents and are suspected origins of the release (Refs. 8, pp. 3, 4, 26, 27; 13, pp. 8, 35, 36). Therefore, the release may have resulted from multiple origins.

During a 1994 LUST investigation at an auto repair facility on Hennepin Avenue E, TCE was detected in groundwater samples. The highest concentration detected was 24 µg/L (Refs. 8, p. 90; 34, pp. 1, 12, See Figure 2 of this HRS documentation record). Another auto repair facility was investigated under the LUST program in 2009 and subsequently by MPCA in 2013 (Ref. 8, p. 90). Analytical results of the samples collected in 2009 showed PCE up to 50.6 µg/L, TCE up to 1,620 µg/L, trans-1,2-DCE up to 33.1 µg/L, cis-1,2-DCE up to 1,000 µg/L, and vinyl chloride up to 4.1 µg/L (Ref. 35, pp. 1, 24). Groundwater samples collected from permanent monitoring wells installed in 2012 at this auto repair facility contained PCE up to 7.8 µg/L, TCE up to 78.9 µg/L, cis-1,2-DCE up to 54 µg/L, and vinyl chloride at 0.40 µg/L (Ref. 36, pp. 1, 18). These auto repair facilities are in the southern portion of ASC A (Ref. 13, p. 36).

A former truck and trailer storage and repair facility, the 359 Hoover Street Building, is located in the central portion of ASC A. A foundry operated in the eastern portion of this property. Historical aerial photographs indicate the presence of unidentified materials on the property where the foundry operated (Ref. 8, p. 89; 37, pp. 1,5; 38, pp. 1, 3, 4). During investigative activities, it was noted that a metal finishing establishment was located north of this property (Ref. 37, p. 19). Groundwater samples collected at the 359 Hoover Street Building contained PCE up to 120 µg/L, TCE up to 3,600 µg/L, cis-1,2-DCE up to 1,200 µg/L, and vinyl chloride up to 60 µg/L ppb, and a soil sample contained TCE at 51 µg/kg (Ref. 38, pp. 1, 8, 9, 16, 18; See Figure 2 of this HRS documentation record).

Other commercial/industrial facilities that were identified as possible origins of subsurface contamination include a commercial laundry facility, office/warehouse where sand and gravel were mined from pits, and a former foundry and outboard motor manufacturer. These commercial/industrial facilities are all located north of Hennepin Avenue E (Ref. 8, pp. 3, 4) (see Figure 2 of this HRS documentation record). Some facilities operated in the area as early as the 1930s (Ref. 8, p. 89). Groundwater samples collected from these properties contained PCE up to 15 µg/L, TCE up to 610 µg/L, cis-1,2-DCE up to 11 µg/L, trans 1,2 DCE up to 100 µg/L (Ref. 8, pp. 8, 9; 41, pp. 10, 16; 42, p. 2).

As presented in Section 5.2.0 of this HRS documentation record, chlorinated solvents including PCE, TCE and their breakdown products (cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride) are present at elevated concentrations in groundwater and sub-slab samples throughout the SE Hennepin site (see Tables 4 through 11 of this HRS documentation record). Chlorinated solvents (such as PCE and TCE) are man-made compounds commonly used in commercial/industrial operations, such as dry cleaning and metal degreasing, while other contaminants, such as cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride, are common breakdown products of PCE and TCE (Refs. 23, p. 24; 24; 25; 26; 27, pp. 1, 257). The presence of these man-made compounds in groundwater and sub-slab soil gas indicates that a release has occurred. Multiple possible origins of the subsurface contamination have been identified; releases from these origins cannot reasonably be separated one from the other.

High Concentrations of Contaminants in Sub-Slab Soil Gas Beneath the Foundations of Commercial and Residential Structures

Subsurface intrusion assessment activities were conducted at multiple commercial and residential properties at the SE Hennepin site from April 23, 2018 through May 24, 2018 (Ref. 13, p. 11). Specifically, sub-slab vapor samples were collected from 26 commercial properties and 34 residential properties at the SE Hennepin site (Ref. 13, p. 18). As documented in this HRS documentation record, sub-slab, chlorinated organic compound concentrations document the presence of vapors beneath foundations of commercial and residential structures. PCE and TCE were detected as high as 1,540 ug/m^3 and 28,880 ug/m^3 in observed release sub-slab vapor samples, respectively, and PCE and TCE were detected as high as 1,090,000 ug/m^3 and 8,240,000 ug/m^3, respectively, in historical samples (see Tables 11 and13 of this HRS documentation record). PCE and TCE are also present in groundwater underlying the structures as documented in Table 9 of this HRS documentation record (See Figures 3 and 4 of this documentation record showing the location of the ASC, structures, and release wells).

Presence Of Chlorinated Organic Compounds In Indoor Air And Preferential Subsurface Intrusion Pathways In Building Floors

Indoor air samples were collected from structures COM_001, COM_003, COM_009, COM_027 and COM-028, and UNIT_001 (a school) detecting PCE and TCE in the structures and resulting in the installation of SSDS (Ref. 28, pp. 7, 20, 21, 24, 27, 28, 60, 61, 62, 70; 29, p. 2) (See Figure 3 of HRS documentation record). The presence of PCE and TCE indicate that the structures do not have containment against vapor intrusion. Although samples collected of indoor air have detected PCE concentrations up to 42.4 µg/m^3 and TCE concentrations up to 92.7 µg/m^3, an area of observed exposure was not documented because samples of the same type required to document background levels were not collected (Refs. 1, Sections 2.3 and 5.2.1.1.1; 13, pp. 145 to 148; 30, p. 23; 33, pp. 1-3, 6, 10). The substances documented in indoor air samples are the same substances documented in ASC A as documented in Tables 9 and 11.

Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) have been documented in regularly occupied structures COM_007, COM_009, COM_011, UNIT_012 , UNIT_020, UNIT_030, UNIT_031, UNIT_033 (15, pp. 147, 152, 191, 196, 197, 250, 258, 1058, 1063, 1064, 1120, 1126, 1339, 1344 to 1346, 1378, 1380, 1383, 1426, 1431 to1433).

Evidence of Chlorinated Organic Compound Migration to the Subsurface Below Structures

SE Hennepin overlies deposits comprised of sand with silt and gravel with pockets of clay and sandy silt ranging from 30 feet bgs on the southern portion of SE Hennepin to 90 feet bgs in the northern portion of the site. The deposits comprise the Quaternary shallow water table and the Quaternary Aquifer (Refs. 28, pp. 11, 52 to 58; 49). Depth to groundwater is 40.3 ft below ground surface (bgs) in the northeast part of SE Hennepin, and 14.5 ft bgs in the southwest part of SE Hennepin (Refs. 13, pp. 51 to 54; 28, pp. 52 to 58). The hydraulic conductivity of the Quaternary Aquifer is estimated at 10^{-4} centimeters per second (Ref. 1, Table 3-6). The high permeability of the Quaternary Aquifer and the low permeability of the bedrock underlying the aquifer prevents the downward migration of chlorinated organic compounds and the accumulation in the Quaternary Aquifer. The high permeability of the Quaternary Aquifer and shallowness of the aquifer provide a medium where vapors can diffuse to the surface (Refs. 47, pp. 89, 92, 94; 48; 50; see Table 9 of this HRS documentation record).

As documented in Table 9, concentrations of PCE and TCE in groundwater provide evidence that PCE and TCE have migrated to groundwater underlying structures within the SE Hennepin site. The presence of a confining layer as documented in the Section 5.2 geology section, has prevented downward migration and PCE and TCE have accumulated over the confining layer (Ref. 28, pp. 52 to 58). Indoor air and sub-slab vapor samples document the presence PCE and TCE vapors at the surface and in structures, providing evidence that PCE and TCE vapors have migrated from the groundwater to the surface (Ref. 28, pp. 7, 19 to 22, 26, 27, 28, 59 to 70, 150, 165).

Nearby NPL Site

The GMH NPL site is located near the southwestern portion of and downgradient of the SE Hennepin site (Ref. 8, p. 27; 28, pp. 40, 49, 50; 43, p. 1) (see Figure 2 of this HRS documentation record). The subsurface contamination at the SE Hennepin site is migrating to the south and southwest towards the GMH NPL site. The contamination and releases at the GMH NPL site and the SE Hennepin site have been investigated independently (Ref. 45, pp. 38, 39, 40, 78, 79, 87, 88, 95, 100; see Figure 2 of this HRS documentation record).

GMH operated a food research facility along Hennepin Avenue E from around 1930 to 1977. In 1947, GMH initiated chemical research in addition to food research (Refs. 8, p. 90; 31, p. 6). Solvents reportedly were disposed of in a 12-foot deep absorption pit located in the southeastern portion of the property (Ref. 8, p. 90). Soil and groundwater samples collected in the disposal area contained TCE. In 1981, the disposal pit was excavated to 12 feet bgs and the contaminated soil excavated was disposed of at a permitted landfill (Ref. 8, p. 90). The GMH site was listed on the NPL in 1981. From 1985 to 2010, GMH operated a groundwater extraction system that extracted about 7,000 pounds of TCE over the 25-year period of operation (Refs. 8, p. 90; 44, p. 6; 46, pp. 21, 24). In 2014, GMH conducted subsurface and vapor intrusion investigations surrounding its property; some sampling locations were upgradient of GMH and were within the SE Hennepin site (Ref. 8, p. 90, 91). Analytical results of soil, groundwater, and soil gas samples indicated TCE is impacting groundwater and soil gas conditions along East Hennepin Avenue, in the southern portion of the SE Hennepin site (Refs. 44, pp. 12 to 15; 45, pp. 6, 7; See Figure 2 of this HRS documentation record). The highest concentrations of TCE were detected northeast and upgradient of GMH (Ref. 45, pp. 6, 79).(See Figure 2 of this HRS documentation record).

Hazardous Substances in the Release

PCE
TCE
cis-1,2-DCE
trans-1,2-DCE
Vinyl chloride

Structure Containment

During assessment activities, MPCA prepared vapor intrusion building assessments of the occupied structures within ASC A (Ref. 15). Most of the occupied commercial structures are slab on grade and some have partial basements. Most sub-slab soil gas samples were collected from the main portions of the structures where workers were present (Ref. 39, pp. 2). Because of the presence of PCE or TCE above MPCA commercial screening criteria, property owners have installed SSDS in 13 structures (Refs. 29, pp. 1, 2). The residential structures are mainly older homes with full basements (Refs. 15, pp. 1043, 1062, 1105; 28, pp. 29, 30). Because of the presence of TCE or PCE above MPCA residential screening criteria, MPCA installed SSDS in two of the occupied residential structures assessed (Ref. 28, pp. 21,29, 30). The SSDS are active vapor mitigation systems with outdoor venting, some of which have been verified by MPCA. Property owners conduct inspection and maintenance of SSDS at commercial properties, and MPCA performs inspection and maintenance of SSDS at residential structures. Institutional controls such as deed restrictions are not in place for any of the commercial and residential structures. (Refs. 39, p. 2; 40, pp. 1, 2). Preferential pathways for subsurface intrusion, documented when observed, included sumps, cracks in floors and walls, unsealed utility lines, earthen or incompetent floor slabs, cracks in basement walls, and floor drains as documented in Reference 40, p. 1 and Tables 14 below and 17.

TABLE 14: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
COM_001	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_002	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_003	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_004	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 49, 55, 57
COM_005	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 92, 95
COM_006	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_007	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 147, 152
COM_008	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	Greater than 0	1, Section 5.2.1.1.2.1; 15, pp. 179 to 183
COM_009	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 191, 196, 197

TABLE 14: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
COM_010	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 224, 230, 231
COM_011	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 250, 258, 259
COM_012	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 270, 273
COM_013	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 304, 314, 316
COM_014	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 344, 347, 348
COM_015	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_016	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 390, 398
COM_017	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 459, 460, 463
COM_018	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2

TABLE 14: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
COM_019	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 538, 541, 542,
COM_020	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 565, 568 to 570
COM_021	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_022	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 613, 617 to 619
COM_023	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 634, 637 to 639
COM_025	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 730, 733 to 735
COM_026	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_027	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_028	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2

TABLE 14: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
UNIT_001	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
UNIT_002	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29
UNIT_006	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29
UNIT_007	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29
UNIT_008	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 992, 995
UNIT_010	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1041, 1044
UNIT_011	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29
UNIT_012	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 1058, 1063
UNIT_013	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1080, 1083

TABLE 14: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
UNIT_014	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29
UNIT_015	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1103, 1106
UNIT_020	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - crack in wall	10	15, pp. 1120, 1126
UNIT_028	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1256, 1259 to 1261
UNIT_030	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - earthen floors	10	15, pp. 1339, 1346
UNIT_031	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - drain	10	15, pp. 1378, 1380, 1383
UNIT_032	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1408, 1413 to 1415
UNIT_033	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 1426, 1428, 1431
UNIT_035	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1469, 1474 to 1476

TABLE 14: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
ROS 1 through ROS 62	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	Greater than 0	1, Section 5.2.1.1.2.1

Notes:

ASC	Area of subsurface contamination	COM	Commercial property	ID	Identification
UNIT	Residential property	PCE	Tetrachloroethylene	TCE	Trichloroethylene

Structure Containment Value: 10

The highest structure containment value for the structures in the above table is the assigned structure containment value.

(Ref. 1, Section 5.2.1.1.2.1, Table 5-12)

ASC Hazardous Waste Quantity (HWQ)

HWQ values for Tier A, Hazardous Constituent Quantity and Tier B, Hazardous Wastestream Quantity cannot be determined for an ASC (Ref. 1, Section 2.4.2.1 and Table 2-5 and Section 5.2.1.2.2). However, Tier C, Volume, can be determined and Tier D, Area, can be determined. MPCA obtained the area of the occupied structures in square feet from the Hennepin County tax assessor's website (Refs. 13, p. 28; 28, pp. 27, 28, 29, 30). In accordance with the HRS, the default minimum ceiling height of 8 feet was used to determine the volume (Tier C) (Ref. 1, Section 5.2.1.1.1). The square footage of the occupied structures was multiplied by 8 to obtain the volume in cubic feet. The product was multiplied by 0.037037 to convert the volume to cubic yards (yd^3) (Ref. 1, Section 5.2.1.2.2).

Tier C – Volume

TABLE 15: List of Regularly Occupied Structures					
Structure ID	**Structure Containment (Ref. 1, Table 5-12)**	**Estimated Area (ft^2)**	**Volume (ft^3)[a]**	**Volume (yd^3)[b]**	**References**
COM_001	2	25,017	200,136	7,412.44	13, p. 28; 15, pp. 2, 4; 28, p. 27
COM_002	2	14,122	112,976	4,184.29	13, p. 28; 15, pp. 35, 36; 28, p. 27
COM_003	2	58,829	470,632	17,430.80	13, p. 28; 28, p. 26
COM_004	4	23,601	188,808	6,992.88	13, p. 28; 15, pp. 49, 51; 28, p. 27
COM_005	4	29,904	239,232	8,860.44	13, p. 28; 15, pp. 92, 93; 28, p. 27
COM_006	2	39,636	317,088	11,743.99	13, p. 28; 15, pp. 121, 122 to 124; 28, p. 267
COM_007	10	64,990	519,920	19,256.28	13, p. 28; 15, pp. 147, 149; 28, p. 27
COM_008	Greater than 0	25,131	201,048	7,446.21	1, Section 5.2.1.1.2.1; 13, p. 28; 15, pp. 179, 188; 28, p. 27
COM_009	10	41,177	329,416	12,200.58	13, p. 28; 15, pp. 191,193; 28, p. 28
COM_010	4	9,343	74,744	2,768.29	13, p. 28; 28, p. 28
COM_011	10	47,661	381,288	14,121.76	13, p. 28; 28, p. 28
COM_012	4	12,298	98,384	3,643.85	13, p. 28; 15, pp. 270, 292; 28, p. 26
COM_013	4	16,303	130,424	4,830.51	13, p. 28; 15, pp. 304, 306; 28, p. 28
COM_014	4	10,656	85,248	3,157.33	13, p. 28; 15, pp. 344, 345; 28, p. 28
COM_015	2	11,518	92,144	3,412.74	13, p. 28; 28, p. 28
COM_016	4	36,719	293,752	10,879.70	13, p. 28; 15, pp. 390, 392, 393; 28, p. 28

TABLE 15: List of Regularly Occupied Structures					
Structure ID	**Structure Containment (Ref. 1, Table 5-12)**	**Estimated Area (ft^2)**	**Volume (ft^3)[a]**	**Volume (yd^3)[b]**	**References**
COM_017	4	19,260	154,080	5,706.66	15, pp. 459, 460; 28, p. 28
COM_018[d]	2	62,641 - 780 (basement) = 61,861	494,888	18,329.17	15, pp. 504, 505; 28, p. 28
COM_019	4	16,685	133,480	4,943.70	13, p. 28; 15, pp. 538, 539; 28, p. 28
COM_020	4	1,222	9,776	362.07	13, p. 28; 15, pp. 565, 566; 28, p. 28
COM_021	2	7,056	56,448	2,090.66	13, p. 28; 15, pp. 588, 589; 28, p. 28
COM_022	4	3,568	28,544	1,057.18	13, p. 28; 15, pp. 613, 614; 28, p. 28
COM_023	4	16,855	134,840	4,994.07	13, p. 28; 15, pp. 634, 635; 28, p. 28
COM_025	4	14,270	114,160	4,228.14	13, p. 28; 15, pp. 730, 731; 28, p. 28
COM_026	2	91,457	731,656	27,098.34	13, p. 28; 15, pp. 752, 754; 28, p. 28
COM_027	2	403,947	3,231,576	119,687.88	13, p. 28 ; 15, pp. 799, 801; 28, p. 28
COM_028	2	44,934	359,472	13,313.76	13, p. 28 ; 15, pp. 908, 910; 28, p. 28
UNIT_001	2	34,596	276,768	10,250.66	13, p. 28
UNIT_002	4	1,363	10,904	403.85	28, p. 29
UNIT_006	4	1,062	8,496	314.67	28, p. 29
UNIT_007	4	1,450	11,600	429.63	28, p. 29
UNIT_008	4	786	6,288	232.89	15, pp. 992, 996; 28, p. 29
UNIT_010	4	834	6,672	247.11	15, pp. 1041, 1046; 28, p. 29
UNIT_011	4	1,122	8,976	332.44	28, p. 29
UNIT_012	10	1,094	8,752	324.15	15, pp. 1058, 1060; 28, p. 29
UNIT_013	4	917	7,336	271.70	15, pp. 1080, 1084; 28, p. 29
UNIT_014	4	1,144	9,152	338.96	28, p. 29
UNIT_015	4	1,222	9,776	362.07	15, pp. 1103, 1107; 28, p. 29
UNIT_020	10	1,096	8,768	324.74	15, p. 1120, 1126; 28, p. 29
UNIT_028	4	14,005	112,040	4,149.63	15, pp. 1256, 1298
UNIT_030	10	1,564	12,512	463.41	15, pp. 1339, 1341; 28, p. 30

TABLE 15: List of Regularly Occupied Structures					
Structure ID	**Structure Containment (Ref. 1, Table 5-12)**	**Estimated Area (ft^2)**	**Volume (ft^3)[a]**	**Volume (yd^3)[b]**	**References**
UNIT_031	10	855	6,840	253.33	15, pp. 1378, 1380; 28, p. 30
UNIT_032	4	874	6,992	258.96	15, pp. 1408, 1410; 28, p. 30
UNIT_033	10	810	6,480	240.0	15, pp. 1426, 1428; 28, p. 30
UNIT_035	4	1,610	12,880	477.04	15, pp. 1469, 1471; 28, p. 30
ROS 1 through ROS 62	Greater than 0	NE[C]	NE	NE[c]	1, Section 5.2.1.1.2.1
TOTAL				**359,828.96**	

Notes:

[a] Area in square feet × 8 ft default ceiling height (Ref. 1, Section 5.2.1.2.2).
[b] 1 ft^3 × 0.037037 = 1 yd^3
[c] This measure could be used to calculate HWQ for the ROS structures, nevertheless EPA is not doing this as the pathway score reaches its maximum without inclusion of the area HWQ. A default area of 1,740 square feet for each residential structure would be used (Ref. 1, Section 5.2.1.2.2) resulting in a value of 107,880 square feet which in turn is divided by 13 coming to an area assigned value of 8,298.461538 (Ref. 1, Table 5-19). The volume assigned value is much greater than the area assigned value.
[d] Small partial basement excluded from area of slab.
COM Commercial property
ft^2 Square feet
ft^3 Cubic feet
ID Identification
NE Not evaluated. These properties were not evaluated because the area of the structures was not obtained by MPCA.
UNIT Residential property
yd^3 Cubic yards

Sum (cubic yards): 359,828.96
Sum of values/2.5 (V/2.5): 359,828.96 ÷ 2.5 = 143,931.58
Equation for Assigning Value (Ref. 1, Table 5-19):
Volume Assigned Value: 143,931.58

Tier D – Area

Tier D, Area, was not scored for ASC A because the volume was estimated. Therefore, in accordance with the HRS, the area is not calculated (Ref. 1, Section 2.4.2.1.3 and 2.4.2.1.4)

Area Assigned Value: Not scored

Hazardous Waste Quantity

TABLE 16: ASC A - Hazardous Waste Quantity		
Area of Subsurface Contamination Number	**Hazardous Waste Quantity Value**	**Reference**
A	143,931.58	13, p. 28; 28, pp. 27, 28, 29, 30

ASC Hazardous Waste Quantity Factor Value: 143,931.58

5.2.1 SUBSURFACE INTRUSION COMPONENT

5.2.1.1 LIKELIHOOD OF EXPOSURE

5.2.1.1.1 Observed Exposure

Observed exposure was not scored for this HRS documentation record. See additional supporting information at the end of previous investigations in the Site Description section of this HRS documentation record.

5.2.1.1.2 Potential for Exposure

Potential for exposure is scored when an observed exposure is not documented.

5.2.1.1.2.1 Structure Containment

Groundwater and sub-slab soil gas samples collected within ASC A contained concentrations of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride (vinyl chloride not in soil gas) above background levels (see Tables 9 and 11 of this HRS documentation record). These releases indicate potential for migration of hazardous substances into indoor air via subsurface intrusion. To assign containment factors for occupied structures that overlie ASC A, the following were evaluated: preferential pathways for subsurface intrusion including cracks in foundations and walls near foundations, unsealed utility lines, sumps, earthen or incompetent floors, and crawl spaces; need for vapor mitigation systems; and presence of hazardous substances in indoor air. SSDS have been installed at some properties within ASC A. Post-mitigation sampling at COM_27 has revealed the presence of chlorinated VOCs at levels above laboratory reporting limits and MPCA Intrusion Screening Values (ISVs) indicating VOCs continue to enter the structure through preferential pathways (Refs. 1, Section 5.2.1.1.2.1; 13, p. 19; 28, p. 20, 21) (see Ref. 1, Section 5.2.1.1.2.1) (see Tables 9 and 11 of this HRS documentation record).

TABLE 17: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
COM_001	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_002	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_003	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_004	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 49, 55, 57
COM_005	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 92, 95
COM_006	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_007	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 147, 152
COM_008	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	Greater than 0	1, Section 5.2.1.1.2.1; 15, pp. 179 to 183
COM_009	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 191, 196, 197

TABLE 17: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
COM_010	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 224, 230, 231
COM_011	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 250, 258, 259
COM_012	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 270, 273
COM_013	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 304, 314, 316
COM_014	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 344, 347, 348
COM_015	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_016	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 390, 398
COM_017	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 459, 460, 463
COM_018	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_019	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 538, 541, 542,

TABLE 17: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
COM_020	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 565, 568 to 570
COM_021	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_022	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 613, 617 to 619
COM_023	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 634, 637 to 639
COM_025	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 730, 733 to 735
COM_026	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_027	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
COM_028	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
UNIT_001	Regularly occupied structure with an engineered, active vapor mitigation system without documented institutional controls and funding in place for ongoing operation, inspection, and maintenance	2	29, pp. 1, 2
UNIT_002	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29

TABLE 17: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
UNIT_006	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29
UNIT_007	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29
UNIT_008	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 992, 995
UNIT_010	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1041, 1044
UNIT_011	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29
UNIT_012	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 1058, 1063
UNIT_013	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1080, 1083
UNIT_014	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	28, p. 29
UNIT_015	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1103, 1106
UNIT_020	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - crack in wall	10	15, pp. 1120, 1126

TABLE 17: ASC A Structure Containment			
Regularly Occupied Structure ID	**Structure Description**	**Containment Factor Value (Ref. 1, Table 5-12)**	**References**
UNIT_028	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1256, 1259 to 1261
UNIT_030	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - earthen floors	10	15, pp. 1339, 1346
UNIT_031	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - drain	10	15, pp. 1378, 1380, 1383
UNIT_032	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1408, 1413 to 1415
UNIT_033	Regularly occupied structure with open subsurface intrusion preferential pathways (such as sumps, unsealed utility lines, foundation cracks, floor drains, trenches) - sump pump	10	15, pp. 1426, 1428, 1431
UNIT_035	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	4	15, pp. 1469, 1474 to 1476
ROS 1 through ROS 62	Regularly occupied structure with no visible open preferential subsurface intrusion pathways from the subsurface (such as sumps, foundation cracks, unsealed utility lines)	Greater than 0	1, Section 5.2.1.1.2.1

Notes:

ASC	Area of subsurface contamination	COM	Commercial property	ID	Identification
UNIT	Residential property	PCE	Tetrachloroethylene	TCE	Trichloroethylene

Structure Containment Value: 10

The highest structure containment value for the structures in the above table is the assigned structure containment value. (Ref. 1, Section 5.2.1.1.2.1, Table 5-12)

5.2.1.1.2.2 Depth to Contamination

ASC A is delineated based on sub-slab soil gas samples collected less than 5 feet below the concrete foundations of regularly occupied structures, and based on groundwater samples from temporary and permanent monitoring wells completed in the Quaternary aquifer (Refs. 8, pp. 62, 63; 13, pp. 95, 96, 97, 98; 39, pp. 1). The thickness of foundations of regularly occupied structures ranges from 3 to 10 inches, and the sub-slab samples were collected at depths less than 5 feet below the foundations (Refs. 15, pp. 17, 43, 101, 262, 601, 765, 821, 1436, 1438, 1462; 39, pp. 1). The depth to contamination was based on slab thickness information collected during sampling and included in Reference 15. The shallowest sub-slab samples were collected at 4 inches in depth and include laboratory sample identifications 10424218001; 10424218003; 10424218005; 10424218007; 10424218009; and 10423667009 (see Table 10 of this HRS documentation record). Therefore, a depth to contamination factor value of 10 is assigned (Ref. 1, Section 5.2.1.1.2.2, Table 5-13).

Depth to Contamination Factor Value: 10
(Ref. 1, Table 5-13)

5.2.1.1.2.3 Vertical Migration

As stated in Section 5.2.1.1.2.2 above, sub-slab soil gas samples were collected at depths less than 5 feet below the foundation of regularly occupied structures within ASC A (see Table 10 of the HRS documentation record). The depth to contamination was based on slab thickness information collected during sampling and included in Reference 15. The shallowest sub-slab samples were collected at 4 inches in depth and include laboratory sample identifications 10424218001; 10424218003; 10424218005; 10424218007; 10424218009; and 10423667009 (see Table 10 of this HRS documentation record). In accordance with Reference 1, Section 5.2.1.1.2.3, if depth to contamination is less than 10 feet, a vertical migration factor value of 15 is assigned (Ref. 1, Section 5.2.1.1.2.3).

Vertical Migration Factor Value: 15
(Ref. 1, Table 5-15)

5.2.1.1.2.4 Vapor Migration Potential

Depth to contamination in ASC A is less than 10 feet bgs, and sub-slab soil gas sampling depths ranged from 3 to 10 inches (Ref. 15, pp, 17, 43, 262, 765, 821, 1438, 1462; see Table 10 of this HRS documentation record). The depth to contamination was based on slab thickness information collected during sampling and included in Reference 15. The shallowest sub-slab samples were collected at 4 inches in depth and include laboratory sample identifications 10424218001; 10424218003; 10424218005; 10424218007; 10424218009; and 10423667009 (see Table 10 of this HRS documentation record). In accordance with Reference 1, Section 5.2.1.1.2.4, if depth to contamination is less than 10 feet, a vapor migration potential factor value of 25 is assigned (Ref. 1, Section 5.2.1.1.2.4).

Vapor Migration Potential Factor Value: 25
(Ref. 1, Table 5-17)

5.2.1.1.2.5 Calculation of Potential for Exposure Factor Value

Depth to Contamination Factor Value: 10
Vertical Migration Factor Value: 15
Vapor Migration Potential Factor Value: 25
Structure Containment Factor Value: 10

(Depth to Contamination + Vertical Migration + Vapor Migration Potential) x Structure Containment:
(10 + 15+ 25) × 10 = 500

Potential for Exposure Factor Value (Ref. 1, Sec. 5.2.1.1.2.5): 500

Likelihood of Exposure Factor Category Value: 500
(Ref. 1, Sec. 5.2.1.1.3)

5.2.1.2 WASTE CHARACTERISTICS

5.2.1.2.1 Toxicity/Degradation

Tables 18 and 19 below summarize toxicity and degradation factor values for the hazardous substances detected in samples collected from ASC A where regularly occupied structures with containment factor values greater than zero are located. All these substances are eligible subsurface intrusion substances per HRS, Section 5.2.1.1.2 because they were documented as part of the ASC and because these are hazardous substances with a vapor pressure greater than or equal to one torr or a Henry's constant greater than or equal to 10^{-5} atm-m^3/mol. The combined toxicity/degradation factor values are assigned in accordance with Reference 1, Section 5.2.1.2.1.3, and are listed in Table 20.

Toxicity Factor Value

The toxicity values were assigned in accordance with Reference 1, Section 5.2.1.2.1.1.

TABLE 18: ASC A Toxicity Factor Value		
Hazardous Substance	**Toxicity Factor Value**	**Reference**
cis-1,2-Dichloroethylene	1,000	2, p. 1
trans-1,2-Dichloroethylene	100	2, p. 2
Tetrachloroethylene	100	2, p. 3
Trichloroethylene	1,000	2, p. 4
Vinyl chloride	10,000	2, p. 5

Degradation Factor Value

The degradation factor values were assigned in accordance with Reference 1, Section 5.2.1.2.1.2. The following hazardous substances were detected in sub-slab soil gas samples at 4 inches below the ground surface: cis-1,2-dichloroethylene , trans-1,2-dichloroethylene, tetrachloroethylene, and trichloroethylene (see Tables 10 and 11 of this HRS documentation record). Vinyl chloride was not detected soil gas samples but was detected in groundwater samples at the shallowest depth of 10.5 feet bgs (See Tables 8 and 9 of this HRS documentation record).

TABLE 19: ASC A Degradation Factor Value

Hazardous Substance	Sample Depth/ Laboratory ID	Depth to Contamination Assigned Value (Ref. 1, Table 5-13)	Half Life (days)	In Observed Exposure? (Y/N)	Is NAPL present within 30 ft? (Y/N?)	Degradation Factor Value (Ref. 1, Table 5-18)	References (1, Tables 5-13 and 5-18)
cis-1,2-Dichloroethylene	4 inches/ 10424218001	10	31	No	No	1	2, p. 1; Tables 10 and 11 of this HRS documentation record
trans-1,2-Dichloroethylene	4 inches/ 10424218001	10	1*	No	No	1	2, p. 2; Tables 10 and 11 of this HRS documentation record
Tetrachloroethylene	8 inches/ 10432470005	10	154	No	No	1	2, p. 3; Tables 10 and 11 of this HRS documentation record
Trichloroethylene	4 inches/ 10424218001	10	171	No	No	1	2, p. 4; Tables 10 and 11 of this HRS documentation record
Vinyl chloride	10.5 feet/ 10387334002	10	171	No	No	1	2, p. 5; Tables 8 and 9 of this HRS documentation record

Note: *If no half-life information is available and the substance is not already assigned a factor value of 1, a value of 1 is assigned (Ref. 1, Section 5.2.1.2.1.2).

The toxicity/degradation factor values were assigned in accordance with Reference 1, Section 5.2.1.2.1.3.

TABLE 20: Subsurface Intrusion Toxicity/Degradation					
Hazardous Substance	**ASC Letter**	**Toxicity Factor Value**	**Degradation**	**Toxicity/ Degradation (Ref. 1, Section 5.2.1.2.1.3)**	**Reference**
cis-1,2-Dichloroethylene	A	1,000	1	1,000	2, p. 1
trans-1,2-Dichloroethylene	A	100	1	100	2, p. 2
Tetrachloroethylene	A	100	1	100	2, p. 3
Trichloroethylene	A	1,000	1	1,000	2, p. 4
Vinyl chloride	A	10,000	1	10,000	2, p. 5

For the subsurface intrusion component, vinyl chloride has the highest toxicity factor value of 10,000 (Ref. 2, p. 5). Vinyl chloride was detected in groundwater samples collected within ASC A (see Table 9 of this HRS documentation record). The half-life values were obtained from the EPA Superfund Chemical Data Matrix (Ref. 2, pp. 1, 2, 3, 4, 5). The hazardous substance with the highest combined toxicity/degradation value (vinyl chloride) is used to assign the toxicity/degradation factor value for this SE Hennepin site.

Toxicity/Degradation Factor Value: 10,000
(Ref. 1, Section 5.2.1.2.1.3)

5.2.1.2.2 Hazardous Waste Quantity

TABLE 21: Hazardous Waste Quantity	
Area of Subsurface Contamination Letter	**ASC Hazardous Waste Quantity**
A	143,931.58

ASC A includes commercial and residential regularly occupied structures (see Figures 3 and 4 of this HRS documentation record). See Table 15 of this HRS documentation record for the volume of the structures and the determination of the HWQ assigned value of 143,931.58.

Hazardous Waste Quantity Factor Value: 10,000
(Ref. 1, Table 2-6)

5.2.1.2.3 Calculation of Waste Characteristics Factor Category Value

For waste characteristics, vinyl chloride has the highest toxicity/degradation factor value of 10,000 (Ref. 2, p. 5) (see Table 20 of this HRS documentation record). The waste characteristics factor value was obtained by multiplying the toxicity/degradation and hazardous waste quantity factor values (Ref. 1, Section 5.2.1.2.3). Based on this product, a value was assigned in accordance with Reference 1, Table 2-7.

Toxicity/Degradation Factor Value (see Section 5.2.1.2.1 of this HRS documentation record): 10,000
Hazardous Waste Quantity Factor Value (see Section 5.2.1.2.2 of this HRS documentation record): 10,000

Toxicity/Degradation Factor Value ×
Hazardous Waste Quantity Factor Value: 1×10^8

Waste Characteristics Factor Category Value: 100
(Ref. 1, Table 2-7)

5.2.1.3 TARGETS

Of the 107 regularly occupied structures within ASC A, 27 are commercial and 80 are residential (see Figures 3 and 4 of this HRS documentation record). The regularly occupied structures do not have subunits (Ref. 39). Populations of these structures were obtained during the MPCA sampling investigations (Refs. 13, p. 28; 28, pp. 27, 28, 29, 30). If MPCA was unable to obtain residential population, the U.S. Census persons per household factor value of 2.4 for Hennepin County, MN was used (Ref. 32). Populations that reside or work in the regularly occupied structures are estimated at 822 full-time workers, 69 part-time workers, and 218 residents (Refs. 13, p. 28; 15, pp. , 195, 229, 257, 313, 567, 804, 930, 949, 1043, 1062, 1105, 1121, 1343, 1430, 1456; 28, pp. 27, 28, 29, 30) (see Tables 22 and 23 of this HRS documentation record).

5.2.1.3.1 Exposed Individual

Elevated concentrations of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride in groundwater and sub-slab soil gas (no vinyl chloride in soil gas) samples have been documented in ASC A (see Tables 4, 6, 8 and 10 of this HRS documentation record). In accordance with Reference 1, Section 5.2.1.3.1, a factor value of 20 is assigned for the subsurface intrusion component when actual contamination at Level I or Level II concentrations has not been documented and there are residents and/or workers in regularly occupied structures in an ASC.

ASC Letter: A
Level of Contamination: Potential
References: 1, Section 5.2.1.3.1; 13, p. 28; 28, pp. 27, 28, 29, 30.

Exposed Individual Factor Value: 20
(COM_001 was used to evaluate the Exposed Individual factor, see Table 22)

5.2.1.3.2 Population

5.2.1.3.2.1 Level I Concentrations

An AOE was not scored; therefore, Level I concentrations are not scored.

Level I Concentrations Factor Value: Not scored

5.2.1.3.2.2 Level II Concentrations

An AOE was not scored; therefore, Level II concentrations are not scored.

Level II Concentrations Factor Value: Not scored

5.2.1.3.2.3 Population within Area(s) of Subsurface Contamination

Populations within ASC A are commercial and residential regularly occupied structures (see Section 5.2.0 and Figure 4 of this HRS documentation). The worker and residential populations were obtained by MPCA during the sampling investigations (Refs. 13, pp. 27, 28; 28, pp. 27, 28, 29, 30). If MPCA was unable to obtain residential population, the U.S. Census persons per household factor value of 2.4 for Hennepin County, MN was used (Ref. 32). Table 22 below lists regularly occupied structures within ASC A and the weighting factor from HRS Table 5-21, and Table 23 lists the population assigned to the regularly occupied structures within ASC A. The foundation thickness of the regularly occupied structures range from 3 to 10 inches, and sub-slab samples were within 6 inches below the foundations (Ref. 15, pp. 262, 601, 1436, 1438, 1462) (See Table 12 of this HRS documentation record). The Weighting Factor Value of 0.4 from HRS Table 5-21 is used for those structures where sub-slab samples were collected.

Groundwater samples were collected at various depths ranging from 10.5 and 69 feet to the top of the water column. Most of the groundwater samples were collected at depths less than 35 feet below ground surface. Some of the highest concentrations detected were the shallow wells with depths less than 20 feet bgs (see Tables 8 and 9 of this HRS documentation record).

TABLE 22: Regularly Occupied Structures Within ASC A

Regularly Occupied Structure ID	Associated Location ID/ Inferred Subsurface Contamination*	Associated Sample Media/Type	Depth or Distance to Contamination (bgs)	Presence of NAPLs? (Y/N)	Weighting Factor Value HRS Table 5-21	References
COM_001	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
COM_002	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
COM_003	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
COM_004	COM_19, SS-03 (COM_004, SS-02, SS-07), Inferred	Sub-slab SG	8 inches (6 inches)	N	0.4	Tables 10 to 13, Figure 4; 15, pp. 49, 63, 73,538, 549, 550; 62
COM_005	SP-37, Inferred	Groundwater	18 to 23 ft bgs	N	0.1	Tables 8 and 9, Figure 4
COM_006	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
COM_007	SP-35, Inferred	Groundwater	15 to 20 ft bgs	N	0.1	Tables 8 and 9, Figure 4
COM_008	SP-37, Inferred	Groundwater	18 to 23 ft bgs	N	0.1	Tables 8 and 9, Figure 4
COM_009	COM_021, SS-05 (COM_10, SS-05), Inferred	Sub-slab SG	4 inches (10 inches)	N	0.4	Tables 10 to 13, Figure 4; Ref. 15, p. 224, 241, 588, 605; 62
COM_010	COM_021, SS-03 (SS-01 to SS-05), Inferred	Sub-slab SG	4 inches (10 inches)	N	0.4	Tables 10 to 13, Figure 4; Ref. 15, pp. 224, 237 to 241, 588, 603; 62
COM_011	COM_21, SS-03, Inferred	Sub-slab SG	4 inches	N	0.4	Tables 10 and 11, Figure 4; 15, p. 588, 603; 62

TABLE 22: Regularly Occupied Structures Within ASC A						
Regularly Occupied Structure ID	**Associated Location ID/ Inferred Subsurface Contamination***	**Associated Sample Media/Type**	**Depth or Distance to Contamination (bgs)**	**Presence of NAPLs? (Y/N)**	**Weighting Factor Value HRS Table 5-21**	**References**
COM_012	COM_21, SS-03 (COM_001, SS-02), Inferred	Sub-slab SG	4 inches (8 inches)	N	0.4	Tables 10 to 13, Figure 4; 15, p. 2, 17, 588, 603; 62
COM_013	COM_21, SS-03, (COM_14, SS-03), Inferred	Sub-slab SG	4 inches (6 inches)	N	0.4	Tables 10 to 13, Figure 4; 15, p. 344, 356, 588, 603; 62
COM_014	COM_23, SS-05(COM_014, SS-03), Inferred	Sub-slab SG	4 inches (6 inches)	N	0.4	Tables 10 to 13, Figure 4; 15, p. 344, 356, 634,651; 62
COM_015	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
COM_016	COM_023, SS-05 (COM_016, SS-01), Inferred	Sub-slab SG	4 inches (8 inches)	N	0.4	Tables 10 to 13, Figure 4; 15, p. 390, 415, 634,651; 62
COM_017	COM_023, SS-05, Inferred	Sub-slab SG	4 inches	N	0.4	Tables 10 and 11, Figure 4; 15, p. 634, 645; 62
COM_018	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
COM_019	SS-03, SS-04	Sub-slab SG	8 inches	N	0.4	Tables 10 and 11 Figure 4; 15, p. 538, 549, 550
COM_020	SS-03	Sub-slab SG	5 inches	N	0.4	Tables 10 and 11; Figure 4; Ref. 15, p. 565, 576
COM_021	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
COM_022	304GS or SP-32, Inferred	Groundwater	10.5-20.5 ft bgs 27.5-31.5 ft bgs	N	0.1	Tables 8 and 9, Figure 4
COM_023	SS-05	Sub-slab SG	4 inches bgs	N	0.4	Tables 10 and 11, Figure 4; 15, p. 634, 645
COM_025	COM_023, SS-05 (COM_025,	Sub-slab SG	4 inches (4,8 inches bgs)	N	0.4	Tables 10 to 13, Figure 4;15, p.634,

TABLE 22: Regularly Occupied Structures Within ASC A						
Regularly Occupied Structure ID	**Associated Location ID/ Inferred Subsurface Contamination***	**Associated Sample Media/Type**	**Depth or Distance to Contamination (bgs)**	**Presence of NAPLs? (Y/N)**	**Weighting Factor Value HRS Table 5-21**	**References**
	SS-01, SS-02), Inferred					651, 730, 739; 62
COM_026	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
COM_027	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
COM_028	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
UNIT_001	Mitigation System	Mitigation System	Mitigation System	N	0.9	Ref. 29, p. 2; Tables 14 and 17, Figure 4
UNIT_002	305-GS, Inferred	Groundwater	12.5-22.5 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_006	305-GS, Inferred	Groundwater	12.5-22.5 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_007	305-GS, Inferred	Groundwater	12.5-22.5 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_008	305-GS, Inferred	Groundwater	12.5-22.5 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_010	SP-34S, Inferred	Groundwater	15-20 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_011	SP-34S, Inferred	Groundwater	15-20 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_012	SP-34S, Inferred	Groundwater	15-20 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_013	SP-34S, Inferred	Groundwater	15-20 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_014	SP-34S, Inferred	Groundwater	15-20 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_015	SP-34S, Inferred	Groundwater	15-20 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_020	SP-34S, Inferred	Groundwater	15-20 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_028	SP-32, Inferred	Groundwater	27.5-31.5 ft bgs	N	0.1	Tables 8 and 9; Figure 4;
UNIT_030	SP-32, Inferred	Groundwater	27.5-31.5 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_031	SP-32, Inferred	Groundwater	27.5-31.5 ft bgs	N	0.1	Tables 8 and 9; Figure 4; Ref. 15, p. 1388

TABLE 22: Regularly Occupied Structures Within ASC A						
Regularly Occupied Structure ID	**Associated Location ID/ Inferred Subsurface Contamination***	**Associated Sample Media/Type**	**Depth or Distance to Contamination (bgs)**	**Presence of NAPLs? (Y/N)**	**Weighting Factor Value HRS Table 5-21**	**References**
UNIT_032	SP-32, Inferred	Groundwater	27.5-31.5 ft bgs	N	0.1	Tables 8 and 9, Figure 4
UNIT_033	SP-32, Inferred	Groundwater	27.5-31.5 ft bgs	N	0.1	Tables 8 and 9; Figure 4; Ref. 15, pp. 1436, 1437
UNIT_035	SP-32, Inferred	Groundwater	27.5-31.85ft bgs	N	0.1	Tables 8 and 9, Figure 4
ROS 1 to ROS 62	SP-32, Inferred	Groundwater	27.5-31.5 ft bgs	N	0.1	Tables 8 and 9, Figure 4

Notes:

*	For structures assigned a weighting factor of 0.4, a nearby 2018 commercial sub-slab sample meeting observed release criteria is identified, followed by additional subslab samples (shown in parenthesis), supporting the presence of contamination beneath a structure's foundation.
ASC	Area of subsurface contamination
COM	Commercial property
ft bgs	Feet below ground surface
HRS	Hazard Ranking System
ID	Identification number
N	No
NAPL	Nonaqueous phase liquid
ROS	Regularly occupied structure (residential)
SG	Soil gas
UNIT	Residential property
Y	Yes

TABLE 23: Populations in ASC A									
Regularly Occupied Structure ID	No. of Exposed Individuals (Non-Workers)	No. of Full-Time Workers		No. of Part-Time Workers		Total Adjusted Population per Regularly Occupied Structure	Weighting Factor Value (HRS Table 5-21)	Regularly Occupied Structure's Total Population Value	References
		Actual	Adjusted (No./3)	Actual	Adjusted (No./6)				
COM_001	NA	20	6.66	0	NA	6.66	0.9	5.99	13, p. 28; 15, pp. 2, 6; 28, p. 27; 29
COM_002	NA	52	17.33	6	1	18.33	0.9	16.49	13, p. 28; 15, pp. 35, 37; 28, p. 27; 29
COM_003	NA	50	16.66	0	NA	16.66	0.9	14.99	13, p. 28; 28, p. 27; 29
COM_004	NA	105	35	1	0.16	36.16	0.4	14.46	13, p. 28; 28, p. 27
COM_005	NA	15	5	0	NA	5	0.1	0.50	13, p. 28; 15, pp. 92, 94; 28, p. 27
COM_006	NA	42	14	1	0.16	14.16	0.9	12.74	13, p. 28; 28, p. 27; 29
COM_007	NA	95	31.66	5	0.83	32.49	0.1	3.24	13, p. 28; 15, pp. 147, 151; 28, p. 27
COM_008	NA	30	10	0	NA	10	0.1	1.00	13, p. 28; 28, p. 27
COM_009	NA	50	16.66	0	NA	16.66	0.4	6.66	13, p. 28; 15, p. 191, 195; 28, p. 28
COM_010	NA	7	2.33	0	NA	2.33	0.4	0.93	13, p. 28; 15, p. 224, 229; 28, p. 28
COM_011	NA	40	13.33	0	NA	13.33	0.4	5.33	13, p. 28; 15, p. 250, 257; 28, p. 28; 61, p. 1

TABLE 23: Populations in ASC A									
Regularly Occupied Structure ID	No. of Exposed Individuals (Non-Workers)	No. of Full-Time Workers		No. of Part-Time Workers		Total Adjusted Population per Regularly Occupied Structure	Weighting Factor Value (HRS Table 5-21)	Regularly Occupied Structure's Total Population Value	References
		Actual	Adjusted (No./3)	Actual	Adjusted (No./6)				
COM_012	NA	13	4.33	0	NA	4.33	0.4	1.73	13, p. 28; 28, p. 26; 28, p. 28
COM_013	NA	40	13.33	0	NA	13.33	0.4	5.33	13, p. 28; 15, p. 304, 313; 28, p. 28; 61, p. 1
COM_014	NA	30	10	0	NA	10	0.4	4.00	13, p. 28; 15, p. 344, 346; 28, p. 28
COM_015	NA	34	11.33	5	0.83	12.16	0.9	10.94	13, p. 28; 28, p. 26; 28, p. 28; 29
COM_016	NA	11	3.66	0	NA	3.66	0.4	1.46	13, p. 28; 28, p. 28
COM_017	NA	26	8.66	8	1.33	9.99	0.4	3.99	13, p. 28; 28, p. 28
COM_018[1]	NA	25	8.33	0	NA	8.33	0.9	7.49	13, p. 28; 15, pp. 504, 506; 28, p. 28; 29
COM_019	NA	6	2	0	NA	2	0.4	0.80	13, p. 28; 28, p. 28
COM_020	NA	3	1	8	1.33	2.33	0.4	0.93	13, p. 28; 15, p. 565, 567; 28, p. 28
COM_021	NA	5	1.66	22	3.66	5.32	0.9	4.78	13, p. 28; 28, p. 28; 29
COM_022	NA	18	6	2	0.33	6.33	0.1	0.63	13, p. 28; 28, p. 28
COM_023	NA	7	2.33	1	0.16	2.49	0.4	0.99	13, p. 28; 28, p. 28

TABLE 23: Populations in ASC A									
Regularly Occupied Structure ID	No. of Exposed Individuals (Non-Workers)	No. of Full-Time Workers		No. of Part-Time Workers		Total Adjusted Population per Regularly Occupied Structure	Weighting Factor Value (HRS Table 5-21)	Regularly Occupied Structure's Total Population Value	References
		Actual	Adjusted (No./3)	Actual	Adjusted (No./6)				
COM_025	NA	8	2.66	2	0.33	2.99	0.4	1.19	13, p. 28; 28, p. 28
COM_026	NA	30	10	8	1.33	11.33	0.9	10.19	13, p. 28; 15, pp. 752, 758; 28, p. 28
COM_027	NA	50	16.66	0	NA	16.66	0.9	14.99	13, p. 28; 15, p. 799, 804; 28, p. 28
COM_028	NA	9	3	0	NA	3	0.9	2.70	13, p. 28
UNIT_001	NA	1	0.33	NA	NA	0.33	0.9	0.30	28, p. 29; Ref. 29
UNIT_002	5	NA	NA	NA	NA	5	0.1	0.50	28, p. 29
UNIT_006	5	NA	NA	NA	NA	5	0.1	0.50	28, p. 29
UNIT_007	6	NA	NA	NA	NA	6	0.1	0.60	28, p. 29
UNIT_008	4	NA	NA	NA	NA	4	0.1	0.40	15, p. 992, 994; 28, p. 29
UNIT_010	1	NA	NA	NA	NA	1	0.1	0.10	15, p. 1041, 1043; 28, p. 29
UNIT_011	2.4	NA	NA	NA	NA	2.4	0.1	0.24	28, p. 29; 32, p. 1; Figure 4
UNIT_012	2	NA	NA	NA	NA	2	0.1	0.2	15, p. 1058, 1062; 28, p. 29
UNIT_013	2.4	NA	NA	NA	NA	2.4	0.1	0.24	28, p. 29
UNIT_014	2.4	NA	NA	NA	NA	2.4	0.1	0.24	28, p. 29; 32, p. 1; Figure 4

TABLE 23: Populations in ASC A									
Regularly Occupied Structure ID	No. of Exposed Individuals (Non-Workers)	No. of Full-Time Workers		No. of Part-Time Workers		Total Adjusted Population per Regularly Occupied Structure	Weighting Factor Value (HRS Table 5-21)	Regularly Occupied Structure's Total Population Value	References
		Actual	Adjusted (No./3)	Actual	Adjusted (No./6)				
UNIT_015	2	NA	NA	NA	NA	2	0.1	0.20	15, pp. 1103, 1105; 28, p. 29
UNIT_020	5	NA	NA	NA	NA	5	0.1	0.50	15, p. 1120, 1121; 28, p. 29
UNIT_028	2.4	NA	NA	NA	NA	2.4	0.1	0.24	32, p. 1
UNIT_030	3	NA	NA	NA	NA	3	0.1	0.30	15, p. 1339, 1343; 28, p. 30
UNIT_031	2.4	NA	NA	NA	NA	2.4	0.1	0.24	28, p. 30; 32, p. 1; Figure 4
UNIT_032	2.4	NA	NA	NA	NA	2.4	0.1	0.24	28, p. 30; 32, p. 1; Figure 4
UNIT_033	4	NA	NA	NA	NA	4	0.1	0.40	15, p. 1426, 1430; 28, p. 30
UNIT_035	18	NA	NA	NA	NA	18	0.1	1.80	28, p. 30
ROS 1 to ROS 62	2.4 × 62 = 148.8	NA	NA	NA	NA	148.8	0.1	14.88	32, p. 1; Figure 4
Subtotal	218.2	822	NA	69	NA	NA	NA	NA	
Population within ASC A Factor Value								**176.09**	

Notes:
[1] The vapor instruction interior building survey form notes the number of occupants as 2,025 (Ref. 15, p. 507).

ASC Area of subsurface contamination
COM Commercial property
HRS Hazard Ranking System
ID Identification number
NA Not Applicable
ROS Regularly occupied structure (residential)
UNIT Residential property

5.2.1.3.2.4 Calculation of Population Factor Value

Level I Concentrations Factor Value: Not scored
Level II Concentrations Factor Value: Not scored
Population within an Area of Subsurface Contamination Factor Value: 176.09

Level I Concentrations + Level II Concentrations + Population within an Area of Subsurface Contamination: 176.09

Population Factor Value: 176.09

5.2.1.3.3 Resources

Resources were not scored.

Resources Factor Value: Not scored

5.2.1.3.4 Calculation of Targets Factor Category Value

Exposed Individual Factor Value: 20
Population Factor Value: 176.09
Resources Factor Value: Not scored

Exposed Individual + Population + Resources: 196.09

Targets Factor Category Value: 196.09