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Waterloo Building 4 Vapor Intrusion Mitigation System Pilot Test

Remedial Design Work Plan

July 18, 2019

Former New Hampshire Chemical Corp.

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Acronyms and Abbreviations

%	percent
AARST	American Association of Radon Scientists and Technologists
ANSI	American National Standards Institute
AOC B	Area of Concern B
cfm	cubic feet per minute
CH2M	CH2M HILL Engineers, Inc.
IDLH	immediately dangerous to life and health
IDW	investigation-derived waste
Jacobs	Jacobs Engineering Group Inc.
lb/hr	pounds per hour
LEL	lower explosive limit
mL/min	milliliter(s) per minute
NIOSH	National Institute for Occupational Safety and Health
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PHA	process hazard analysis
PPE	personal protection equipment
PVC	polyvinyl chloride
QC	quality control
RCRA	Resource Conservation and Recovery Act
RD	remedial design
ROI	radius of influence
Site	Former Hampshire Chemical Inc. Site – Area of Concern B
SSDS	subslab depressurization system
TCD	thermal conductivity detector
UEL	upper explosive limit
VI	vapor intrusion
VOC	volatile organic compound

1. Introduction

Jacobs Engineering Group Inc (Jacobs) has prepared this Remedial Design (RD) Work Plan on behalf of Dow Chemical as an outline for a pilot study as part of the mitigation of subslab vapors at the Former Hampshire Chemical Inc. Site – Area of Concern B (AOC B) (site) located at 228 East Main Street in the village of Waterloo, Seneca County, New York. The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has approved conducting this vapor mitigation pilot study to test subslab depressurization as a viable alternative for mitigation of potential vapor intrusion (VI) hazards posed by hydrogen sulfide and methane present in the subsurface at the site. This pilot test will measure the effectiveness of a subslab depressurization system (SSDS) to reduce the potential for hydrogen sulfide and methane from beneath the Building 4 slab to enter the building.

1.1 Background

The site is located at 228 East Main Street in the village of Waterloo, Seneca County, New York and is bordered to the north by East Main Street, to the east by Gorham Street, to the west by East Water Street, and to the south by the Cayuga-Seneca Canal (Figure 1). Evans Chemetics LP currently operates a specialty sulfur compound manufacturing facility at the site. The property contains several interconnected buildings that house chemical manufacturing facilities, offices, a quality control (QC) laboratory, maintenance, and shipping/receiving operations, as well as an industrial wastewater treatment plant. The site also includes outside drum storage areas and several tank farms.

The site is regulated under the Resource Conservation and Recovery Act (RCRA) with the NYSDEC as the lead agency. RCRA facility investigation efforts have been performed at the site since 1993 to evaluate the nature and extent of chemical releases at the site.

1.2 Pre-Design Investigations

High concentrations of methane and hydrogen sulfide exist in parts of the vadose zone beneath the slab of Building 4. In April and May 2017, 15 subslab sampling ports were installed across the site and sampled for hydrogen sulfide, methane, and volatile organic compounds (VOCs). In addition, a building survey and VI attenuation testing were undertaken to gather information useful for assessing interim mitigation actions. Results of the studies were reported in the *Evaluation of Subslab Hydrogen Sulfide and Methane Concentrations Technical Memorandum* (CH2M HILL Engineers, Inc. [CH2M][1] 2017). The technical memorandum summarized the data collected during the pre-design evaluation and indicated that a strongly anaerobic zone is present under Building 4 and that this anaerobic environment is the source of the hydrogen sulfide and methane vapors. Jacobs recommended that both institutional and engineering controls be evaluated to reduce the exposure risks related to high concentrations of hazardous vapors beneath Building 4. In addition, Jacobs suggested that a feasibility study for long-term mitigation/remediation alternatives for hydrogen sulfide and methane be completed.

In a response letter dated March 1, 2018, NYSDEC's approval of the *Evaluation of Subslab Hydrogen Sulfide and Methane Concentrations Technical Memorandum* (2017) included a request to conduct a feasibility study for long-term mitigation/remediation alternatives for hydrogen sulfide and methane. The approved pilot study mitigation alternative is the use of a subslab depressurization system (SSDS) to mitigate the vapor under the Building 4 slab.

1.3 Pilot Test Design Objective

The objective of the SSDS pilot test is to demonstrate that a sustained negative pressure differential of at least 0.004 inches of water or 1 pascal when measured under cold weather conditions, or 0.01 inches of

[1] CH2M HILL Engineers, Inc. is now a wholly owned subsidiary of Jacobs Engineering Group Inc.

water column or 2.5 pascal when measured under warm weather conditions (American National Standards Institute [ANSI]/American Association of Radon Scientists and Technologists [AARST], 2017), can be measured and maintained at all existing subslab probes within a determined radius (or zone) of influence. The negative pressure differential created and maintained by the SSDS will capture the potentially hazardous subslab vapors for subsequent treatment by an onsite existing scrubber system before discharge to the atmosphere. Reversing the pressure differential across the slab and capturing the subslab vapors will reduce the likelihood of the potentially hazardous subslab vapor migrating into and impacting indoor air at Building 4.

2. SSDS Pilot Design Remedy of Record

2.1 Pilot Test Overview

Two SSDS suction nodes were installed in December 2018 by coring a roughly 4-inch-diameter hole through the concrete floor and removing approximately 1.75 gallons of underlying material. The void created during drilling was filled with Silica Holliston Sand ½ x ¼" and Filpro Superior Quartz Filtration Media (pea gravel). The 3-inch Schedule 80 polyvinyl chloride (PVC) extraction piping was inserted directly into the concrete and sealed into the slab with epoxy so that a vacuum can be applied without leaks from the atmosphere. The pipe rises 2 feet above the ground and terminates in a 3-inch PVC butterfly valve that will be used to modify suction flow throughout the system. Figure 2 is a schematic of the installed subslab depressurization extraction points (Jacobs 2018a).

Five new subslab soil vapor probes (Cox Colvin Vapor Pins) were also installed in December 2018 to act as additional radius of influence (ROI) monitoring points during the SSDS pilot study. New and existing subslab soil vapor probes will be used together to monitor ROI. A leak check was performed on each newly installed vapor pin prior to sampling to ensure that its seal is intact. Figure 3 depicts locations of the installed extraction nodes and ROI monitoring points.

To conduct the test, the extraction point risers will be connected to the treatment scrubber through a length of stainless-steel piping. The extracted soil gas from the subsurface will then be diluted using a large volume of ambient air introduced through an additional pipe to lower the concentrations to below 20 percent of the lower explosive limit (LEL). The combined dilution air and extracted soil gas streams will then be conveyed to the scrubber pipe, site scrubber, and discharge stack. Figure 4 presents the process flow diagram of the proposed pilot test system.

The SSDS extraction riser, common stainless-steel piping, and air dilution system will be equipped with instrumentation to measure flow, pressure, humidity, and various chemicals in the soil gas including methane, hydrogen sulfide, sulfur dioxide, etc., and valves to maintain desired flow and pressure throughout the system.

2.2 Baseline Monitoring

Prior to startup of the pilot test, pressure differential baseline and methane and hydrogen sulfide vapor concentration readings from the headspace of monitoring wells (MW-03, MW-33, MW-34 and PZ-01), subslab monitoring points (SV-3, SV-4, SV-6, SV-7, SV-7r, SV-12, SV-17, SV-18, SV-19), and SSDS extraction wells (EX-02, EX-03) (Figure 3) will be collected.

The baseline results will be compared with the pilot test results and a post-sampling event to evaluate changes in the subslab conditions after the pilot test.

2.3 SSDS System Leak Test Procedures

Prior to pilot test startup, the SSDS pilot system will be tested for leaks. The leak check will confirm the integrity of the installed equipment and evaluate the potential for introduction of ambient air into the system as an important safety precaution. Three individual leak checks will be performed, one test for the extension pipe to the scrubber, a second for the SSDS extraction well riser seal, and a third for all pipe fittings, monitoring devices and sensor connections.

2.4 Flow Control Test and Balance

Before soil gas enters the system, the system will be operated on clean air. Clean air will be directed through the system at the anticipated pilot test flow rates and vacuums. The blower, dilution leg, and scrubber will be operated so that the ability of the flow control valves and measurement system to limit the initial flow of “soil gas” to 10 to 15 cfm can be verified.

2.5 SSDS Pilot Test Operations Overview

During the test, the scrubber system blower will create negative pressure in the extraction nodes and a vacuum will be propagated beneath the floor slab. Initial operations (Phase 1) are planned for up to 15 cfm at each individual extraction point separately. After operation of Phase 1, the subsurface temperature will be observed for a period of 4 weeks using the in-slab thermocouples.

After this period of observation is complete, additional testing will be performed with a goal of ramping up to 150 cfm (Phase 2) of soil gas extracted. The rate of ramp up will be determined in the field based on scrubber and dilution system capacity.

Each phase of operations is anticipated to take 2-3 weeks (Table 1). Operation of the pilot system will only take place while Jacobs personnel are on-site. This phased approach and temperature measurement monitoring will be performed to confirm that delayed pyrophoric iron sulfide oxidation processes are not observed.

Table 1

Pilot Study Phases of Field Work

Task	1st Qtr. 2019			2nd Qtr. 2019			3rd Qtr. 2019			4rth Qtr. 2019		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SSDS Node and ROI Points Installations												
Baseline Sampling - SSDS Nodes/ROI Points/Select SV Points												
Piping Placement Field Scoping/System Design/Permitting												
Construction											`	
Pilot System Commissioning												
Pilot Study Testing Phase 1 - Flow 15 CFM												
Intermediate Sampling - SSDS Nodes/ROI Points/Select SV Points												
Pilot Study testing Phase 2 - Flow 150 CFM												
Post Pilot Sampling - SSDS Nodes/ROI Points/Select SV Points												

Each extraction setting will be tested for 3 hours or more, if necessary, to achieve quasi steady-state differential pressure conditions. As explained above, the extraction point pipe has been designed with a butterfly valve to control the flow rate/negative pressure during the test. Pressure/flow rate, temperature and humidity will be continuously monitored while the blower is operating. After testing the two extraction nodes individually at each flow step, both nodes will be operated together, if appropriate.

The ROI of each extraction point will be determined by measuring the pressure differential in the subslab soil gas probes located within Building 4 and, if applicable, outside of Building 4 (SV-03, SV-04, and SV-08). Pressure differential readings provide a direct and quantitative means to measure a negative pressure field. A differential pressure of less than 0.002-inch of water (0.5-Pascal) is generally not considered significant.

Pressure differential at each subslab probe will be measured using micromanometers. To minimize exposure, four of these micromanometers will be maintained stationary at locations close to the extraction point where high concentrations of methane and hydrogen sulfide are expected based on results of previous sampling events (Jacobs 2018b). A fifth micromanometer will be used in a portable mode to measure differential pressure from the rest of the selected subslab soil gas probes further from the extraction points.

The results of the diagnostic tests will be reviewed as they occur. If necessary, sealing work will be done as discussed in the following section and the testing repeated.

At the end of system operations each day, the air flow from the blower to the extraction points will be turned off with valves and the concentrations of methane and hydrogen sulfide at the headspace of nearby monitoring wells will be measured. Readings will be compared in the data analysis phase to baseline concentrations readings to determine the impact of the SSDS test in the subslab soil gas concentrations. Methane concentration will be measured using a landfill gas meter (Landtec GEM 2000/5000 or equivalent) and the hydrogen sulfide concentration will be measured with a multi-gas meter (RKI GX-6000 or equivalent).

Once the diagnostic testing is completed in one extraction node, the riser and extension pipes will be closed using the tee and riser pipe butterfly valves. Equipment will be reconfigured in preparation for testing at the other extraction node. If time and resources allow, an optional third test may be conducted with simultaneous extraction from both nodes (to examine balancing the available flow between the two extraction nodes, and areas of synergy between the vacuum fields). If after the test, the ROI from the two locations is found insufficient to cover the entire Building 4 subslab area, installation of additional extraction nodes will be considered during design of the full-scale SSDS.

2.6 Pilot Diagnostic Testing and Sampling Procedures

To assess SSDS performance, the potential range of the ROI that can be reached around the SSDS extraction nodes will be evaluated by collecting differential pressure data from subslab soil gas probes previously installed throughout Building 4 slab. Additionally, soil vapor pin locations previously installed in nearby buildings will also be evaluated to assess potential preferential vapor flow paths extending beyond the study area.

The analytical sampling and field test data collection is to be completed as follows:

2.6.1 Sampling

- Three analytical sampling events will take place: 1) baseline sampling to establish initial concentrations prior to the commencement of the pilot test; 2) post-Phase 1 sampling to assess regeneration between tests and establish baseline for Phase 2; and 3) final sampling to assess regeneration rate of hydrogen sulfide and methane vapors after Phase 2 testing is complete.
- Sixteen vapor samples, plus one field duplicate sample, will be collected for laboratory analysis at the 11 ROI points (SV-05, SV-06, SV-07, WAT-SG-7R, SV-12, SV-17, SV-18, SV-15, SV-18, SV-20, and SV-21), two SSDS extraction wells (EX-02 and EX-03), and three monitoring wells' headspaces (MW-03, MW-33, and MW-34) during each phase of work.

2.6.2 Sampling Procedures

- Prior to collecting the subslab vapor samples differential pressures will be measured using a micromanometer and leak checks of the soil vapor pins will also be performed using the water dam method.
- Approximately 1 liter of soil vapor will be purged at a rate of 200 milliliters per minute (mL/min) from the subslab sampling port into a Tedlar bag over about a 5-minute period using a portable vacuum pump or lung box. After purging, the Tedlar bag will be removed and a 1-liter laboratory-supplied Silonite-lined stainless-steel sample canister will be attached to the sampling valve. Sampling will be

initiated by opening the sampling valve and soil vapor will be collected under a beginning canister gage vacuum of approximately -30 inches of mercury and will proceed until an ending vacuum of approximately -4 inches of mercury is attained.

- The subslab vapor samples will then be packaged and shipped under chain-of-custody procedures by road freight as flammable and poisonous gases (per U.S. Department of Transportation regulations) to Centek Laboratories LLC in Syracuse, New York for analysis. These vapor samples will be analyzed for low-level sulfur compounds and VOCs by U.S. Environmental Protection Agency (EPA) Method TO-15, and fixed gases by EPA Method 3C.

2.6.3 Field Instrument Monitoring

- Field data will be collected during the pilot test startup, including:
  - Differential pressure from the extraction nodes and subslab soil gas probes using a digital micromanometer during the testing phases of work.
  - Temperature and humidity from the extraction nodes using sensors installed in the pipe.
  - Temperature measurements from ten subslab locations in which thermocouples will be installed. Temperature readings will cover two depths.
  - CH_4, H_2S, SO_2, CO_2, O_2, and N_2 concentrations in the extraction nodes using an onsite gas chromatograph (MicroGC Fusion, Inficon) with a thermal conductivity detector (TCD).
  - CH_4, H_2S, SO_2, CO_2, and O_2 from subslab soil gas and monitoring wells.

  Baseline data will be compared against pilot test results to determine changes in the subslab conditions during and after the test.

- Data to be collected during the test to determine SSDS performance are the following:
  - Differential pressure from the extraction node being tested will be collected intermittently at least every 10 minutes from the in-line pressure indicator.
  - Differential pressure in the subslab soil gas probes following a step-by-step procedure to determine the extraction node ROI: pressure differential will be measured at locations close to extraction point and then moving outwards to farther locations if the pressure differential is greater than 0.002-inches of water (0.5-Pascal). Pressure differentials will be measured using digital micromanometers.
  - Differential pressure will be collected at select soil vapor locations near the extraction point.
  - Temperature and humidity from the extraction nodes using sensors installed in the pipe.
  - Temperature from five subslab locations in which thermocouples will be installed. Temperature readings will cover two depths.
  - CH_4, H_2S, SO_2, CO_2, O_2, and N_2 concentrations will be measured during the test from the extraction node being tested.
  - Sulfuric acid mist samples using National Institute for Occupational Safety and Health (NIOSH) method 7908 will be collected from the extraction node being tested.

- Following the completion of each test, the riser and extension pipes will be closed. The following data will be collected:
  - Differential pressure from each extraction node and subslab soil gas probe.
  - Temperature from the five subslab locations with thermocouples.
  - CH_4, H_2S, SO_2, CO_2, O_2, and N_2 concentrations from subslab soil gas probes and monitoring wells' headspace.

3. SSDS Pilot Operation and Monitoring Plans

A pilot field operation manual will be generated to outline specific tasks and procedures for the pilot testing. The SSDS pilot test will operate during normal work hours when Jacobs personnel can manually operate and monitor the system. The phased approach is anticipated to take 2 weeks per phase. The following guidance documents will be developed in support of the pilot test:

- Commissioning plan that includes step-by-step instructions on operating the SSDS pilot test system on clean air to confirm proper functionality of the valves and instruments.
- Performance monitoring worksheets and flow charts to support clear and concise data collection for the required monitoring.
- System shutdown plan that includes step-by-step instructions on how to stop the pilot system operations, safely remove subslab gases from piping and valves throughout the SSDS pilot test system, and safely complete short-term and long-term decommissioning of the system.

3.1 Site Hazards Overview and Proposed Monitoring Needs

The hydrogen sulfide concentrations in extracted soil gas are initially expected to be above immediately dangerous to life and health (IDLH) conditions and above the upper explosive limit (UEL). Methane also is expected to be above the UEL initially at the point of extraction. Concentrations of flammable gasses between the UEL and LEL will exist at the edges of the anaerobic zone. Thus, substantial precautions are required to avoid skin contact with the soil gas, inhalation of undiluted soil gas or introduction of sources of ignition during the pilot test.

The extraction points and risers were installed with Level B personal protection equipment (PPE). Work during the SSDS pilot test will be performed using Level D PPE; however, because of the elevated concentration of methane and hydrogen sulfide in the subslab soil gas, indoor air will be constantly monitored for hydrogen sulfide and LEL. An evacuation plan will be in place prior to startup of the pilot testing.

In addition, since the negative pressure differential created by the blower will draw air into the subslab, there is a potential for sulfur compounds contained in the subslab soil minerals (pyrophoric iron sulfide) to auto-oxidize to iron oxide and sulfur dioxide. Therefore, sulfur dioxide concentrations and temperature will be constantly monitored at the extraction point. Sulfur dioxide will be measured at the extraction point and temperature will be measured by a thermocouple installed in the extraction point pipe. In situ temperature measurements at soil monitoring locations at two depths near the extraction points will also be used to monitor for hotspot development.

Another potential hazard is the generation of sulfuric acid in situ from oxidation of the various sulfide forms, which could lead to the degradation of the bottom portion of the slab. Thus, sulfur dioxide gas and sulfuric acid will be monitored at the extraction point. The potential generation of sulfuric acid also can be evaluated through the pH and alkalinity testing included in the ongoing monitored natural attenuation monitoring program for shallow groundwater beneath Building 4.

3.2 Process Hazard Analysis Overview

In early 2019, Hampshire Chemical Corp., Evans Chemetics, and Jacobs conducted a process hazard analysis (PHA) to evaluate and mitigate the potential hazards associated with the SSDS operations. Previous PHAs were completed in support of installing subslab extraction points, sampling probes, and sampling subslab vapors and water. The following layers of protection identified in the analysis are included in the SSDS pilot test:

- Monitoring of flammability in the diluted air and of the principle flammable constituents in the extraction header before dilution to assess system.

- Discharge of hydrogen sulfide to the scrubber will be limited to 7 pounds per hour (lb/hr). The test will be stopped or the flow rate reduced if this level is exceeded.
- Staged startup approach will be taken, operating at 15 cfm. Temperature and gas concentrations will be monitored and the flow gradually increased to 150 cfm during the second test.
- Ball valves isolating the extraction points from the conveyance system will be closed when not in operation.
- A classified explosion proof blower will be used to minimize ignition risks.
- Metal piping will be grounded.
- Fiberglass can be used after the dilution air is added (when system is less than LEL).
- Stainless-steel pipe is required from the extraction point valve to the dilution air mixing point.
- Upon a high LEL reading, an automated block valve will close, immediately isolating the subslab vapor from the scrubber. Before starting the SSDS pilot test, a final PHA will be completed to review the final pilot test design.

3.3 Investigation-Derived Waste Management

All investigation-derived waste (IDW) generated during the pilot will be collected in properly labeled 55-gallon drums and grouped by environmental matrix. Subsequently, the drums will be characterized with laboratory analyses and properly disposed in accordance with management of IDW procedures outlined in a material management plan. If any residuals are generated during the pilot study (chemically treated soils and/or water) will be containerized and shipped to a pre-approved offsite disposal facility.

3.4 Community Air Monitoring

Community air monitoring requires real-time monitoring for VOCs, particulates (i.e., dust), and related odors at the downwind perimeter of each designated work area when certain activities are in progress at the site. The community air monitoring is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., offsite receptors including residences and businesses and onsite workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of pilot test activities.

Because this work will not create dust or discharges, a Community Air Monitoring Work Plan will not be required for the pilot study.

3.5 Site Survey

Following completion of the SSDS pilot, all ROI and SSDS points will be surveyed for elevation and location using a licensed New York surveyor prior to the preparation of the final design documents. In addition, the survey will include other site elements such as site boundaries, topography, storm drain and/or sanitary sewer system invert elevations, and possibly other subsurface utilities (e.g., water lines). This information will be merged with the existing base map information to allow preparation of a revised base map for the final design.

4. Permitting

Vapor emission calculations were completed in support of air permitting for the pilot test. The potential-to-emit vapor emissions are below Evans Chemetics' existing air permit limits; thus, only a notification letter is required for the pilot test. On January 3, 2019, a pilot test notification letter was submitted to NYSDEC per Air Permit 8-4538-00003/00099 requirements was submitted including initial pilot test assumptions (Appendix A).

On June 7, 2019, Evans Chemetics submitted an updated notification letter to provide updated potential-to-emit vapor emissions based on the March 2019 sample data and notification of modifications to the overall SSDS pilot test system design since the original letter was submitted (Appendix A).

5. Schedule and Deliverables

Table 2 shows overall pilot study schedule of activities.

Table 2. SSDS Pilot Test Schedule

Task	Preliminary Schedule
PHAs – Process Hazard Assessment	March 1, 2019
30% Design Internal Review Meeting	April 10, 2019
Final Layer of Protection Analysis Review	July 2019
60% Design Final Internal Review	End of June 2019
Pilot Testing Construction	August/September 2019
Pilot Testing	October/November 2019
Report Generation	December 2019/January 2020

Note:

% = percent

The sampling and performance results of the SSDS pilot study will be presented in a summary report, that will include a combination of text, tables, figures, and appendixes that present the scope of work, analytical results, key findings, and recommendations for the final design. The technical memorandum will be submitted upon receipt, review, and validation of the performance and analytical data. It is anticipated that this report will be submitted within 90 days after receipt of the analytical results from the final (rebound) sampling event.

6. References

American National Standards Institute (ANSI)/American Association of Radon Scientists and Technologists (AARST). 2017.

CH2M HILL Engineers, Inc. 2017. *Evaluation of Subslab Hydrogen Sulfide and Methane Concentrations Technical Memorandum*.

Jacobs Engineering Group Inc. (Jacobs). 2018a.

Jacobs Engineering Group Inc. (Jacobs). 2018b.

New Jersey Department of Environmental Protection (NJDEP). 2018.

New York State Department of Environmental Conservation (NYSDEC). 2018. Response letter and approval of the *Evaluation of Subslab Hydrogen Sulfide and Methane Concentrations Technical Memorandum*. March 1.

Figures

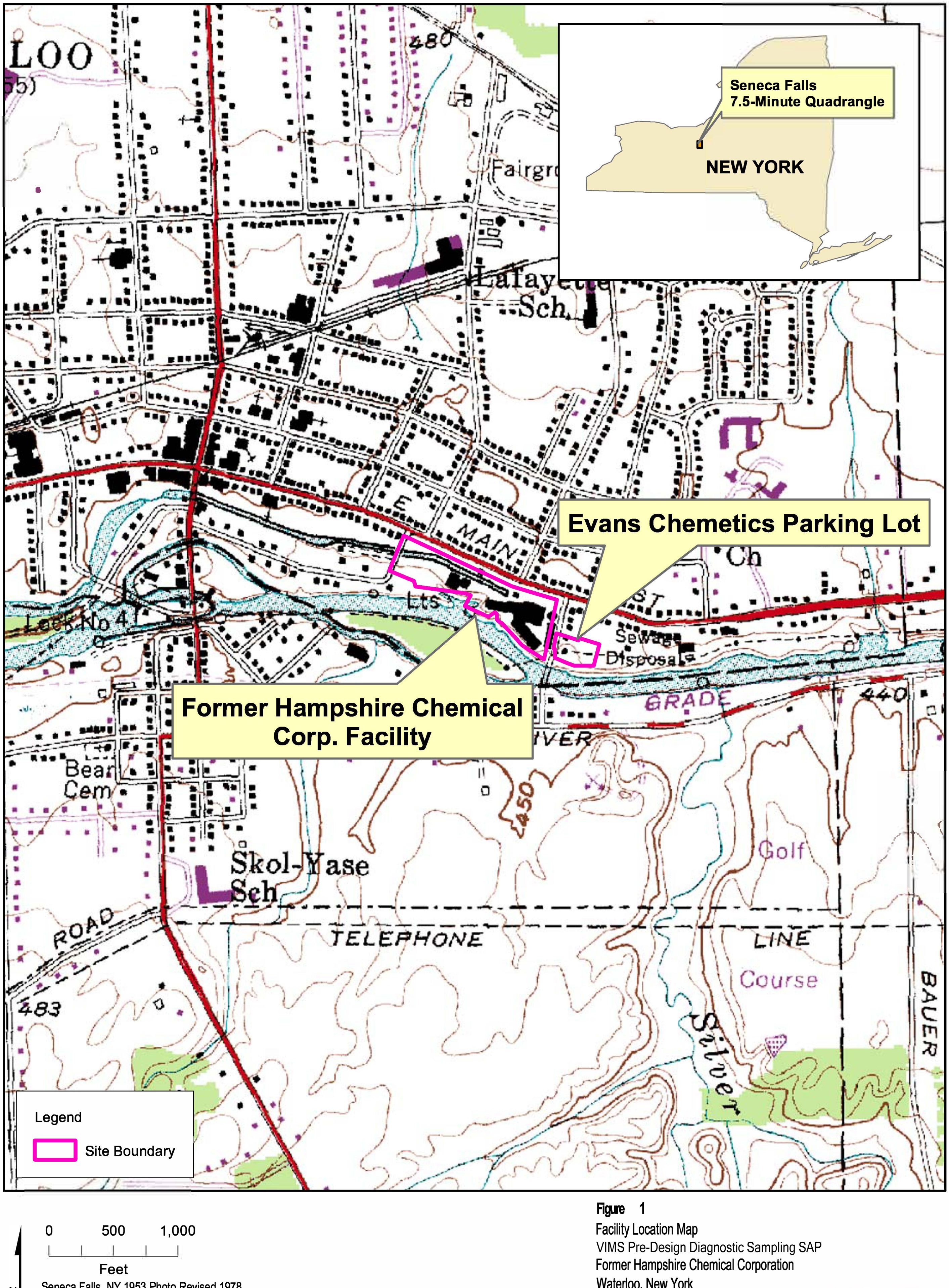

Figure 1

Facility Location Map
VIMS Pre-Design Diagnostic Sampling SAP
Former Hampshire Chemical Corporation
Waterloo, New York

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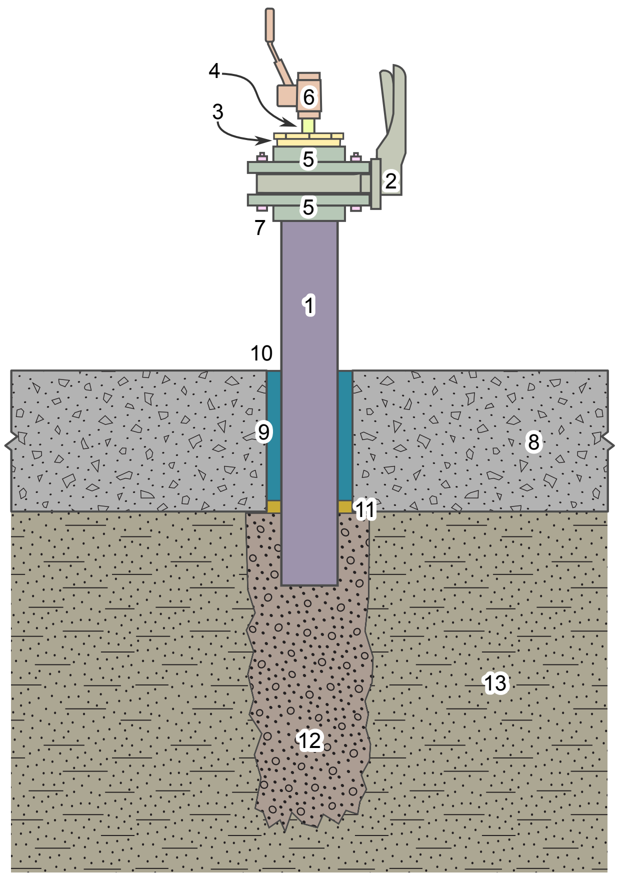

1) 3-inch Schedule 80 PVC riser
2) 3-inch PVC locking butterfly valve
3) 3-inch to 0.25-inch reducing fittings
4) 2-inch x 3/8-inch threaded nipple
5) 3-inch threaded PVC flanges
6) 3/8-inch ball valve sampling port
7) 5/8-inch bolts
8) concrete slab
9) epoxy
10) 4-inch cored hole
11) inert buffer material
12) pea gravel backfill
13) existing subslab material

Scale Approximate

1 foot

1 foot

Figure 2
Subslab Depressurization Extraction Point Schematic
Former Hampshire Chemical
Waterloo, New York

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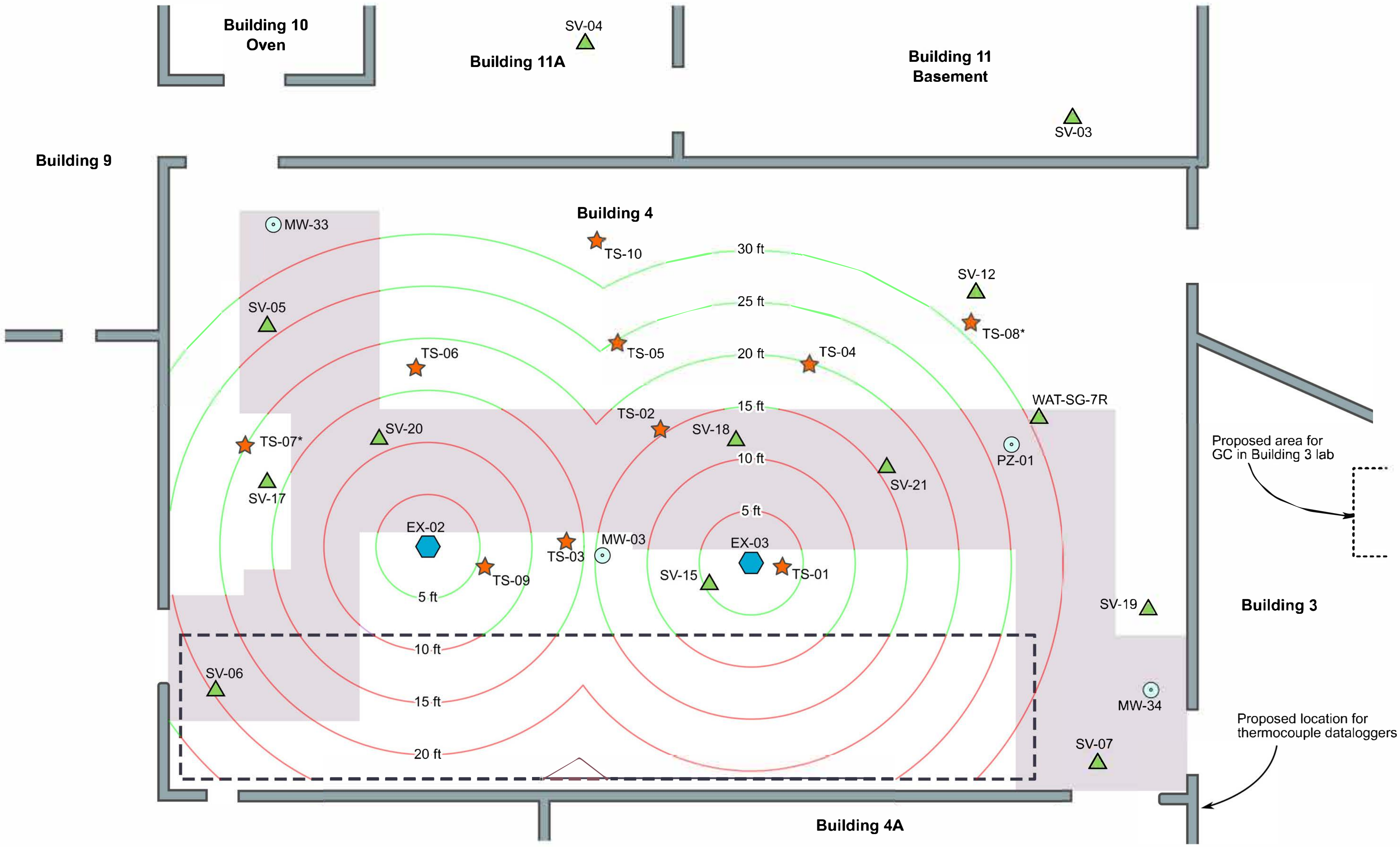

LEGEND

- Monitoring well
- Subslab probe
- SSDS Extraction Points
- Proposed Temperature Sensor Locations
- Approximate Area of Fork Truck Traffic
- Approximate Area of Building 4 Pit
- 30 ft — Approximate distance from the nearest SSDS extraction point. (green = favorable area, red = unfavorable)

0 25
feet

Notes:
* The locations of TS-07 and TS-08 have not been field verified

Figure 3
SSDS Pilot Test Monitoring Points
Former Hampshire Chemical Corp.
Waterloo, NY

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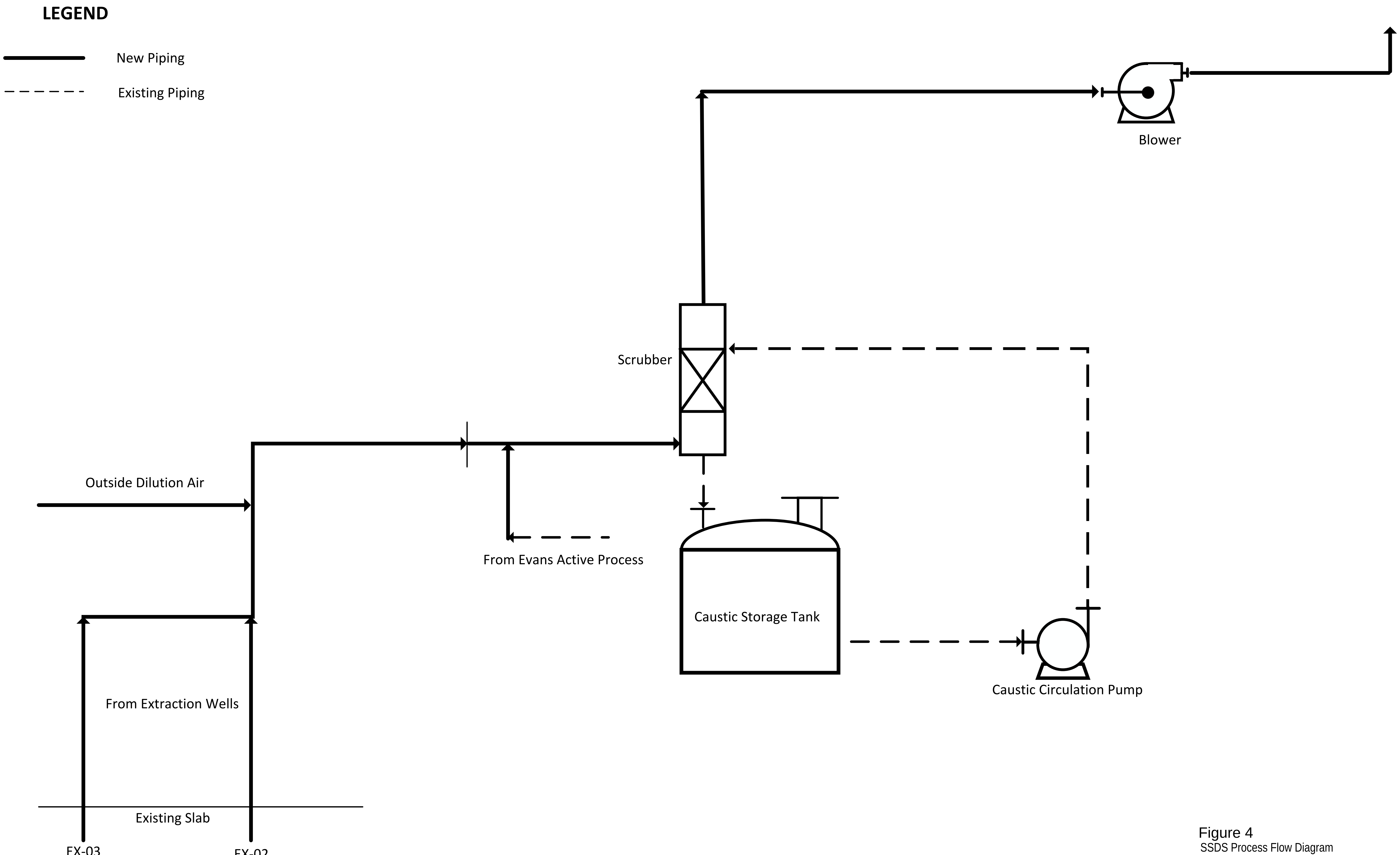

Figure 4
SSDS Process Flow Diagram
Former Hampshire Chemical Corp.
Waterloo, NY

Notes:
- SSDS – Subslab depressurization system
- Drawing not to scale.

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Appendix A
NYSDEC Pilot Study
Notification for Air Permit

Ms. Gail Dieter
New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau E, Section B
625 Broadway, 12th Floor
Albany, NY 12233-7017

July 18, 2019

Subject: Building 4 Vapor Intrusion Mitigation System Pilot Test Remedial Design Work Plan (RDWP), Former Hampshire Chemical Corp. Facility, Waterloo, New York

Dear Ms. Dieter:

Hampshire Chemical Corp. (HCC) is pleased to submit one hard copy and one electronic copy of the Building 4 Vapor Intrusion Mitigation System Pilot Test - Remedial Design Work Plan for the Former Hampshire Chemical Corp. Facility, Waterloo, New York. The Remedial Design Work Plan was prepared as an outline for a pilot study as part of the mitigation of subslab vapors at the Former Hampshire Chemical Inc. Site – Area of Concern B (AOC B) (site).

The Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) and corrective measures activities were conducted pursuant to a Second Amended Order on Consent executed between Hampshire Chemical Corp. (HCC) and the NYSDEC under Index Number 8-20000218-3281, August 12, 2011.

Please contact me at 304-747-7788 or Brian Carling at 610-384-0747 should you have any questions or require any additional information.

Sincerely,

Jerome E. Cibrik, P.G.
Remediation Leader

Copies: Mr. Matthew Gillette, NYSDEC Region 8 (CD)
Mr. Scott Foti, NYSDEC Region 8 (CD)
Mr. Mark Sergott – NYSDOH (CD)
Mr. Bart Putzig – NYSDEC Central Office (CD)
Mr. Steve Brusso, Evans Chemetics (Hard copy and CD)
CH2M Project File (Hard copy and CD)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Air Resources, Region 8
6274 East Avon-Lima Road, Avon, NY 14414-9516
P: (585) 226-2466 I F: (585) 226-2909
www.dec.ny.gov

June 27, 2019

Samantha Gotthardt
Evans Chemetics LP
228 E Main St.
Waterloo, NY 13165

Re: **Response to Notification of Change under Operation Flexibility**
Evans Chemetics
DEC Permit No.8-4538-00003/00099
Short-term remedial action pilot study – subslab depressurization system pilot test

Dear Ms. Gotthardt:

We have reviewed the information received on June 19, 2019 for changes which were subject to notification under the operational flexibility provisions of Evans Chemetics LP's permit as authorized under 6NYCRR Part 201.

Based on this review of the submission, the Department acknowledges that the proposed changes meet the operational flexibility criteria and are within the parameters of the protocol outlined in the permit. The changes do not require approval by the Department. This letter is to confirm Evans Chemetics LP is authorized to commence the changes described in the notification with the following condition.

The changes in the permit made necessary by this notification will be made during the next permit renewal or modification.

If you have any questions, please contact me at (585) 226-5304.

Sincerely,

Yuan Zeng
Regional Air Pollution Control Engineer

cc: Division of Environmental Permits
file