The Dow Chemical Company
P.O. Box 8361
South Charleston, VW 25303-8361
USA

January 09, 2019

Ms. Gail Dieter

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau E, Section B
625 Broadway, 12th Floor

Subject: 2018 Supplemental Building 4 Vapor Investigation at the Former Hampshire Chemical Corp. Facility, Waterloo, New York
Site No. 850001A

Dear Ms. Dieter:

Hampshire Chemical Corp. (HCC) is pleased to submit one hard copy and one electronic copy of the *2018 Supplemental Building 4 Vapor Investigation at the Former Hampshire Chemical Corp. Facility, Waterloo, New York* for Site No. 850001A.

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

Copy To: Ms. Gail Dieter, NYSDEC Region 8
Ms. Bernadette Schilling, NYSDEC Region 8 (CD)
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 LP (CD)
Jacobs Project File

TRANSMITTAL

JACOBS

TO: Evans Chemetics
228 East Main Street,
Waterloo, NY 13165

FROM: Brian Carling
Jacobs
26 Somerset Drive
East Fallowfield, PA 19320

ATTN: Steve Brusso

DATE: January 9, 2019

RE: 2018 Supplemental Building 4 Vapor Investigation at the Former Hampshire Chemical Corp. Facility, Waterloo, New York
Site No. 850001A

We Are Sending You:

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☐ Documents

☐ Drawings

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Method of Shipment:

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Quantity	Description
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If the material received is not as listed, please notify us at once.

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Mr. Matthew Gillette, NYSDEC Region 8 (CD)
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Mr. Steve Brusso, Evans Chemetics LP (CD)
Jacobs Project File

TRANSMITTAL

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

FROM: Brian Carling
Jacobs
26 Somerset Drive
East Fallowfield, PA 19320

ATTN: Gail Dieter

DATE: January 9, 2019

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Jacobs Project File

TRANSMITTAL

TO:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Region 8
6274 East Avon- Lima Road
Rte 5 & 20
Avon, NY 14414

FROM:
Brian Carling
Jacobs
26 Somerset Drive
East Fallowfield, PA 19320

ATTN: Scott Foti

DATE: January 9, 2019

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Bureau E, Section B
625 Broadway, 12th Floor
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FROM:
Brian Carling
Jacobs
26 Somerset Drive
East Fallowfield, PA 19320

ATTN: Bernadette Schilling

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Jacobs Project File

JACOBS

Memorandum

299 Madison Avenue
Morristown, NJ 07960
www.jacobs.com

Subject **2018 Supplemental Building 4 Vapor Investigation at the Former Hampshire Chemical Corp. Facility, Waterloo, New York**

Attention Former Hampshire Chemical Corp.

From Jacobs

Date January 9, 2019

Project Number 703077

1. Introduction

This memorandum summarizes the methods, analytical results, and findings of a supplemental vapor investigation in Area of Concern (AOC) B (Building 4), AOC D (Building 3), and adjacent spaces at the former Hampshire Chemical Corp. (HCC), Waterloo, New York facility (site) conducted during May and June 2018. The vapor investigation described in this memorandum was performed to re-assess subslab and subsurface soil vapor results obtained during previous investigations conducted in 2016 and April 2017 and complete an air exchange and attenuation factor evaluation for Building 4. Additionally, groundwater sampling, apart from the annual long-term monitoring (LTM) program which is reported separately, was performed at select monitoring wells in and around Building 4 for possible characterization of soil vapor source constituents.

This memorandum also includes recommendations to address specific objectives discussed with the New York State Department of Environmental Conservation and the New York State Department of Health during a project team meeting on August 21, 2018, at the subject facility.

2. Background

The site is located at 228 East Main Street in the village of Waterloo, Seneca County, New York (Figure 2-1), 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. Evans Chemetics 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 laboratory, maintenance, and shipping/receiving operations, as well as an industrial wastewater treatment plant. The site also includes outside raw material and product storage areas and several tank farms.

The site is regulated under the Resource Conservation and Recovery Act (RCRA) with the New York State Department of Environmental Conservation (NYSDEC) as the lead agency regarding environmental releases. RCRA facility investigation (RFI) efforts have been performed at the site since 1993 to evaluate the nature and extent of releases. The ongoing manufacturing operations by Evans Chemetics at the site are regulated by U.S. Department of Labor Occupational Safety and Health Administration (OSHA) Region 2, the New York State Department of Labor (NYSDOL) Division of Safety and Health Public Employee Safety and Health Bureau, among others. Air emissions from the site's ongoing operations, including hydrogen sulfide from multiple emissions points, are governed by a permit from NYSDEC. As a safety precaution, Evans Chemetics operates several hydrogen sulfide monitors within its operating facilities; this hydrogen sulfide and lower explosive limit (LEL) monitoring program was expanded in 2018 to include two new hydrogen sulfide and three new LEL meter stations and hazard communication.

The potential for vapor intrusion of volatile organic compounds (VOCs) in specific buildings at the site has been previously evaluated in a series of reports (CH2M 2007, 2010, 2011, 2013a, 2013b).

During a long-term groundwater monitoring sampling event at AOCs B and D in November 2015, field instrument readings detected elevated hydrogen sulfide and methane concentrations in the headspaces of several monitoring wells. Ten vapor samples were collected from two existing subslab soil vapor sampling ports (subslab ports) and eight monitoring well headspaces in April and August 2016 and indicated hydrogen sulfide and methane are present in the subsurface (CH2M 2016). In August 2016, CH2M (now Jacobs) completed a historical data review and field infrastructure assessment (building survey) for Buildings 3 and 4 with the objectives of making observations and collecting data to support a focused subslab soil vapor investigation. The results of this vapor sampling effort were summarized in the technical memorandum titled *Evaluation of Vapor Concentrations in AOC B (Building 4) and AOC D (Building 3) at the Former Hampshire Corp. Facility, Waterloo, New York* (CH2M 2016).

NYSDEC and the New York State Department of Health (NYSDOH) were notified on of the subslab soil vapor conditions and approved workplans before conducting further investigations on May 30, 2018. In April and May 2017, an additional 15 subslab sampling ports were installed within Building 4 and the surrounding structures and sampled for hydrogen sulfide, methane, and VOCs, and a building survey was undertaken to gather information useful for assessing interim actions. The results of this investigation were summarized in the *Evaluation of Subslab Hydrogen Sulfide and Methane Concentrations Technical Memorandum* (2017 Technical Memorandum [CH2M 2017a]). NYSDEC accepted recommendations made in the 2017 Technical Memorandum in correspondence dated March 1, 2018 and suggested additional actions (NYSDEC 2018). The scope of work for the subslab soil vapor evaluation summarized in this memorandum was submitted to and approved by NYSDEC on January 23, 2018. This memorandum addresses the following subset of recommendations:

- Monitor changes in subsurface hydrogen sulfide and methane concentrations in subsurface soil gas at the site coupled with monitoring of differential pressures at subslab vapor sampling points and monitoring well headspaces.
- Conduct further investigation of building air exchange rates and the flux of soil gas into Building 4. This investigation may include radon or other tracer testing to establish whether the potential for hydrogen sulfide vapor intrusion is significant as compared to applicable industrial screening levels.
- Conduct further vapor and groundwater sampling in and around Building 4 to define the vapor plume and attempt to determine the constituents associated with hydrogen sulfide and methane generation.

3. Historical Information

Known historical uses of Buildings 3 and 4 include storage and use of raw materials used in the woolen mill process to dye wool and later, the manufacturing of divalent organic sulfur intermediates used for the cosmetic, pharmaceutical, and plastics industries. The site was first owned and operated by the Waterloo Woolen Manufacturing Company, which operated a woolen textile mill from before 1839 until approximately 1936, when the mill was closed. Evans Chemetics reopened the facility in 1943 and produced divalent organic sulfur chemical intermediates that are still manufactured at the facility. The facility was acquired by the W.R. Grace Company in 1979 and remained a part of Grace's Organic Chemical Division until 1992, when HCC completed a management buyout of the Organic Chemical Division. Evans Chemetics was part of the management buyout, and the facility became an operating unit of HCC. In 1995, HCC was purchased by and became a wholly owned subsidiary of Sentrachem, Ltd., a South African chemical company. In 1997, Sentrachem was acquired as a wholly owned subsidiary of The Dow Chemical Company. In 2005, the site (as well as other assets of Evans Chemetics) was sold to Bruno Bock. Evans Chemetics LP, now a wholly owned subsidiary of Bruno Bock, currently operates the site.

Small manmade waterways ran from the main northern raceway located along the upper elevation of the site through the woolen mill to turn water wheels for power, then discharging into the main canal at a lower elevation south of the site. These waterways were generally filled in after the cessation of wool mill operations except for the northern raceway and are partially located under the existing structures.

The primary chemicals manufactured at the facility after the cessation of woolen operations were thioglycolic acid (TGA), mercaptopropionic acid (MPA), and thiodipropionate esters for use in various industrial applications. Manufacturing of thioglycolic acid was discontinued in 2014. Currently, Building 4 is used primarily for the production of MPA, with chemical operations discontinued in Building 3 in 2014. Process-related equipment is also present in Buildings 9, 10, and 11A. Building 14 is used for empty drum and chemical storage. Building 16 houses the facility treatment plant. Chemical raw materials used at the site include acids, caustics (sodium hydroxide and sodium hydrosulfide), acrylonitrile, alcohols, alkalis, and ammonia. Metals (iron and zinc) were used in the past, with zinc usage stopped around 1995, and iron usage stopped in 2007.

4. Vapor Study Field Methods

During May and June 2018, a field investigation to study the nature and extent of subslab soil vapors in and around AOCs B and D, in particular hydrogen sulfide and methane, was performed. Work associated with this investigation included installing one new subslab soil vapor sampling port (Vapor Pins from Cox-Colvin & Associates, Inc.), removing and replacing one existing subslab port, attempting to collect soil vapor samples at 16 subslab ports, and collecting vapor samples from the headspaces of 12 groundwater monitoring wells. Figure 2-2 shows the locations of subslab and monitoring well vapor sampling locations. This section discusses the investigative methods used during this effort. Section 7 discusses the vapor investigation results.

4.1 Subslab Soil Vapor Port Installation

4.1.1 Underground Utility Clearance

Dig Safely New York was notified of the forthcoming intrusive activities associated with subslab sampling port installation at least 2 business days before commencing work. A third-party utility locating service verified the absence of underground utilities at each proposed boring location, and Evans Chemetics staff reviewed facility plans. Technicians from New York Leak Detection of Jamesville, New York, inspected proposed work areas in Building 4, inside and on the exterior west of Building 7 (Tank Storage), Building 16 (wastewater treatment system building), and Building 14 for surficial evidence of buried facilities, followed by a survey with electromagnetic locating equipment and ground-penetrating radar on June 6, 2018. Permanent or semi-permanent means were used to mark an area free of underground obstructions before advancing each point.

4.1.2 Sampling Port Installation and Replacement

On June 6, 2018, one new subslab port (SV-16) was installed in Building 7 (tank storage room) using standard installation procedures adapted to the need for ventilating potentially hazardous gases and suppressing sparks. SV-16 was placed with respect to known historical and geophysical features, and at least 5 feet away from exterior walls and penetrations in the slab (e.g., large cracks, sumps, drains, and utilities) to avoid short-circuiting of ambient air. Figure 2-2 shows the locations of the subslab ports.

Drilling was conducted using advanced health and safety measures, including multiple layers of engineering and institutional controls, redundant ventilation, and Level B personal protective equipment with supplied-air respiratory protection. A nitrogen-filled glovebox was placed over the borehole to dilute/inert potentially explosive gases at ground level and limit vapors entering the work zone during drilling and installation. The glovebox atmosphere was exhausted through a port fed into the ventilation ducting which exhausted outside the building.

Real-time air monitoring was conducted continuously before, during, and after subslab port installation to ensure a hazardous atmosphere did not exist in the breathing zone. Air quality parameters (hydrogen sulfide, methane, sulfur dioxide, carbon dioxide, carbon monoxide, oxygen, total VOCs, and LEL) were measured within and surrounding the work zone and inside the glovebox. The stepwise subslab port installation procedure was described in the *Evaluation of Subslab Hydrogen Sulfide and Methane Concentrations at the Former Hampshire Chemical Corp. Facility, Waterloo, New York* (CH2M 2017a).

During this field event, it was discovered that the protective cover at SV-15 was seized to the underlying subslab port. On June 5, 2018, the subslab port was removed and inspected. Corrosion was found on the portions of the subslab port and protective cover above the interface of the soil and concrete slab. The original slab penetration and surrounding floor appeared free of defects, and the hole was reused to install a new subslab port. A layer of heavy-duty Teflon tape was applied to the threads joining the subslab port and protective cover to decrease the chances of seizing in the future.

4.2 Subslab Soil Vapor Sampling

Vapor samples were collected from 15 subslab ports for laboratory analysis between May 31 and June 8, 2018. Vapor sampling procedures are discussed below and analytical results are reviewed in Section 7.

Prior to collecting the subslab vapor samples, differential pressures were measured using a micro manometer, the sampling train was tested for leaks using a shut-in test, and a leak check of the sampling port and adjacent concrete slab were performed using the water dam method. The vapor sampling train was constructed of inert stainless steel and Teflon tubing joined with stainless steel compression fittings.

Following connection and testing of the sampling manifold, soil vapor was purged at a nominal rate of 800 milliliters per minute (mL/min) from the subslab sampling port using the internal sampling pump of a Durridge RAD7 Radon Gas Detector (RAD7) over about a 5-minute period, while simultaneously collecting radon gas measurements.

After purging soil vapor from the subslab using the RAD7 pump, a 1-liter laboratory-supplied Silonite-lined, stainless steel sample canister with a calibrated flow controller was attached to the sampling port. When the sampling valve was opened, soil vapor was collected at a rate of 250 mL/min through the calibrated flow controller under a beginning canister gauge vacuum of approximately -30 inches of mercury (inHg) and proceeded until an ending vacuum of approximately -4 inHg was attained.

Subslab vapor samples were not collected at SV-05 and SV-12 because of high groundwater conditions. Within the first minute of the soil vapor purge cycle at SV-05, groundwater began aspirating from the subslab port in intermittent pulses. Due to the intermittent flow of water, it was suspected that the subslab port inlet was within the partially saturated capillary fringe. Water began flowing in a steady, continuous stream immediately after beginning the purge cycle at SV-12, hence a vapor sample could not be collected. However, groundwater samples were collected from SV-05 and SV-12 for laboratory analysis as described in Section 8.

The rate of subslab vapor sample collection at SV-06 was very low. A sample was collected at SV-06 during business hours on June 1, 2018, and then again on the morning of June 4 and sampling continuously until the morning of June 6, 2018.

All subslab vapor samples were 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 were 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.

4.3 Monitoring Well Headspace Vapor Sampling

Samples of the gas present in the unwetted riser pipe (headspace) were collected from 12 monitoring wells for laboratory analysis between May 30 and June 8, 2018. With the one exception discussed below, the monitoring well headspace vapor sampling procedures were identical to those discussed for subslab ports in Section 4.2. Monitoring well headspace vapor samples were drawn through a well plug outfitted with a one-way poppet valve (extractor plug from EnviroDesign Products). The extractor plug was connected to the vapor sampling apparatus by a mating quick-connector coupler which opened the poppet valve. The analytical results for monitoring well headspace samples are reviewed in Section 7. Depth-to-water measurements and groundwater elevations for the monitoring wells are presented in Table 4-1. Deviations from the normal operating procedures included the following:

- Monitoring well headspace vapor sampling at PZ-01 was terminated immediately when water was observed flowing into the sample tubing. Because the depth to water in PZ-01 was very shallow (1.70 feet below top of well casing) and the well screen was completely submerged, additional wellhead vapor volume was not available for collection. The PZ-01 vapor sample was submitted to the laboratory with a final vacuum of -15 inHg and successfully analyzed.
- Monitoring well headspace vapor sampling at PZ-03 was terminated immediately when water was observed flowing from the subslab port on June 6, 2018. Because the depth to water in PZ-03 was shallow (3.07 feet below top of well casing) and the well screen was completely submerged, additional wellhead vapor volume was not available for collection. Following groundwater sampling at PZ-03 on June 6, the water level was drawn down, which exposed the well screen to the formation. An additional PZ-03 vapor sample was collected on June 12, 2018, following groundwater sampling, and submitted to the laboratory with a final vacuum of -4 inHg.

5. Groundwater Source Sampling Field Methods

5.1 Field Methods

Between June 5 and 12, 2018, groundwater was collected from 14 locations, including 12 monitoring wells, and two flooded subslab vapor points (SV-05 and SV-12). These samples were part of an effort to identify hydrogen sulfide and methane gas source compounds in groundwater as part of the ongoing monitored natural attenuation (MNA) monitoring for AOC B. The effort was unsuccessful due to the analytical limitations and matrix issues. The ongoing MNA monitoring includes many parameters valuable for understanding the overall biogeochemical conditions of the system (i.e., major anions, dissolved metals, and ferrous iron) as well as information relevant to organics that may serve as substrates for biological processes (i.e., VOCs and total organic carbon [TOC]). The low-flow groundwater sampling field methods are discussed in the forthcoming *2018 Groundwater Monitoring Results and MNA Performance Evaluation Report* (Jacobs 2018 [pending]). A summary of the groundwater samples used in the evaluation are included in Table 5-1. Analytical results for these water samples as they pertain to the methane and hydrogen sulfide sources are discussed in Section 8 of this memorandum.

5.2 Laboratory Methods

The groundwater samples were packaged and shipped under chain-of-custody procedures via Federal Express to Alpha Analytical in Westborough, Massachusetts, and Specialty Analytical in Clackamas, Oregon. Alpha Analytical analyzed the groundwater samples for total sulfur by Method SW6010C and sulfite by Method SM4500 SO3-B. Specialty Analytical undertook method development for non-routine sulfur compounds from five locations (MW-03, MW-19, MW-33, PZ-01, and PZ-03), including attempting to develop methods for total organic sulfurs, mercaptans, thiols, and divalent organic compounds.

Specialty Analytical performed total organic sulfur compound determinations using two independent approaches. In the first approach, total organic sulfur was analyzed for this report as absorption using activated carbon cartridges with thermal desorption at 440 degrees Celsius (°C) in an oxygen stream to convert to sulfate (SO_4), which is quantified using ion chromatography (IC). In the second approach, a sample was collected by inert gas purging, followed by sample combustion and determination of sulfides. Both methods yielded similar values for total organic sulfur (92 to 107%) after adjustment for sulfate and sulfide. Sodium thioglycolate (the salt form of thioglycolic acid) was used as the spiking compound for the laboratory control spike/laboratory control spike duplicate in the total organic sulfur method.

In order to develop methods for determination of other organic sulfur-containing compounds for which standard environmental methods do not exist, extractions of the water samples were performed with various solvents, followed by gas chromatography-mass spectrometry (GC-MS) full-scan screening.

Extractions were performed with nonpolar solvents such as dodecane, hexane, and hexadecane; essentially no sulfur containing chromatographable organic compounds were reported in the analyses of these extracts. It was noted that most of the color of the groundwater sample (believed likely to be a marker of organic compounds) remained in the water layer. Extractions were also performed with a more polar solvent, methylene chloride, again without recovery of sulfonated organics; although more non-sulfur containing organics were found in the extract. It is also possible that organic compounds are present in the samples that are not gas chromatographable due to their high molecular weight. Possible alternate extraction techniques involving pH adjustment before extraction or "salting out" could be explored (Majors 2009).

As a further aid to diagnosing the efficiency of extraction, the apparent color was determined semi-quantitatively by ultraviolet-visible spectroscopy absorption (UV-Vis) using deionized water as a zero-absorbance standard. The wavelengths used were 575-587 nanometers, covering the visual color of yellow to yellowish orange selected based on visual observation of the water sample colors.

6. Radon Attenuation Factor Measurement

To determine the concentration of hydrogen sulfide in indoor air arising from soil gas requires calculating the reduction in vapor concentrations between the subsurface source and indoor air (attenuation factor). During May and June 2018, field activities were conducted to estimate a zone- or building-specific attenuation factor (AF). These activities included field measurements of subslab radon concentrations, passive indoor air sampling for radon, and an air exchange evaluation using a sulfur hexafluoride (SF6) tracer gas. The following sections describe the field methods for both the radon and SF6 studies. Results of the studies are discussed in Section 10.

Short-term field measurements of subslab radon gas concentrations were made prior to and following soil vapor sampling at each subslab port location. Between May 31 and June 8, 2018, a RAD7 was used to measure radon at each subslab port before vapor sample collection. The RAD7 is based on electrostatic collection of alpha-emitters with spectral analysis and can be classified as a continuous radon monitoring (EPA 1992). The RAD7 is an approved measurement device under the National Radon Proficiency Program (NRPP 2016). The RAD7 was attached to the subslab port with Teflon-lined polyethylene tubing. Soil vapor was drawn from the subslab port at a rate of approximately 800 mL/min into the RAD7 for measurement by an internal pump. Radon measurements were collected every 5 seconds over a period of 5 minutes, with each reading and summary statistics printed by an onboard thermal printer. On June 11, 2018, subsequent to subslab soil vapor and passive indoor air radon sample collection, a second set of radon field data was collected at each subslab port. The results of the radon field measurements are presented in Table 6-1.

On June 8, 2018, 20 passive indoor radon samplers (including two field duplicates) were deployed at 18 locations in and around AOCs B and D. The passive radon sampling locations are shown on Figure 6-1. These locations included:

- Inside Building 4 (PR-06 to PR-13)
- Inside the tank storage room (PR-01 and field duplicate PR-20)
- Inside Building 9 (PR-02 and PR-03)
- Inside Building 11A (PR-04 and PR-05)
- Inside Building 4A (PR-14)
- Inside Building 3 (PR-15, PR-16, and field duplicate PR-19)
- Outdoors near MW-19 (PR-17)
- Outdoors southeast for the tank storage room (PR-18)

Each sampler was secured to rail, post, pipe, or other unmovable object at a height of 3 to 4 feet above the floor surface using a nylon cable tie. The samplers were deployed three or more feet from any windows or doors; at least 1 foot from exterior walls; and not near any obvious source of off-gassing chemicals. The passive radon samplers were left in place for 48 hours and collected on June 11, 2018; and shipped under chain-of-custody to EMSL Analytical Inc. in Cinnaminson, New Jersey (an accredited laboratory) for analysis of radon in air by liquid scintillation per EPA Method 402-R-92-004. The radon sampling logs and analytical results are included in Attachments 1 and 2, respectively. A discussion of the passive radon gas results is presented in Section 10.

6.1 Sulfur Hexafluoride Tracer Gas Study

On June 13, 14, and 15, 2018, eight SF_6 tracer gas tests (Test Numbers 1 to 8) were conducted in Building 4 and the adjoining buildings. Test Numbers 1, 2, and 5 were trial runs to optimize equipment setup, flow rates, and measurement techniques. Figures 6-2 to 6-5 show the setups of Test Numbers 3, 4, 6, 7, and 8, including the locations of SF_6 measurement and injection points, locations and orientations of distribution fans, disposition of exterior doors, and general wind directions. Test results are discussed in Section 10.

A steel, size 200 cylinder containing 190 standard cubic feet (SCF) of 15% SF_6 and an 85% argon balance was procured from Airgas of Geneva, New York. Attachment 3 contains a Certificate of Analysis for the gas. The SF_6 cylinder was secured in a tank rack on the southern exterior wall of Building 4 and stepped down to test pressures with a high-pressure regulator containing a rotameter on the low-pressure outlet. Gas was distributed to the interior injection points by a manifold constructed of 0.25-inch outside diameter (OD) by 0.170-inch inside diameter (ID) low-density polyethylene tubing (LDPE). During the first trial test run (Test Number 1), am EKM Metering PGM-075 totalizer was placed between the high-pressure regulator and distribution manifold in an attempt to the measure the amount of injected gas. However, it was found the totalizer leaked internally under test pressures. Subsequent injection volumes were estimated based on the test duration and flow rate measured at the rotameter attached to the SF_6 cylinder's pressure regulator.

Predetermined volumes of SF_6 (3.3 cubic feet [ft^3], 5 ft^3, or 6 ft^3) were introduced into Building 4 at flow rates of 5 or 40 ft^3/hour in order to achieve a concentration in indoor air comfortably above the instrumental detection limit and well below any exposure limits. Table 6-2 summarizes the conditions for Test Numbers 3, 4, 6, 7, and 8. Tests 1 and 2 were preliminary checks to establish appropriate monitoring and dosing ranges. During Test Numbers 3, 4, 6, and 8, four 20-inch-diameter variable-speed box fans were used to homogenize the SF_6 tracer gas with the ambient building air. Test 5 was aborted because one of the two SF_6 analyzers failed during the test. In subsequent tests, the sequence of measurements was altered to allow a useful dataset to be collected with only one instrument. The configuration and orientation of the mixing fans are shown on Figures 6-2 to 6-5. Building 4 exterior doors were left in the open position, typical of normal warm-weather operating conditions at the facility, for Test Numbers 3, 4, 7, and 8, and closed for Test Number 6 to simulate typical cold-weather operating conditions.

After allowing sufficient time for the tracer gas to disperse and homogenize within Building 4, the mixing fans were turned off (if used) and measurements of the SF_6 decay rate began. The concentrations of SF_6 were measured repetitively at 6 to 10 predesignated sampling locations in and around Building 4 (Figures 6-2 to 6-5) using a Thermo Electron MIRAN SapphIRe XL Ambient Air Analyzer (MIRAN SapphIRe). Measurements of SF_6 concentrations were collected from each sampling location at 5-minute intervals after allowing approximately 1 minute for the MIRAN SapphIRe reading to stabilize. A summary of the measurements is presented in Table 6-2.

Data analysis and field procedures for the SF_6 tracer gas study were based on EPA Method IP-4B (1989). The data analysis approach in the method is based on equations that describe a first order decay process. A linear, least squares fit of the natural logarithm of the concentration vs. time in hours was then applied to the dataset. Professional judgment was used to determine when the concentrations had reached a baseline or asymptote. Only the data before the baseline were used for the linear least square fit, as shown by the length of the fitted line. The air exchange rate was then determined as the slope of the best-fit line. Section 10 includes a discussion of the SF_6 tracer study results.

7. Vapor Sampling Results

During May and June 2018, vapor samples were collected from 15 subslab ports and 12 monitoring well headspaces for laboratory analysis. The subslab and headspace vapor results are discussed below; and field sampling methods are provided in Section 4.

7.1 Subslab Soil Vapor Samples

Between May 31 and June 8, 2018, 17 subslab soil vapor samples (including two field duplicate samples) were collected from 15 subslab sampling ports (SV-01 to SV-04, SV-06 to SV-11, SV-13 to SV-16, and WA-T-SG-7R). Samples were not collected at SV-05 and SV-12 because of high groundwater conditions along the northern foundation wall of Building 4. A summary of the soil vapor sampling information is presented in Table 7-1. Field measurements of differential pressure and gas concentrations are the subslab locations are shown in Table 7-2. The soil vapor samples were analyzed for VOCs, low-level sulfur compounds, and fixed gases. Complete analytical results and results for only low-level sulfur compounds are presented in Tables 7-3 and 7-4, respectively. The complete analytical data packages provided by the laboratory are provided in Attachment 4.

The following sections summarize the subslab vapor results for those analytes detected at concentrations above the selected criteria.

7.1.1 Hydrogen Sulfide and other Sulfur Compounds in Subslab Soil Vapor Samples

Hydrogen sulfide was detected in soil vapor samples from the 15 subslab sampling locations (Table 7-3 and Figure 7-1) at concentrations ranging from 18 micrograms per cubic meter (µg/m^3) (SV-09) to 180,000,000 µg/m^3 (SV-15). Methane in Subslab Soil Vapor Samples

Methane was detected in soil vapor samples from six of the 15 subslab sampling locations (Table 7-3 and Figure 7-1) at concentrations up to 31.4 percent by volume (SV-06, Vol%). Methane concentrations exceeded the screening criteria at SV-06, SV-15, and WAT-SG-7R during the 2018 sampling event.

7.1.2 Volatile Organic Compounds Subslab in Soil Vapor Samples

One or more of 24 VOCs were detected at reportable concentrations in soil vapor samples from 14 subslab sampling locations (Table 7-3 and Figure 7-1). Four VOCs (chloroform, ethylbenzene, trichloroethene [TCE], and meta- and para-xylenes [m,p-xylenes]) were detected at concentrations exceeding the VISL screening criteria as follows:

- Chloroform at SV-04, SV-07, SV-14, and SV-15 with a maximum concentration of 15,000 µg/m^3 at SV-15. Similar concentrations have been observed and reported in Building 4 in the past; for example, an estimated value of 15,000 (J) µg/m^3 was reported for SG-7R in a sample collected November 2012 (CH2M 2013b), although the May 2018 concentration at SG-7R was only 150 µg/m^3.
- Ethylbenzene at SV-15 (2,500 µg/m^3).
- TCE at SV-11 (located to the east well outside the area of other impacts) (510 µg/m^3). This result is similar to the previous result of 420 µg/m^3 from the same location in May 2017 (CH2M 2017a)
- m,p-Xylenes at SV-15 (28,000 µg/m^3) compared to 47,000 µg/m^3 at SV-15 in May 2017. Lower concentrations of m,p-xylene in subslab vapor samples from Building 4 had been reported previously at other locations; for example 4,600 µg/m^3 at SG-7 and 8,600 µg/m^3 at SG-7A in 2008; 19 µg/m^3 at SG-7A and below the laboratory reporting limit (21 µg/m^3) in 2012 at SG-7R. The May 2018 concentration at SG-7R was 93 µg/m^3.

TCE was detectable but below the EPA VISL at 260 µg/m^3 at SV-15 in 2018, which is a result identical to what was observed and previously reported at that location in May 2017 (CH2M 2017a). However, this was substantially higher than the concentrations observed in November 2012 in nearby Building 4 subslab ports (20 µg/m^3 at SG-7R and 0.26 µg/m^3 at SG-7A). TCE was not detected at SG-7R in May 2018 at a laboratory reporting limit of 54 µg/m^3.

In addition to the targeted VOCs detected at reportable concentrations, 294 tentatively identified compounds (TICs) and 11 unknown compounds were detected in the subslab vapor samples (Table 7-3). These compounds were not compared to screening criteria since the quantitation and identification is approximate. Some of the compounds reported as TICs are sulfur-containing compounds; for example, at SV-15 an estimated 40,000 µg/m^3 of 4-methyl-2-pentane thiol, 8,400 of isopropyl mercaptan, and 2,600 µg/m^3 of ethyl mercaptan. Some of the same compounds are also reported from targeted analysis as "low-level sulfurs by TO-15" in Table 7-3 (discussed previously in Section 7).

7.2 Groundwater Monitoring Well Headspace Vapor Results

Between May 31 and June 8, 2018, vapor samples were collected from the headspaces of 11 groundwater monitoring wells (MW-01, MW-02, MW-03, MW-19, MW-21, MW-31, MW-34, MW-35, PZ-01, PZ-03, and PZ-04). A summary of the monitoring well headspace vapor sampling information is presented in Table 7-1. The headspace vapor samples were analyzed for VOCs, low-level sulfur compounds, and fixed gases. Complete analytical results and results for only low-level sulfur compounds are presented in Tables 7-5 and 7-4, respectively. Methane and hydrogen sulfide concentrations are shown spatially on Figure 7-1. A complete analytical data package provided by the laboratory is provided in Attachment 4.

The analytical results for the subslab soil vapor samples were compared to the criteria listed in Section 7 to evaluate potential risks during site investigation activities and operations by onsite facility workers.

The following sections summarize the subslab vapor results for those analytes detected at concentrations above the selected criteria.

7.2.1 Hydrogen Sulfide and other Sulfur Compounds in Headspace Vapor Samples

Hydrogen sulfide was detected in each vapor sample from the 12 monitoring well locations (Tables 7-3 and 7-4 and Figure 7-1) at concentrations ranging from 16 µg/m^3 (PZ-03) to 26,000,000 µg/m^3 (MW-03). Hydrogen sulfide concentrations exceeded the TLV screening criteria at three locations (MW-03, MW-33, and MW-34) during the 2018 sampling event. Among the mercaptan and sulfide species, the pattern is similar in adjacent subslab port and monitoring wells pairs. For example, as discussed above, at SV-15 the three most concentrated sulfur species were hydrogen sulfide, isopropyl mercaptan, and methyl mercaptan (in that order). The same order is present at the adjacent monitoring well MW-03.

7.2.2 Methane in Headspace Vapor Samples

Methane was detected in vapor samples from eight of the 12 headspace sampling locations (Table 7-5 and Figure 7-1) at concentrations of 0.838 Vol% (PZ-03) and 80.8 Vol% (MW-34). Methane concentrations exceeded the screening criteria at MW-03, MW-19 (over 100 feet northeast of Building 4), MW-21, MW-31, MW-33, MW-34, and PZ-01 during the 2018 sampling event. Methane was detected in three areas at concentrations above the LEL (5% by volume):

- In Building 4, methane concentrations ranged from 40.7% (PZ-01) to 80.8% (MW-34).
- At MW-21 and MW-31, methane concentrations were 14.3% and 16.4%, respectively.
- At MW-19, methane was detected at a concentration of 42.1%.

7.2.3 Volatile Organic Compounds in Headspace Vapor Samples

One or more of 25 VOCs were detected in vapor samples from the 12 well headspace sampling locations (Table 7-3 and Figure 7-1). Two VOCs (chloroform and Freon 12) were detected at concentrations exceeding the VISL screening criteria as follows:

- Chloroform at MW-01 at a concentration of 2,900 µg/m^3
- Freon 12 at MW-19 at a concentration of 130,000 J µg/m^3

In addition to the VOCs detected at reportable concentrations, 395 TICs and 13 unknown compounds were detected in the headspace vapor samples. These compounds were not compared to screening criteria since the quantitation and identification is approximate.

8. Groundwater Source Identification Results

Between June 5 and 12, 2018, groundwater was sampled at 12 monitoring wells and two flooded subslab vapor points (SV-05 and SV-12). These samples are part of an effort to identify the hydrogen sulfide and methane gas parent/source compounds in groundwater as well as part of the ongoing MNA remedy monitoring for AOC B. Complete laboratory reports are provided in Attachments 5 and 6. Table 8-1b summarizes the major inorganic sulfur species and total sulfur elemental analysis for these groundwater samples. One notable finding was the high level of sulfite, relative to sulfate, in the groundwater from MW-03 and MW-33, where the highest concentrations of hydrogen sulfide and methane in headspace vapor samples were also reported. This relationship is notable because sulfite is expected to readily oxidize to sulfate in groundwater systems. However, sulfite is known to be present in high concentrations in some wastewaters (e.g., from papermills) and as a natural fermentation product. Reactions can occur under anaerobic conditions in which an organic molecule is the electron acceptor and sulfate-reducing bacteria can use either sulfite or sulfate as terminal electron acceptors resulting in the production of hydrogen sulfide (Institute of Medicine 2005; Greenwood and Earnshaw 1984; Lumen 2018). Sulfite was also present at concentrations above 150 milligrams per liter (mg/L) in groundwater samples from three wells south of Building 4 along the canal (MW-02, PZ-04 and MW-21). Sulfite is relevant because it could serve as an additional source of sulfur that could be transformed by a microbial community to sulfide.

Table 8-1a compares the concentrations of sulfur species in groundwater to those of total organic sulfur, TOC, and total dissolved solids (TDS) in the monitoring wells sampled. The highest levels of total sulfur, dissolved sulfide, TOC, and TDS in groundwater samples correspond to locations with the highest reported concentrations of hydrogen sulfide, other sulfides, mercaptans, and methane in monitoring well headspace vapor samples. The sum of sulfur-containing species measured individually and converted to an “as-sulfur” basis exceeds the reported concentration of total sulfur in the groundwater samples analyzed by Method 6010C after a heated acid digestion by Method 3005A. This discrepancy may be related to the loss of sulfur compounds in the heated digestion, which involves evaporation to reduce sample volume. Thus, use of multiple analytical methods provides a useful quality control check on the sulfur content of the samples, which is related to the potential of the system to produce hydrogen sulfide.

The first total organic sulfur procedure performed by Specialty Analytical included adsorbing the organic sulfur compounds onto an activated carbon cartridge, and finally conversion to sulfate by thermal desorption in 440°C oxygen stream. The results of these analyses on an “as-sulfur” basis were 330 and 283 mg/L for the MW-03 and MW-33 groundwater samples, respectively. These results would be substantially higher if reported on a “as-organic-compound basis.” The sulfur-containing VOC concentrations reported by Method 8260 do not account for the amount of total organic sulfur observed.

Following the total organic sulfur analytical procedure described above, the carbon media collected from the MW-03 and MW-33 groundwater samples were then subjected to a harsher “bomb” procedure in pure oxygen. Additional sulfate was reported using this procedure, ranging from 82 to 164 mg/L for the MW-03 and MW-33 samples, respectively. According to the Specialty Analytical report “…this may indicate the presence of additional organic sulfur compounds in the sample that are not released from carbon adsorption cartridges during normal thermal desorption. This may infer tightly bound or high molecular weight organic sulfur compounds remained after initial desorption at 440°C.”

The historical production processes at the site involved organic materials with a wide range of polarities, structures and molecular weights, which makes identification of the components of the total organic carbon and total organic sulfur in the groundwater difficult.

9. AOC B Long-term Groundwater and Hydraulic Monitoring Results

In May and June 2018, the 10 AOC B groundwater monitoring wells (MW-01, MW-02, MW-03, MW-33, MW-34, PZ-01, PZ-03, PZ-04, PZ-06, and PZ-07R) were sampled as part of ongoing, long-term groundwater performance monitoring. These groundwater samples were analyzed for Target Analyte List (TAL) metals, VOCs, cations, anions, nutrients, and general water quality constituents. In addition to laboratory analytes, field parameters were measured while purging the monitoring wells, including temperature, pH, dissolved oxygen, specific conductance, oxidation reduction potential, ferrous iron, sulfide, and/or sulfate. Together, the field and laboratory analyses were used to evaluate MNA effectiveness as a remedy at AOC B. The detected constituents in groundwater samples included in the fingerprinting analysis are included in Table 8-1a through 8-1d. The *2018 Groundwater Monitoring Results and Monitored Natural Attenuation Performance Evaluation Report* (Jacobs 2018 [pending]) contains a complete discussion of all AOC B groundwater analytical results. The following subsections consider the major factors that may control the in situ anaerobic biodegradation processes that produce the hydrogen sulfide and methane. An understanding of these processes sets the stage for predicting the likely outcomes of various remedial options being considered in a feasibility study.

9.1 AOC B Hydraulic Conditions

During late May and early June 2018, groundwater flowed toward the canal at gradients ranging from 0.015 (MW-19 to MW-21) to 0.021 (MW-03 to PZ-06) foot/foot. Using the average hydraulic conductivity of 4 feet per day (ft/day) determined from aquifer testing conducted at the former BLDG4-PIT-SSP (CH2M 2013a), the hydraulic gradients from the synoptic surveys, and a porosity of 0.35 for silty sands (Walton 1989), groundwater velocities across the area during 2018 range from 0.17 (MW-19 to MW-21) to 0.24 (MW-03 to PZ-06) ft/day. Further hydraulic monitoring information is provided in the *2018 Groundwater Monitoring Results and Monitored Natural Attenuation Performance Evaluation Report* (Jacobs 2018 [pending]).

9.2 Hydrogen Sulfide, Sulfate, and Other Sulfur Compounds in Groundwater Samples

Results from the 2018 groundwater sampling event include sulfate concentrations in groundwater from Building 4 wells (MW-03, MW-33, and MW-34) that are lower than sulfate concentrations in monitoring wells southeast of Building 4 (MW-02, PZ-04, MW-23, MW-31 and MW-21) (Table 8-1a; Jacobs, 2018). Sulfide concentrations are elevated relative to other monitoring wells at the site at the following locations, which lie along a rough northwest to southeast trend:

- MW-03 and MW-33 inside Building 4;
- The subslab ports that yielded groundwater (SV-05 and SV-12) at the north end of Building 4; and,
- Downgradient of Buildings 3 and 4 along the canal (MW-02, PZ-04 and MW-21).

Lower sulfide concentrations were observed upgradient (PZ-03) and cross-gradient (MW-35, MW-1) relative to Building 4. Sulfite concentration patterns are very similar to those of sulfide; which suggests that the anaerobic conditions producing the sulfide also involve the sulfite. Sulfate concentrations are depleted in groundwater relative to the wells closer to the canal (CH2M 2017b), which may suggest that sulfate is being consumed as an electron acceptor by sulfate-reducing bacteria, leading to the formation of hydrogen sulfide.

9.3 General Chemistry Relevant to Biological Processes in Groundwater Samples

Relatively higher concentrations of ammonia and total Kjeldahl nitrogen suggest that nitrogen is not limiting biological growth in the area around MW-03 and MW-33 where the hydrogen sulfide and methane concentrations in the headspace vapor samples are highest.

Concentrations of TOC in groundwater, typically are used as an indicator of potential organic substrate mass to support biological processes, are highest at MW-03, MW-21, MW-33, and MW-02 (in descending order of concentration). Again, the highest TOC concentrations trend roughly northwest to southeast beginning in Building 4.

Although the concentrations of total phosphorous and orthophosphate are substantially lower than those of organic carbon or available nitrogen forms, they likely would not limit biological processes since phosphorous requirements for microorganisms are much lower than for carbon and nitrogen (Cleveland and Liptzin 2007).

9.4 Metals in Groundwater Relevant to Sulfur Forms

When sulfide is formed in anaerobic biological systems, it frequently is precipitated with metals such as iron and manganese thus controlling its buildup (Wetzel 1983; Suthersan 2002). While some dissolved iron and manganese were observed in the strongly reducing zone under Building 4 (i.e., MW-03 and MW-33), the concentrations were less than 1 mg/L (Table 8-1b), which is stoichiometrically insufficient for the precipitation of the sulfide present at these locations (65 to 68 mg/L). The sulfide in groundwater data is a line of evidence that supports the hydrogen sulfide in the well headspace and subslab samples. Sulfide in groundwater has the potential to be transferred to equilibrate into the vapor phase over time, depending in part on pH. Sulfide is more likely to form hydrogen sulfide and be volatilized under acidic pH conditions. Hydrogen sulfide predominates in solution below approximately pH 7 (Takeno, 2005). pH conditions beneath Building 4 and adjacent buildings are generally stable between pH 6 and 8 (Jacobs 2018).

9.5 Volatile Organic Compounds in Groundwater

VOCs reported in groundwater samples from AOC B are presented on Table 8-1c. Methyl Isobutyl ketone (MIBK)(4-methyl-2-pentanone) was detected at the highest concentration of all VOCs (1,200 µg/L) at MW-03. This concentration of MIBK represents only a fraction of the TOC (158,000 µg/L) observed at MW-03. These data suggest that substantial concentrations of other organic compounds including natural organic matter are present.

10. Site-Specific Attenuation Factor and Air Exchange Evaluation

Two potential sources of hydrogen sulfide in indoor air include: 1) current production processes; and 2) subslab soil vapor concentrations of hydrogen sulfide. Determining the concentration of hydrogen sulfide in indoor air arising from soil gas requires calculating the reduction in vapor concentrations between the subsurface source and indoor air (AF). The EPA default AF (EPA 2012) of 3×10^{-2} was developed as the 95th percentile of *residential* buildings; and is unlikely to accurately describe the attenuation between subslab and indoor air in this historical *industrial* building. Previous studies of military industrial buildings have established that attenuation factors of 0.001 or less are more typical (Venable et al. 2015). Therefore, it is necessary to estimate a zone- or building-specific AF to evaluate whether subsurface hydrogen sulfide sources could result in indoor air concentrations above regulatory action levels. Two methods to determine a site-specific AF are considered below, using radon data collected in June 2018 and historical VOC concentrations from indoor air and subslab vapor samples.

In addition to the rate of hydrogen sulfide entry from the subsurface, indoor air quality is affected by the volumetric air exchange rate for a space through natural or mechanical means. Air exchange rates for Building 4 and connected buildings were measured using a SF_6 tracer gas in June 2018.

Consistent with EPA practice, the following AFs are discussed in this report:

- The AF describing processes across the building envelope ($AF_{building}$).

$$AF_{building} = (indoor\ air\ gas\ concentration) \div (subslab\ soil\ gas\ concentration)$$

- The AF describing process across the building envelope is also equal to the ratio of the flow of soil gas (Q_{soil}) into the building to the ventilation rate of the building ($Q_{building}$) (Johnson 2005; Brewer 2014; Song et al. 2018). As these two flows are positively correlated, the variability in $AF_{bldg.}$ is expected to be less than the variability of the individual flow rates.

$$AF_{building} = Q_{soil} \div Q_{building}$$

- The AF describing processes that occur in the vadose zone (AF_{soil}). The groundwater vapor concentration is often the concentration calculated to be in deep soil gas at equilibrium with the groundwater analyzed, using Henry's law.

$$AF_{soil} = (subslab\ soil\ gas\ concentration) \div (groundwater\ vapor\ concentration)$$

- The overall AF for vapor intrusion from groundwater to indoor air (AF_{VI}) was calculated and reflects both soil column and building envelope effects.

$$AF_{VI} = (indoor\ air\ concentraion) \div (groundwater\ vapor\ concentraion) \text{, thus}$$

$$AF_{VI} = AF_{building} \times AF_{soil}$$

10.1 Radon Attenuation Factor Measurement

AFs are an important approach to vapor intrusion exposure assessment. In residences, the range of AFs ($AF_{building}$) after screening to minimize indoor source contributions, range two orders of magnitude 3.2×10^{-4} to 2.6×10^{-2} (5th to 95th percentiles of the distribution), which led EPA to set 3×10^{-2} as the default for residences (EPA 2012). There is also a wide range of AFs in commercial buildings, but lower values predominate. Venable et al. (2015) recommended 1×10^{-3} as an appropriately conservative AF for commercial buildings in the absence of an atypical preferential pathway based on a study of 49 Department of Defense buildings. Within any one site/measurement location, a variation of AF of one order of magnitude over time (months) is common (Folkes and Kurtz 2009).

To determine a site-specific AF, radon measurements were obtained from subslab and indoor air samples representative of the same buildings. The radon subslab port and indoor air passive radon sampling locations are shown on Figure 6-1. A summary of the subslab and passive radon sampling results are presented in Tables 6-1 and 10-1. Radon in subslab soil gas could not be sampled in sample locations SV-5 or SV-12 due to high water levels. Initial measurements of radon in soil gas were done for reconnaissance purposes in the outlying buildings (SV-01, SV-09, SV-10, and SV-11), but those locations were not included in the second round of field measurements because those buildings were not being studied for AF. The complete laboratory report for the passive radon sampling analyses is included in Attachment 2.

For the purpose of this AF analysis, Buildings 4, 4A, 9, and 11A were treated as one zone because results of an SF_6 tracer study demonstrate that indoor air rapidly mixed from Building 4 into the adjacent buildings through open doorways. A discussion of the SF_6 tracer study is presented in a subsequent section. Thus, the AF calculation used the average indoor air concentration in those spaces, after a correction for the average outdoor concentration. The AF calculation used the average subslab concentration from the sampling rounds before and after the passive radon samples were collected. This resulted in a best estimate radon-based $AF_{building}$ of 8.4×10^{-4} with significant uncertainty because of temporal variability of radon in subslab and the relatively low concentration observed in indoor air.

An estimated range of uncertainty from a sensitivity analysis was calculated as $AF_{building}$ of 2.0×10^{-2} to 4.6×10^{-4}. The higher end of the sensitivity analysis was based on an estimate of the maximum radon concentration based on the precision of the testing of 0.1 picoCuries per liter (pCi/L), divided by the lower of the averages from the two rounds of subslab measurements. The lower end of the sensitivity analysis was based on the ambient air corrected indoor air concentration used in the "best estimate" divided by the higher of the averages from the two rounds of subslab measurements.

10.2 Attenuation Factor Measurement Using a Volatile Gas

If a VOC can be identified that is stable and present at high concentrations in subslab vapor samples, but believed not to have an indoor source, it would be possible to derive a site-specific AF from the ratio of subslab to indoor air concentrations. As the site is an active chemical manufacturing facility with an extensive chemical inventory, the selection of a suitable compound without the potential of interference from indoor sources is difficult. An analysis of VOC concentrations in indoor air and subslab vapor samples collected from Building 4 and the tank storage room (Building 7) during 2008, 2010, and 2012 (CH2M 2013b; Table 10-2) concludes that there is uncertainty in using this approach to calculate a site-specific AF. However, with the exception of the more optimistic February 2012 AF (3 x 10^{-4}), the site-specific average AFs for November 2008 (1 x 10^{-3}), March 2010 (8 x 10^{-3}), February/March 2012 (3 x 10^{-4}), and November 2012 (7 x 10^{-3}) are within an order of magnitude (Table 10-2). The consistency of those values among VOCs suggests that the selected VOCs did not have large indoor sources at the time of measurement, because professional experience suggests that in many buildings even a small indoor source can manifest itself as a dramatic difference in attenuation factors (many orders of magnitude). The best estimate radon attenuation factor of 8.4 x 10^{-4} agrees quite well with those previous VOC-based measurements, which further strengthens the assumption that the VOC measurements were likely not highly biased by indoor sources. As the degree of attenuation in any given building often varies over one or more orders of magnitude with time, all of these measurements are within the expected range of variability and thus support each other, so this study used an AF of 8.4 x 10^{-4}.

10.3 Sulfur Hexafluoride Air Exchange Measurement

10.3.1 Doors Open Testing – Dosing in Building 4

After completion of scoping tests, a pair of SF_6 tests (Tests 3 and 4) were initially conducted with dosing into Building 4 (Figure 6-2) with the doors open representing the normal summer condition. Monitoring began at an elapsed time zero; the time at which both the SF_6 injection and the fan mixing were stopped. At time zero in Tests 3 and 4, the SF_6 was widely distributed not only within Building 4 but in the adjacent Buildings 9 and 11A, which are connected to Building 4 through normally open fire doors (Tables 6-2a and 6-2b). It was observed that this was consistent with perceptible wind directions entering through large exterior doors on Building 4A and Building 4. This observation further supports the assumption made in the radon AF calculations that those buildings behave as an interconnected single zone during normal summer operations.

Figures 10-1a and b and Figures 10-2a and b shows the results of SF_6 decay during each test. At the locations that had a high initial concentration of SF_6 (above 500 parts per billion [ppb], ln(500) = 6.2), the best fit slope of the plot of natural log of concentration vs. hours into test was -4.8 to -15. Thus, the measured air exchange rate is between 4.8 and 15 air exchanges per hour for that period. Results in this range were observed at nine sampling stations in Test 3 and 6 sampling stations in Test 4.

At the more distant monitoring stations, concentrations increased after time zero, suggesting as expected that some of the air exchange from Building 4 occurs from/into more distant buildings such as Building 4A (Station SF6-9) and Building 3 (Station SF6-10).

At the end of Test 3, the concentration of SF_6 plateaued at most monitoring stations at a concentration of approximately 150 to 160 ppb. A concentration of 160 ppb was also observed outside the Building 4 minutes after the completion of the test. This suggests a possible rise in the instrumental baseline since it was initially zeroed to the outside air concentration before the testing. When the instrument arrived at that baseline, it gave the same reading both in the building and more than 50 feet upwind outside the building.

10.3.2 Doors Closed Testing – Dosing in Building 4

Test 6 was conducted with the largest exterior doors of Building 4 in a closed condition (Figure 10-3), which was intended to more closely simulate winter operations.[1] Because one of two SF_6 instruments had become inoperable, a smaller number of monitoring locations were used than in Tests 3 and 4. In contrast to the observations in the previous tests, the initial tracer dose did not rapidly spread to Buildings 9 and 11A under the influence of the mixing fans. Concentrations gradually rose in Buildings 3,

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[1] However, under actual winter conditions stronger temperature differentials would be present that would affect both the air exchange rate and the soil gas entry rate.

9, and 11 as the tracer was exchanged out of Building 4. During this test, a somewhat lower air exchange rate was measured for the Building 4 locations ranging from 1.5 to 4.9 exchanges per hour.

10.3.3 Doors Open Test – Lower Rate Localized Dosing in Building 4

Test 7 was conducted to explore the transport of a tracer that was introduced at a lower rate near the location of the highest previously observed subsurface methane and hydrogen sulfide concentrations (MW-03 and SV-15). For this test, instead of the four widely spaced injection locations across the north-central axis of Building 4 as in the previous tests, only two injection locations near the locations of MW-03 and SV-15 were used (south central in Building 4). The injection was conducted at 5 ft^3/hr for just over an hour, in contrast to 40 ft^3/hr for about 10 minutes in the previous tests. The injected SF_6 was allowed to mix naturally rather than with fans. The results for Test 7 are presented in Table 6-2a. Immediately after the completion of the injection, a slightly elevated concentration was found throughout Buildings 3 and 4, with lower concentrations in Buildings 9 and 11A. This shows that Building 3 and 4 are naturally well mixed under summer conditions. As the concentrations were always below 210 ppb they were not judged to be high enough to calculate quotative air exchange rates.

10.3.4 Doors Open Testing – Dosing in Buildings 7, 9, and 11A

Test 8 was designed to explore transport in the opposite direction to that studied in Tests 3 and 4. In Test 8, dosing and fan mixing was performed in the complex of buildings north and northwest of Building 4 (Buildings 7, 9, and 11A; Figure 10-4). High beginning concentrations (greater than 5,500 ppb) were established in Buildings 7 and 9 using an injection protocol similar to Tests 3, 4, and 6; that is an injection rate of 40 ft^3/hr using mixing fans. The initial concentration in Building 11A was lower (800 ppb). Initial concentrations in Building 4 were near ambient baseline values. The relatively gradual changes in tracer concentrations in these spaces permitted a substantially longer period of test observation before concentrations reached background/ambient levels.

Lower air exchange rates were observed from these spaces; in all cases, less than 2 air exchanges per hour (ACH). That result is consistent with engineering expectations, since although named as separate "buildings", Buildings 9 and 11A have much less exterior wall area and thus less potential for wind-driven ventilation. While Building 7 has substantial exterior wall area, appearances suggest it is of much more recent construction then Building 4 and has a less permeable building envelope. Building 7 also has a lesser number of exterior doors (one overhead and one personnel door) as compared to Building 4 (two overhead and three personnel door).

10.3.5 Summary of Sulfur Hexafluoride Air Exchange Measurements

The air exchange rate for Building 4 as normally operated most of the year (with the doors open) was between 4.8 and 15 ACH at multiple locations measured over two tests. This is the air exchange rate that would apply to dilute entry of soil gas from the high concentration hydrogen sulfide zone near SV-05 and SV-15. The air exchange rate with the doors closed under summer conditions was 1.5 to 4.9 ACH. The air exchange rate measured when tracers were introduced in the Buildings 7, 9, and 11A area was less than two per hour. Building 4 currently is not equipped with any centralized mechanical ventilation system. A previous analysis (CH2M 2017c) considered recommendations from several voluntary ACH standards that were analogous but not directly applicable to this situation. The analysis concluded that there is no specific code-required minimum ventilation rate for this type of space. The recommended ventilation rate was determined based on the greater value of 6 ACH or 1 cubic foot per minute per square foot (ft^3/sf). The 6 ACH was found to be the larger value. Thus, the existing natural ventilation under the condition studied appears to be similar to what a mechanical ventilation system would be designed to produce.

11. Discussion of Findings

11.1 Nature and Extent of Subslab and Monitoring Well Headspace Gases

The analytical and field dataset suggests that a strongly anaerobic zone is present under at least a portion of Building 4, generating high concentrations of methane and hydrogen sulfide. This is indicated by the low oxygen concentrations, and substantial methane and hydrogen sulfide concentrations observed from subslab sampling points and monitoring well headspaces. This is corroborated by other biogeochemical data, such as strongly anaerobic conditions as suggested by groundwater parameters discussed in the *Monitored Natural Attenuation Performance Evaluation Report, Year One Former Hampshire Chemical Corp. Facility, Waterloo, New York* (CH2M 2017d; Jacobs, 2018). For example, highly reducing conditions with ORP less than -300 millivolts are widespread and consistent over time at MW-02, MW-03, MW-21, MW-23, MW-33, MW-34, PZ-04, and PZ-07R (Jacobs 2018; Figure 11-1). Other signs of strongly anaerobic conditions at key wells in Building 4 (i.e., MW-33, MW-03) include elevated concentrations of sulfide, ferrous iron, and TOC. Concentration range distribution maps (Figures 11-2 to 11-9) and distribution plots (Figure 11-10) show the concentrations of hydrogen sulfide and methane in vapor samples collected from subslab points and monitoring well headspaces in 2016 through 2018. In general, the following observations are made from the apparent extent of methane and hydrogen sulfide:

- The surface area of higher hydrogen sulfide concentrations as measured at subslab monitoring points has decreased between 2017 and 2018. This is demonstrated by comparing the number of samples with hydrogen sulfide concentrations greater than 1,000 μg/m^3 in Figures 11-7 and 11-8. However, the concentration at SV-15 (the location having the highest concentration) has increased.
- The surface area of higher methane concentrations as measured at subslab monitoring points has increased between 2017 and 2018. This is demonstrated by comparing the number of samples with methane concentrations greater than 0.1% in Figures 11-2 and 11-3.
- The surface areas of higher hydrogen sulfide and methane concentrations as measured in groundwater monitoring well headspaces has increased between 2016 and 2018. This is demonstrated by comparing the number of samples with methane concentrations greater than 0.1% and 5% in Figures 11-4 and 11-5. In addition, the number of samples with concentrations of hydrogen sulfide greater than 1,000 μg/m^3 in Figures 11-6 and 11-9 southeast of Building 4 indicates an increase in headspaces in that area.

The available differential pressures (the difference between ambient and subslab or headspace pressures) data collected from 2016 to 2018 (Table 7-2) suggests positive differential pressures are present beneath Building 4. These pressures may be due to a combination of biological generation of gases, variations in the water table at this site (especially during very wet years such as 2017), and/or in certain seasons due to the stack effect. In some locations, where the well screen is entirely submerged and the well tightly sealed with an expandable well plug (e.g., PZ-03), the observed headspace pressures are likely related primarily to changes in water level.

11.2 Groundwater Conditions Influencing Soil Gas Migration and Distribution

Similar to the 2017 field event (Jacobs 2018), hydraulic head in the northern portion of Building 4 remains higher than or immediately below the concrete and acid brick floor, with the estimated affected area (blue polygon) shown on Figures 11-2, 11-3, 11-7, and 11-8. An elevated water table is evidenced by water being drawn from SV-05 and SV-12 during sampling, and water was seen seeping from the foundation wall north of SV-15 at a height of approximately 1 foot above the floor. The groundwater elevation measured at MW-33 on May 31, 2018 was 433.19 feet above mean sea level (amsl), only 1.1 feet below the surveyed ground surface (concrete slab) elevation of 434.29 feet amsl. During installation of SV-05 in April 2017, a ⅝-inch hole was drilled through the concrete slab with a rotary hammer drill. At that time, it was estimated that the slab was roughly 11 inches thick. Therefore, the water table and/or capillary fringe is almost certainly in contact with the bottom of the concrete slab. The water table in contact with the concrete slab may form at least a partial barrier against vapor migration to the north of Building 4.

The facility is constructed on a slope which descends approximately 12 feet from the raceway along East Main Street at the northern boundary of the site to the canal at the southern boundary of the site. In Building 4 the floor surface is approximately 5 feet lower than the floors of adjoining buildings to the north (Buildings 9, 10, 11 Basement, and 11A, all of those floors also being below natural ground elevation at those locations) (Figure 2-2), and approximately 11 ft lower than the ground level at the northeast portion of the building. Groundwater elevation measurements at MW-03, MW-33, MW-34, and PZ-01, during May and June 2018 ranged from 433.19 feet amsl (0.68 feet below top-of-casing [btoc]) at MW-33 to 430.76 feet amsl (3.03 feet btoc) at MW-34 (Table 4-1; Figure 11-11). The groundwater elevation trend in the northern area of Building 4 (MW-33 and PZ-01) is either stable or rising since measurements at those locations began 2009 (PZ-01) and 2013 (MW-33). Groundwater elevations at most other wells in AOCs B and D display relatively stability or a slightly downward trend from 2009 to 2018 (Figures 11-11 and 11-12). The hydraulic heads in the northern portion of Building 4 may be controlled by the relative stability of surface water elevations in the northern raceway and the canal, and a lack of natural recharge. If so, a persistent barrier against vapor migration to the north of Building 4 formed by the water table in contact with the concrete slab will likely remain. This persistence is also suggested by the repeated observations of water seeping from the northern foundation wall of Building 4, and staining and mineral deposits on the acid brick floor downslope.

11.3 Horizontal and Vertical Distribution of Constituents of Concern

Building 4 has operated from 1943 until the present time as a chemical manufacturing facility producing divalent organic sulfur intermediates. The RFI report (CH2M 2006) and subsequent reports for this facility document that at Building 4:

- VOCs and SVOCs above applicable screening criteria had been observed in soil and pit water (CH2M 2017d).
- Sulfate concentrations are depleted in groundwater relative to the wells closer to the canal (CH2M 2017d), which would suggest the potential that sulfate is being consumed as an electron acceptor by sulfate reducing bacteria, leading to the formation of hydrogen sulfide.

Recent results (Jacobs 2018) show that sulfate concentrations in Building 4 wells (MW-03, MW-33, and MW-34) are still substantially below sulfate concentrations in a group of monitoring wells southeast of Building 4 along the canal (MW-02, PZ-04, MW-23, MW-31 and MW-21). Thus, there is a rough correlation between reduced, but not exhausted, sulfate concentrations in groundwater and elevated hydrogen sulfide in well headspace.

An extensive geochemical evaluation performed for AOCs B and D concludes that groundwater at AOC B exhibits mostly mixed oxic-anoxic chemistry with nitrate, ferric iron and sulfate reduction constituting the primary redox processes (CH2M 2017b). The mixed chemistry observations may result from wells whose screens intersect multiple redox conditions. The observations of methane and hydrogen sulfide production are thus broadly consistent with the presence of biodegradable organic compounds, multiple sources of sulfur, and areas of strongly anaerobic conditions.

The lateral transport of that hydrogen sulfide and methane is apparently limited beyond the northern boundary of Building 4; as indicated by comparison of the Building 4 locations to those located just outside Building 4 (SV-02, SV-03, and SV-04). The limitation in transport could be a function of shallow groundwater, damp soils, an aerobic capillary fringe conditions in which the hydrogen sulfide and methane are being consumed biologically, and/or building foundation feature interference. Moist soils provide a substantial barrier to flow in the vadose zone (EPA 2012b).

The vertical extent of elevated methane concentrations may also be constrained by the action of methane-oxidizing microbial communities (i.e., methanotrophs). For example, the lateral extent of observed methane in subslab soil gas (Figures 11-2 and 11-3) is substantially smaller then in monitoring well headspaces (Figures 11-4 and 11-5). Some shallow biological consumption of methane may even be occurring above the areas of highest methane production. For example, the concentration of methane in four well head space samples in Building 4 in 2018 ranged from 40.7% to 80.8% (average 61.7%; Figure 7-1 while the concentration of methane in four soil gas samples in Building 4 in 2018 ranged from

0.4% to 31.4% (average 16.3%; Figure 7-1). However, it should be noted that in the case of a well screened across the water table, it likely represents a smaller lateral area then the nearby subslab sample does.

In contrast, the subslab hydrogen sulfide concentrations are currently higher than the well headspace concentrations in the zones of highest hydrogen sulfide production. For example, at subslab point SV-15 the concentration of hydrogen sulfide is 180,000,000 µg/m^3, while nearby at MW-03 the concentration was 26,000,000 µg/m^3. Similarly, at subslab point SG-7R the concentration was 23,000,000 µg/m^3 while at nearby well PZ-01 the concentration was only 4,000 µg/m^3. Northwest of Building 4, in Building 7 the subslab concentration was 32 µg/m^3 at two different locations, while the monitoring well headspace was below 1 µg/m^3. The exception to this trend was at MW-34, with a hydrogen sulfide concentration of 750,000 µg/m^3, while subslab point SV-07 approximately 15 feet away had a concentration of only 20 µg/m^3. Together, these results suggest that sulfate reduction may predominate over sulfide oxidation in shallow areas beneath Building 4 as well as in the shallow portion of the saturated zone.

11.4 Occurrence of Other Sulfur-Containing Compounds

Other sulfur-containing compounds have been reported in subslab soil gas samples at concentrations greater than those for headspace vapor samples from nearby monitoring wells. For example, methyl mercaptan was reported at concentrations of 230,000 and 19,000 µg/m^3 for the SV-15 and MW-03 subslab port-monitoring well pair. At the SG-7R and PZ-01 pair, methyl mercaptan was reported at a concentration of 15,000 µg/m^3 and below the laboratory reporting limit (98 µg/m^3). Additionally, concentrations at subslab sampling point SG-7R substantially exceed those at nearby piezometer PZ-01 for 1-propanethiol, carbon disulfide, ethyl mercaptan, isopropyl mercaptan, MIBK, and toluene.

It is unknown whether the observations at MW-19, which lies approximately 100 feet northeast from the closest Building 4 monitoring points are directly related to the observations in Building 4. MW-19 is characterized by consistently elevated methane, carbon dioxide, and depleted oxygen concentrations as well as negative ORP and substantially positive differential pressure over numerous sampling rounds (Figures 11-1 and 11-13 and Table 11-12). However, hydrogen sulfide is low and variable at MW-19 (Figure 11-1). Samples from the nearest subslab ports in the shop buildings SV-10 and SV-11 indicate that hydrogen sulfide and methane are not present at these locations to the north of Bldg. 4.

11.5 Groundwater Source Fingerprinting

While the current analytical methods cannot identify specific sulfur compounds as a source for methane and hydrogen sulfide in soil vapor, the fingerprinting effort generated the following findings:

- Substantial concentrations of organic sulfur compounds of widely varying molecular weight are present in the groundwater beneath Building 4.
- High concentrations of sulfite and sulfate, in the magnitude of several hundred mg/L, are present within the highly reducing zone where methane and hydrogen sulfide are being produced. This suggests that sulfur electron acceptors are not the factor limiting the production of hydrogen sulfide.
- Monitoring wells with the highest levels of hydrogen sulfide, methane, and other mercaptan and sulfide compounds in headspace vapors, also have the highest levels of total sulfur, dissolved sulfide, TOC, and TDS in the groundwater.

11.6 Site-Specific Attenuation Factor and Air Exchange Evaluation

The AF measured for Building 4 and adjoining buildings under summer conditions, using a radon AF of 8.4 x 10^{-4}, is much less conservative then default residentially based attenuation factors and agrees well with previous VOC AF measurements. Although there is significant uncertainty in this value, the agreement of AFs measured with multiple methods, as well as the measured high air exchange rate of the building, supports the conclusion that the AF for this building is below the standard default AF.

The ability to use the site-specific AF to calculate an expected indoor air concentration attributable to vapor intrusion is constrained by the inability to obtain subslab samples in portions of Building 4 where the water table is close to the slab. The accuracy of any such estimate would also be limited by the potential for different soil gas entry rates from soils of differing permeabilities. As hydrogen sulfide is a known byproduct of the facilities industrial processes, apportioning the source of any hydrogen sulfide observed in indoor air would also be difficult. However, continuous monitoring of hydrogen sulfide in indoor air by Evans Chemetics provides confidence that there are not currently exceedances of facility-specific action levels.

The air exchange rate measurements suggest a substantial natural air exchange of greater than 4 ACH under summer operating conditions. This air exchange rate is achieved in the absence of mechanical ventilation systems due to the leaky nature of the building envelope and the many open doors in this facility. The doorways connecting Building 4 to Buildings 3, 4, 4A, 9, 10, and 11A are equipped with fire doors, and except for the oven room (Building 10), which were normally open during previous site visits. As expected, air exchange rates were lower with the doors closed in summer. However, under actual winter conditions, temperature differentials would be expected to drive higher air exchange rates then were measured in the summer with the doors closed (Song et al. 2014).

12. Data Quality Evaluation

Attachment 7 contains detailed data quality evaluations (DQEs) for the soil vapor and groundwater samples collected during the May and June 2018 sampling event. The DQEs conclude that with limited exceptions the precision, accuracy, and representativeness of the laboratory results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures. Furthermore, the data can be used for decision making, with the exception of the rejected data, taking into consideration the validation flags applied.

13. Conclusions

The following is a summary of conclusions based on the results of this investigation:

- Groundwater monitoring well headspace vapor results indicate that hydrogen sulfide and methane are present in the subsurface and that groundwater conditions are locally sulfate reducing and methanogenic.
- Subslab soil vapor sample results indicate hydrogen sulfide and methane exist underneath the Building 4 floor at elevated concentrations.
- Persistent shallow groundwater levels beneath Building 4 constrain the ability to sample or mitigate subslab gases and may also act to limit the lateral migration of methane and hydrogen sulfide in the northern portion of the building.
- The primary soil gas/vapor intrusion concerns appear to be related to hydrogen sulfide and methane rather than VOCs.
- Tracer studies with SF_6 show a high natural ventilation rate of greater than 4 ACH in Building 4 under the typical summer operating conditions with open doors. Lower ventilation rates were observed with the doors closed, which is not the normal summer operating condition.
- Radon AF measurements agree with previous VOC observations showing a much greater degree of attenuation across the floor then would be assumed based on conservative, residentially based values.

14. Recommendations

The following are recommendations based on the results of this investigation:

- Continue using engineering controls during regular site activities, such as groundwater monitoring, to protect site workers. This includes ventilation during sampling, using hydrogen sulfide and methane sensors connected to the plant's system control and data acquisition systems, and institutional controls implemented by Evans Chemetics.

- As discussed with the NYSDEC and NYSDOH in the August 21, 2018 meeting, conduct a subslab vapor mitigation pilot test to assess subslab air flow and communication under Building 4 and the extent to which methane and hydrogen sulfide are being generated.
- Conduct an alternatives assessment of mitigation and remediation alternatives for hydrogen sulfide and methane based on the findings of the pilot test.
- Concurrent with the pilot test, evaluate the spatial and temporal variability of groundwater levels beneath the facility. This evaluation should also consider the possible role of stormwater drainage and canal/raceway stage in controlling the groundwater elevations beneath the facility.
- Continue to monitor changes in subsurface hydrogen sulfide and methane concentrations in subsurface soil gas at the site coupled with monitoring of differential pressures on an annual basis until a mitigation system is operating.
- Further investigation of building air exchange and the flux of soil gas into Building 4 during the heating season to establish whether the potential for hydrogen sulfide vapor intrusion is significant as compared to applicable industrial screening levels. This investigation may include radon and SF_6 tracer testing.
- Further evaluate institutional controls that may be appropriate given the concentrations of methane observed in soil gas. These could include precautions during future subsurface construction activities and the avoidance of small enclosed spaces above grade where methane and hydrogen sulfide could accumulate.

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Tables

TABLE 4-1. Groundwater Elevation Measurements In and Around AOCs B and D

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Well Number	**Date**	**Ground Elevation** (ft amsl)	**Inner Casing Elevation** (ft amsl)	**Depth to Water** (ft from TIC)	**Groundwater Elevation** (ft amsl)
MW-01	5/30/18	434.03	433.80	4.70	429.10
MW-02	5/30/18	433.33	432.93	3.98	428.95
MW-03[a]	5/31/18	434.44	434.02	1.98	432.04
MW-19	5/30/18	445.64	445.25	10.24	435.01
MW-21	5/30/18	433.46	433.10	3.90	429.20
MW-23	5/30/18	432.67	432.35	3.47	428.88
MW-31	5/30/18	433.13	432.65	3.84	428.81
MW-33[a]	6/1/18	434.29	433.87	0.68	433.19
MW-34[a]	5/30/18	434.36	433.79	3.03	430.76
MW-35	5/30/18	433.60	433.43	3.00	430.43
MW-36	5/30/18	433.26	432.80	0.90	431.90
MW-37	5/30/18	433.32	433.02	1.45	431.57
PZ-01[a]	5/30/18	434.49	434.25	1.70	432.55
PZ-03[a]	6/6/18	434.41	434.06	3.07	430.99
PZ-04	5/30/18	432.73	432.14	3.32	428.82
PZ-06	5/30/18	433.06	432.77	3.57	429.20
PZ-07R	5/30/18	433.07	432.57	3.92	428.65

Notes:

[a] Water level measurements were collected in Level B PPE due to wellhead hydrogen sulfide and/or methane.

[b] Water level measurements were not collected because the well could not be located.

1. Water level measurements were collected on May 30th, 2018, with the exception of MW-03, MW-33, and PZ-03 which were collected on 5/31/18, 6/1/18, and 6/6/17 respectively.
2. All wells were surveyed to the New York Central state plane coordinate system (NAD 1983).

amsl - above mean sea level	NA - not available
bgs - below ground surface	NM - not measured
ft - feet	TIC - top of inner casing

Table 5-1. Summary of Groundwater Samples Collected

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Sampling Location	Sample Identification	Laboratory Analysis	Sample Delivery Group	Sample Type	Sampling Method	Pump Placement Depth (ft. from TIC)	Sample Date	Sample Time
MW-01	MW01-061218	VOCs, Metals[1], MNA	L1821978	N	Peristaltic	9.5	06/12/2018	15:10
MW-01	MW01-061218	Sulfite, Total Sulfur	L1821979	N	Peristaltic	9.5	06/12/2018	15:10
MW-02	DUP-GW-061218	VOCs, Metals[1], MNA	L1821978	FD	Peristaltic	9.5	06/12/2018	10:15
MW-02	MW02-061218	VOCs, Metals[1], MNA, Sulfite	L1821978	N	Peristaltic	9.5	06/12/2018	10:10
MW-02	DUP-GW-061218	Sulfite, Total Sulfur	L1821979	FD	Peristaltic	9.5	06/12/2018	10:15
MW-02	MW02-061218	Sulfite, Total Sulfur	L1821979	N	Peristaltic	9.5	06/12/2018	10:10
MW-03	MW03-060518	Sulfite, Total Sulfur	L1820783	N	Peristaltic	14	06/05/2018	11:00
MW-03	MW03-060518	VOCs, Metals[1], MNA	L1820793	N	Peristaltic	14	06/05/2018	11:00
MW-19	MW19-061118	VOCs, Metals[1], SVOCs, PAHs	L1821757	N	Peristaltic	15.5	06/11/2018	12:00
MW-19	MW19-061118	MNA, Sulfite, Total Sulfur	L1821758	N	Peristaltic	15.5	06/11/2018	12:00
MW-21	MW21-061218	Metals[1], MNA, Sulfite	L1821978	N	Peristaltic	10	06/12/2018	17:10
MW-21	MW21-061218	Sulfite, Total Sulfur	L1821979	N	Peristaltic	10	06/12/2018	17:10
MW-33	MW33-060518	Sulfite, Total Sulfur	L1820783	N	Peristaltic	8	06/05/2018	15:00
MW-33	MW33-060518	VOCs, Metals[1], MNA	L1820793	N	Peristaltic	8	06/05/2018	15:00
MW-34	MW34-060718-MS	MNA	L1821305	MS	Peristaltic	10	06/07/2018	15:30
MW-34	MW34-060718	VOCs, Metals[1], MNA	L1821305	N	Peristaltic	10	06/07/2018	15:30
MW-34	MW34-060718	Sulfite, Total Sulfur	L1821306	N	Peristaltic	10	06/07/2018	15:30
MW-35	MW35-060518	Sulfite, Total Sulfur	L1820783	N	Peristaltic	9	06/05/2018	12:15
MW-35	MW35-060518MS	Sulfite, Total Sulfur	L1820783	MS	Peristaltic	9	06/05/2018	12:15
MW-35	MW35-060518MSD	Sulfite, Total Sulfur	L1820783	SD	Peristaltic	9	06/05/2018	12:15
MW-35	MW35-060518	Metals[1], MNA	L1820793	N	Peristaltic	9	06/05/2018	12:15
MW-35	MW35-060518-MS	MNA	L1820793	MS	Peristaltic	9	06/05/2018	12:15
PZ-01	PZ01-060418	Sulfite, Total Sulfur	L1820596	N	Peristaltic	8	06/04/2018	15:30
PZ-01	PZ01-060418	VOCs, Metals[1], MNA	L1820597	N	Peristaltic	8	06/04/2018	15:30
PZ-03	PZ03-060618-MS	Metals[1], MNA	L1821023	MS	Peristaltic	8	06/06/2018	11:00
PZ-03	PZ03-060618	VOCs, Metals[1], MNA	L1821023	N	Peristaltic	8	06/06/2018	11:00
PZ-03	PZ03-060618	Sulfite, Total Sulfur	L1821028	N	Peristaltic	8	06/06/2018	11:00
PZ-04	PZ04-061118	VOCs, Metals[1], MNA	L1821757	N	Peristaltic	8	06/11/2018	15:20
PZ-04	DUP-GW-061118	MNA, Sulfite, Total Sulfur	L1821758	FD	Peristaltic	8	06/11/2018	15:25
PZ-04	PZ04-061118	MNA, Sulfite, Total Sulfur	L1821758	N	Peristaltic	8	06/11/2018	15:20
PZ-07R	PZ07R-060818	Sulfite, Total Sulfur	L1821548	N	Peristaltic	8.5	06/08/2018	11:30
PZ-07R	PZ07R-060818MS	VOCs, Metals[1], MNA	L1821549	MS	Peristaltic	8.5	06/08/2018	11:30
PZ-07R	PZ07R-060818MSD	VOCs, Metals[1], MNA	L1821549	SD	Peristaltic	8.5	06/08/2018	11:30
PZ-07R	PZ07R-060818	VOCs, Metals[1], MNA	L1821549	N	Peristaltic	8.5	06/08/2018	11:30
SV-05	SV05-060518	Total Sulfur	L1820783	N	Peristaltic	NA	06/05/2018	15:30
SV-05	SV05-060518	VOCs, MNA	L1820793	N	Peristaltic	NA	06/05/2018	15:30
SV-12	SV12-060418	Total Sulfur	L1820596	N	Peristaltic	NA	06/04/2018	15:15
SV-12	SV12-060418	VOCs, MNA	L1820597	N	Peristaltic	NA	06/04/2018	15:15

Notes:

1. All normal environmental samples were analyzed for total and dissolved metals

MNA - Natural Attenuation Parameters, and includes sulfates, nitrates, methane, carbon dioxide, alkalinity, phosphorus, and total organic carbon

VOC - Volatile Organic Compounds
SVOC - Semivolatile Organic Compounds
TOC - Total Organic Carbon
TDS - Total Dissolved Solids
TIC - Top of Inner Casing
TB - Trip Blank

ft = feet
FB - Field Blank
FD - Field Duplicate Sample
N - Normal Environmental Sample
MS - Matrix Spike
SD - Matrix Spike Duplicate
N/A - Not Applicable

Table 6-1. Summary of Radon Screening

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Soil Vapor Screening - Initial					**Soil Vapor Radon Screening - Final**				
Location	Date	Time	Radon (pCi/L)	Statistical Uncertainty (+/- pCi/L)	Date	Time	Radon (pCi/L)	Statistical Uncertainty (+/- pCi/L)	Notes
SV-01	6/7/2018	16:00	16.1	9.9	--	--	--	--	Isolated from SF6 test, therefore ommited from final radon screening
SV-02	6/6/2018	11:00	29.3	12.6	6/11/2018	17:19	5.99	6.55	
SV-03	6/7/2018	15:45	4.67	6.44	6/11/2018	17:43	0.86	4.15	
SV-04	6/7/2018	15:20	8.5	7.86	6/11/2018	17:32	1.71	4.68	
SV-05	6/6/2018	--	--	--	--	--	--	--	High groundwater conditions. Water in probe.
SV-06	6/1/2018	12:20	2.8	5.6	6/11/2018	16:29	2.82	5.6	
SV-07	5/30/2018	12:50	16.9	10.1	6/11/2018	15:23	3.74	6.05	
SV-08	5/30/2018	14:50	228	32.2	6/11/2018	15:33	14.1	9.39	
SV-09	6/8/2018	12:35	75.9	19	--	--	--	--	Isolated from SF6 test, therefore ommited from final radon screening
SV-10	6/8/2018	13:30	128	24.4	--	--	--	--	Isolated from SF6 test, therefore ommited from final radon screening
SV-11	6/8/2018	13:20	183	28.8	--	--	--	--	Isolated from SF6 test, therefore ommited from final radon screening
SV-12	5/31/2018	--	--	--	--	--	--	--	High groundwater conditions. Water in probe.
SV-13	6/7/2018	16:50	27.4	12.2	6/11/2018	15:52	9.44	8.15	
SV-14	6/7/2018	16:40	9.39	8.11	6/11/2018	15:43	17	10.3	
SV-15	6/5/2018	10:35	--	--	6/11/2018	16:07	2.83	5.67	SV compromised, replaced later. Post reading only
SV-16	6/7/2018	11:20	40.8	14.5	6/11/2018	16:43	6.57	7.18	
SG-7R	5/31/2018	11:09	19.8	11.3	6/11/2018	--	--	--	Water pulled in by RAD7 instrument during post test
--	--	--	--	--	--	--	--	--	
--	--	--	--	--	--	--	--	--	
--	--	--	--	--	--	--	--	--	

Table 6-2a. Test Number 3 Data, Sulfur Hexafluoride Air Exchange Evaluation

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Test Run Number : 3

Date of Test : June 13, 2018

Fans Start Time: 16:06

Fans End Time: 16:15

SF_6 Injection Start Time: 16:05

SF_6 Injection End Time: 16:14

Weather: warm, breezy with gusts from the west

Building Doors: normal conditions (Building 4 doors open)

Total SF_6 Injection Volume: 6 ft

SF_6 Injection Rate: 40 ft^3/hr

	Time:	16:20	16:25	16:30	16:35	16:40	16:45
	Elapsed Time (hours):	0.00	0.08	0.17	0.25	0.33	0.42
Location	**Location Description**	**Sulfur Hexafluoride** (ppb)					
SF6-01	Central Building 9	3,620	1,200	570	380	250	190
SF6-02	Central Building 11A	2,780	1,450	600	270	210	160
SF6-03	NE Building 4 (lower level)	2,480	350	160	110	150	150
SF6-04	Northern Building 4 (mezzanine)	1,500	550	200	130	160	160
SF6-05	SW Building 4 (lower level)	1,340	140	110	120	150	160
SF6-06	Southern Building 4 (mezzanine)	870	220	110	120	140	150
SF6-07	NE Building 4 (lower level)	510	150	90	130	140	160
SF6-08	Building 4 (lower level)	370	100	90	130	150	160
SF6-09	Central Building 4	150	80	70	130	150	150
SF6-10	Western Building 3 (lower level)	120	110	100	160	150	160

Notes

ft^3 - cubic feet

ft^3/hr - cubic feet per hour

NE - northeastern

ppb - parts per billion

SW - southwestern

SF_6 - sulfur hexafluoride

Table 6-2b. Test Number 4 Data, Sulfur Hexafluoride Air Exchange Evaluation
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Test Run Number: 4
Date of Test: June 14, 2018
Fans Start Time: 09:07
Fans End Time: 09:20

SF_6 Injection Start Time : 09:10
SF_6 Injection End Time : 09:19
Weather: warm, breezy with gusts from the west
Building Doors: normal conditions (Building 4 doors open)

Total SF_6 Injection Volume: 6 ft^3
SF_6 Injection Rate: 40 ft^3/hr

	Time:	9:21	09:26	09:31	09:36	09:41	09:46	09:51
	Elapsed Time (hours):	0.00	0.08	0.17	0.25	0.33	0.42	0.5
Location	**Location Description**	**Sulfur Hexafluoride** (ppb)						
SF6-01	Central Building 9	1427	508	349	240	193	146	150
SF6-02	Central Building 11A	851	687	382	206	165	136	127
SF6-03	NE Building 4 (lower level)	1258	389	170	95	91	87	105
SF6-04	Northern Building 4 (mezzanine)	1284	460	180	98	99	99	110
SF6-05	SW Building 4 (lower level)	1072	215	128	84	81	81	103
SF6-06	Southern Building 4 (mezzanine)	4650	910	350	200	130	180	NM[1]
SF6-07	NE Building 4 (lower level)	800	310	150	120	110	180	NM[1]
SF6-08	Building 4 (lower level)	1150	380	120	100	110	170	NM[1]
SF6-09	Central Building 4	300	100	80	90	90	210	NM[1]
SF6-10	Western Building 3 (lower level)	500	200	140	110	130	220	NM[1]

Notes

[1] Final measurements at SF6-06 thru SF6-10 not collected due to instrument malfunction.

ft^3 - cubic feet

ft^3/hr - cubic feet per hour

NE - northeastern

NM - not measured

ppb - parts per billion

SF_6 - sulfur hexafluoride

Table 6-2c. Test Number 6 Data, Sulfur Hexafluoride Air Exchange Evaluation

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Test Run Number: 6
Date of Test: June 14, 2018
Fans Start Time: 13:06
Fans End Time: 13:20

SF_6 *Injection Start Time:* 13:07
SF_6 Injection End Time: 13:16
Weather: warm and breezy
Building Doors: Building 4 doors closed

Total SF_6 Injection Volume: 6 ft^3
SF_6 Injection Rate: 40 ft^3/hr

	Time:	13:21	13:26	13:31	13:36	13:46	13:51	13:56	14:01	14:06
	Elapsed Time (hours):	0.00	0.08	0.17	0.25	0.42	0.50	0.58	0.67	0.75
Location	**Location Description**	**Sulfur Hexafluoride** (ppb)								
SF6-01	Central Building 9	15	10	42	55	59	72	89	98	130
SF6-02	Central Building 11A	35	16	33	49	64	69	79	104	141
SF6-03A	Western Building 4 (lower level)	1,320	255	64	44	68	64	80	107	136
SF6-04A	Central Building 4 (lower level)	1,304	412	182	121	103	84	98	124	147
SF6-05A	Eastern Building 4 (lower level)	1,220	199	167	117	111	106	110	151	150
SF6-09	Central Building 4	200	141	121	96	90	87	110	115	145
SF6-10	Western Building 3 (lower level)	25	80	79	125	122	117	149	143	174

Notes

[1] Notable air movement from overhead near MW-33, even with all doors closec

[2] 13:36 time interval went over 5 minutes, skipped 13:41 time interval to return to even 5-minute interval

ft^3 - cubic feet

ft^3/hr - cubic feet per hour

ppb - parts per billion

SF_6 - sulfur hexafluoride

Table 6-2d Test Number 7 Data, Sulfur Hexafluoride Air Exchange Evaluation

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Test Run Number: 7
Date of Test: June 14, 2018
Fans Start Time: NA
Fans End Time: NA

SF_6 Injection Start Time: 14:51
SF_6 Injection End Time: 15:57
Weather: warm and breezy
Building Doors: normal conditions (Building 4 doors open)

Total SF_6 Injection Volume: 5 ft^3
SF_6 Injection Rate: 5 ft^3/hr

	Time:	15:58	16:03	16:08	16:13	16:18	16:23
	Elapsed Time (hours):	0.00	0.08	0.17	0.25	0.33	0.42
Location	**Location Description**	**Sulfur Hexafluoride** (ppb)					
SF6-01	Central Building 9	37	36	43	33	39	40
SF6-02	Central Building 11A	44	41	57	45	46	42
SF6-03A	Western Building 4 (lower level)	98	50	50	36	40	45
SF6-04A	Central Building 4 (lower level)	162	57	63	46	43	46
SF6-05A	Eastern Building 4 (lower level)	208	72	67	49	46	48
SF6-09	Central Building 4	136	43	72	40	41	46
SF6-10	Western Building 3 (lower level)	152	64	70	45	48	49

Notes
ft^3 - cubic feet
ft^3/hr - cubic feet per hour
ppb - parts per billion
SF_6 - sulfur hexafluoride

Table 6-2e. Test Number 8 Data, Sulfur Hexafluoride Air Exchange Evaluation

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Test Run Number : 8
Date of Test : June 15, 2018
Fans Start Time: 09:31
Fans End Time: 09:40

SF_6 Injection Start Time: 09:30
SF_6 Injection End Time: 09:35
Weather: mild, warm, slight breeze
Building Doors: Normal conditions (Building 4 doors open, Tank Storage Room doors closed)

Total SF_6 Injection Volume: 3.3 ft^3
SF_6 Injection Rate: 40 ft^3/hr

	Time:	09:42	09:47	09:52	09:57	10:02	10:07	10:12	10:17	10:22	10:27	10:32	10:37	10:42	10:47	10:52	10:57	11:02	11:07	11:12	11:17	11:22
	Elapsed Time (hours):	0.00	0.08	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.83	0.92	1.00	1.08	1.17	1.25	1.33	1.42	1.50	1.58	1.67
Location	**Location Description**	**Sulfur Hexafluoride** (ppb)																				
SF6-01B	Eastern Tank Storage	6,190	5,320	4,305	3,330	NM[1]	2,402	1,750	1,501	NM	1,296	1,070	927	NM[1]	780	630	430	NM[1]	431	380	NM[1]	350
SF6-02B	Central Building 9	5,720	2,240	3,780	3,150	NM[1]	2,350	1,750	1,652	NM	1,018	1,175	1,078	NM[1]	820	654	509	NM[1]	422	299	NM[1]	358
SF6-03B	Central Building 11A	800	670	391	247	NM[1]	199	184	146	NM	177	193	216	NM[1]	240	225	230	NM[1]	201	212	NM[1]	209
SF6-04B	NW Building 4 (lower level)	120	85	115	120	NM[1]	104	130	129	NM	140	162	181	NM[1]	217	199	196	NM[1]	194	202	NM[1]	205
SF6-05B	Central Building 4 (lower level)	100	79	121	109	NM[1]	114	138	125	NM	139	160	190	NM[1]	219	197	195	NM[1]	196	204	NM[1]	206
SF6-06B	SE Building 4 (lower level)	79	64	99	94	NM[1]	102	130	132	NM	145	158	199	NM[1]	216	200	201	NM[1]	195	200	NM[1]	204

Notes

[1] Locations not measured due to slight lag behind in previous time interval, skipped next interval so that even 5-minute increments can be resumed

ft^3 - cubic feet
ft^3/hr - cubic feet per hour
NW - northwestern
ppb - parts per billion
SE - southeastern
SF_6 - sulfur hexafluoride

Table 7-1. Soil Vapor Sampling Summary

2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Location	Location Type	Sample ID	Sample Date	Sample Delivery Group	Purge Start Time	Purge End Time	Purge Rate (mL/min)	Sample Start Time	Sample End Time
SG-7R	Vapor Pin	WAT-SG-7R-053118	5/31/2018	C1806037	11:15	11:17	Syringe	11:19	12:04
SV-01	Vapor Pin	WAT-SV01-060718	6/7/2018	C1806037	15:56	16:03	800	16:15	16:50
SV-02	Vapor Pin	WAT-SV02-060618	6/6/2018	C1806037	10:50	10:58	800	11:04	11:30
SV-03	Vapor Pin	WAT-SV03-060718	6/7/2018	C1806037	15:33	15:38	800	15:51	16:20
SV-04	Vapor Pin	WAT-SV04-060718	6/7/2018	C1806037	15:15	15:20	800	15:27	15:49
SV-05[a]	Vapor Pin	--	--	--	--	--	--	--	--
SV-06[b]	Vapor Pin	WAT-SV06-060118	6/1/2018[b]	C1806037	12:20	12:25	800	12:26[b]	07:40[b]
SV-07	Vapor Pin	WAT-SV07-053018	5/30/2018	C1806037	12:45	12:46	Syringe	12:55	12:55
SV-08	Vapor Pin	WAT-SV08-053018	5/30/2018	C1806037	14:50	14:51	Syringe	14:53	15:26
SV-09	Vapor Pin	WAT-SV09-060818	6/8/2018	C1806037	12:28	12:35	800	12:41	13:07
SV-10	Vapor Pin	WAT-SV10-060818	6/8/2018	C1806037	13:30	13:35	800	13:36	14:17
SV-11	Vapor Pin	WAT-SV11-060818	6/8/2018	C1806037	12:55	13:05	800	13:29	14:06
SV-11	Vapor Pin	DUP-SV-060818	6/8/2018	C1806037	12:55	13:05	800	13:29	14:06
SV-12[a]	Vapor Pin	--	--	--	--	--	--	--	--
SV-13	Vapor Pin	WAT-SV13-060718	6/7/2018	C1806037	16:38	16:45	800	16:55	17:26
SV-14	Vapor Pin	WAT-SV14-060718	6/7/2018	C1806037	16:20	16:29	800	16:40	17:11
SV-15	Vapor Pin	WAT-SV15-060518	6/5/2018	C1806021	10:35	10:40	800	10:40	11:22
SV-15	Vapor Pin	DUP-SV-060518	6/5/2018	C1806021	10:35	10:40	800	10:40	11:22
SV-16	Vapor Pin	WAT-SV16-060718	6/7/2018		11:20	11:25	800	11:25	11:57
MW-01	Monitoring Well	WAT-MW01-060818	6/8/2018	C1806037	--	--	--	10:46	11:22
MW-02	Monitoring Well	WAT-MW02-060818	6/8/2018	C1806037	--	--	--	10:36	11:11
MW-03	Monitoring Well	WAT-MW03-053118	5/31/2018	C1806021	--	--	--	15:57	16:22
MW-19	Monitoring Well	WAT-MW19-060718	6/7/2018	C1806021	--	--	--	08:45	09:15
MW-19	Monitoring Well	DUP-MW-060718	6/7/2018	C1806021	--	--	--	09:16	09:46
MW-21	Monitoring Well	WAT-MW21-060718	6/7/2018	C1806021	--	--	--	11:32	12:01
MW-31	Monitoring Well	WAT-MW31-060718	6/7/2018	C1806021	--	--	--	11:00	11:30
MW-33	Monitoring Well	WAT-MW33-060118	6/1/2018	C1806021	--	--	--	10:27	10:45
MW-34	Monitoring Well	WAT-MW34-053018	5/30/2018	C1806021	--	--	--	11:31	11:51
MW-35	Monitoring Well	WAT-MW35-060818	6/8/2018	C1806037	--	--	--	11:21	12:00
PZ-01	Piezometer	WAT-PZ01-053018	5/30/2018	C1806021	--	--	--	16:00	16:20
PZ-03[c]	Piezometer	WAT-PZ03-060618	6/6/2018	C1806037	--	--	--	10:40	11:06
PZ-04	Piezometer	WAT-PZ04-060818	6/8/2018	C1806037	--	--	--	10:41	11:18

Notes:

Unless noted, vapor Pins were conducted during radon measurements using a Durridge RAD7 Radon Gas Detector.

Monitoring well headspaces were not purged prior to sample collection.

"--" = not sampled/not measured. See footnotes for explanations.

[a] = Samples were not collected at SV-05 and SV-12 due to the high groundwater conditions.

[b] = Sample was collected from 6/1/2018 and 6/6/2018 between the hours of approximately 07:00 and 18:00

[c] = Sample was collected from 10:40 to 11:06 on 6/6/2018 until moisture pulled in, remaining volume collected from 11:00 to 11:10 on 6/12/2018

mL/min = milliliters per minute

syringe = Vapor Pin was purged using a 150 milliliter syringe to avoid poisoning field instrument sensors with possible high concentrations of methane and/or hydrogen sulfide

Table 7-2. Subslab and Monitoring Well Headspace Vapor Field Measurements

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Location	**Building**	**Date**	**Field Measurements**								
			Differential Pressure Across Slab (in. WC)	**PID** (ppm)	**Hydrogen Sulfide** (ppm)	**Lower Explosive Limit** (%)	**Methane** (% vol)	**Carbon Monoxide** (ppm)	**Oxygen** (%vol)	**Carbon Dioxide** (% vol)	**Sulfur Dioxide** (ppm)
SV-01	Building 14 Basement	5/1/2017		0	0	0	0	0	20.2	0	0
		5/8/2017	+0.00000	0.8	0.0		0.0	0.0	20.4		0.1
		5/10/2017	+0.25000	--	--	--	--	--	--	--	--
		11/8/2017		0.0	0.0	0.0	0.0	0.0	20.8	0.0	0.0
		6/7/2018	+0.00050	0.7	1.0	0.0	0.0	0.0	20.2		0.0
SV-02	Building 7 Tank Storage	5/8/2017	+0.00000	0.5	0.0		0.0	0.0	20.6		0.0
		11/8/2017		2.5	0.0	0.0	0.0	0.0	19.9	0.6	0.0
		6/6/2018	+0.00100	2.1	0.0	0.0	0.0	0.0	20.0		0.0
SV-03	Building 11 Basement	5/1/2017		0	0	1	0	0	20.9	0	0
		5/8/2017	+0.01000	1.1	0.0		0.0	0.0	20.1		0.0
		11/8/2017		70.0	0.0	0.0	0.0	0.0	20.1	0.0	0.0
		6/7/2018	+0.00017	1.1	1.0	0.0	0.0	0.0	19.6		0.0
SV-04	Building 11-A	5/1/2017		0	0	0	0	0	19.6	0.4	0
		5/8/2017	--	1.0	0.0		0.0	0.0	19.9		0.0
		11/8/2017		90.0	0.0	0.0	0.0	0.0	19.8	1.0	0.0
		6/7/2018	+0.00000	1.9	1.0	0.0	0.0	0.0	19.8		0.0
SV-05[a]	Building 4	5/1/2017		>2	>80	>100	>26	5	7.4	13.2	0
		5/9/2017	+2.10000	--	--		--	--	--		--
SV-06	Building 4	5/1/2017		0.6	0	>100	>28	10	19	--	0
		5/9/2017	+0.02000	2.4	1.0		33.9	0.0	2.2		--
		6/1/2018	+1.42000	--	--	--	--	--	--	--	--
SV-07	Building 4	5/3/2017		5	0	1	0	0	19.7	0.1	0.2
		5/9/2017	+0.00400	0.8	0.0		0.0	0.0	20.3		0.0
		5/30/2018	-0.00300	0.0	0.0	0.0	0.0	0.0	18.5		0.0
SV-08	Building 4-A	5/3/2017		8	0	3	0.1	6	18.9	0	0.1
		5/9/2017	+0.00000	1.5	0.0		0.0	4.0	19.7		0.0
		11/8/2017		3.2	0.0	0.0	0.0	0.0	20.2	0.0	0.0
		5/30/2018	-0.00400	1.2	0.0	0.0	0.0	0.0	19.9		0.0
SV-09	Building 13	5/1/2017		4.8	0	0	0	0	19.1	0.9	0
		5/8/2017	+0.00000	0.5	0.0		0.0	0.0	19.7		0.0
		11/8/2017		1.1	0.0	0.0	0.0	0.0	19.8	1.1	0.0
		6/8/2018	+0.00240	0.0	0.0	0.0	0.0	0.0	18.5		0.0
SV-10	Building 13-A	5/1/2017		0	0	0	0	0	19.8	0.3	0
		5/8/2017	+0.00500	0.5	0.0		0.0	0.0	20.3		0.0
		11/8/2017		>300	0.0	0.0	0.0	0.0	20.6	0.4	0.0
		6/8/2018	+0.00003	0.3	0.0	0.0	0.0	0.0	19.2		0.0
SV-11	Building 12	5/3/2017		2.2	0	0	0	0	19.9	0	0
		5/8/2017	+0.00200	1.0	0.0		0.0	0.0	20.2		0.0
		11/8/2017		0.9	0.0	0.0	0.0	0.0	20.3	0.9	0.0
		6/8/2018	+0.00038	0.1	0.0	0.0	0.0	0.0	19.2		0.0
SV-12[a]	Building 4	5/9/2017	+0.79000	--	0.0		>5	0.0	20.0		0.2
SV-13	Building 3	5/3/2017		4	0	0	0	0	15.7	3.4	0
		5/8/2017	+0.00000	0.0	0.0		0.0	0.0	16.9		0.0
		11/8/2018									
		6/7/2018	-0.00002	0.6	0.0	0.0	0.0	0.0	13.9		0.0
SV-14	Building 3	5/3/2017		3.5	0	0	0	0	20.6	0	0
		5/8/2017	+0.00300	0.3	0.0		0.0	0.0	20.7		0.0
		11/8/2017		2.6	0.0	0.0	0.0	0.0	20.7	0.0	0.0
		6/7/2018	+0.00150	0.0	0.0	0.0	0.0	0.0	19.0		0.0
SV-15	Building 4	5/3/2017			>500	>100	>55				
		5/9/2017	--	247.0	>500		>5	-- [b]	-- [b]		-- [b]
		6/5/2018	+0.00004	--	--	--	--	--	--	--	--
SV-16	Building 7	6/7/2018	+0.00030	0.0	0.5	0.0	0.0	0.0	18.9		0.0
SG-7R	Building 4	8/19/2016	+0.01000	--	>200	--	0.2	2.0	0.0	33.0	--
SG-7A	Building 4	8/19/2016	+0.45000	--	>200	--	40.0	6.0	3.8	27.7	--

Table 7-2. Subslab and Monitoring Well Headspace Vapor Field Measurements

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Location	Building	Date	Field Measurements								
			Differential Pressure Across Slab (in. WC)	**PID** (ppm)	**Hydrogen Sulfide** (ppm)	**Lower Explosive Limit** (%)	**Methane** (% vol)	**Carbon Monoxide** (ppm)	**Oxygen** (%vol)	**Carbon Dioxide** (% vol)	**Sulfur Dioxide** (ppm)
MW-01	West of Building 4	6/15/2016		0.0	0		0.0	0.0	--	1.1	--
		9/26/2016		0.0	0		0.0	0.0	18.5	1.2	--
		12/12/2016		0.0	0		0.0	0.0	19	0.5	0.0
		12/14/2016	-0.00500	--	--	--	--	--	--	--	--
		8/21/2017		0.0	0		0.0	1.9	13.8	0.0	0.0
		5/30/2018	--	0.0	0	0	0.0	0.0	20.6	0.6	0.0
MW-02	South of Building 4	6/15/2016		0.0	0		0.0	0.0	17.9	1.4	--
		9/26/2016		0.0	0		0.0	0.0	19.8	0.7	--
		12/12/2016		0.0	0		1.0	0.0	21	0.2	0.0
		12/14/2016	-1.87000	--	--	--	--	--	--	--	--
		5/10/2017	-0.25600	--	--	--	--	--	--	--	--
		8/21/2017		0.0	0		0.0	0.0	16.9	1.8	0.2
		11/9/2017		0	0		0	0	21.3	0	--
		5/30/2018	+0.36800	0	0	0	0	0	18.6	2	0.0
MW-03	Building 4	4/21/2016	--	--	>200	>100	26.1	3	12.3	8.7	--
		5/31/2018	+0.02500	--	--	--	--	--	--	--	--
MW-05I	Northwest of Building 4	6/15/2016		0.0	0		0.0	0.0	--	0.0	--
		9/26/2016		0.0	0		0.0	0.0	20.4	0.0	--
		12/12/2016		0.0	0		0.0	0.0	20.9	0.1	0.0
		8/21/2017		0.0	0		0.0	0.0	20.3	0.0	0.3
		11/9/2017		--	0		0	0	20.9	0	0
		5/30/2018	--	0	0	0	0	0	22	0	0
MW-06	Offsite, North of SWMU 1	6/15/2016		0.0	0		0.0	0.0	--	0.0	--
		9/26/2016		0.0	0		0.0	0.0	18.8	2.0	--
		12/12/2016		0.0	0		0.0	0.0	20.3	0.6	0.0
		8/21/2017		0.0	0		0.0	0.0	17.9	2.8	0.0
		5/30/2018	--	0.0	0	0	0.0	0.0	19.9	2.5	0.0
MW-07	Offsite East of site	6/15/2016		0.0	0		0.0	0.0	11.7	5.8	--
		9/26/2016		0.0	0.1		0.1	7.0	16.8	8.5	--
		12/12/2016		0.0	0		0.0	0.0	17.4	2.3	0.0
		8/21/2017		0.0	0		0.0	0.0	9.4	6.6	0.2
		5/30/2018		0.0	0	0	0.0	0.0	8.2	4.7	0.0
MW-09R	Southeast of Building 13	6/15/2016		0.0	0		0.0	0.0	--	3.1	--
		9/26/2016		0.0	0		0.0	0.0	19.8	1.0	--
		12/12/2016		0.0	0		0.0	0.0	19.2	2.5	0.0
		8/21/2017		0.1	0		0.0	0.0	18.1	2.6	0.2
		5/30/2018		0.0	0	0	0.0	0.0	17.8	2.6	0.0
MW-10	Northeast area of site	6/15/2016		0.0	0		0.0	0.0	--	0.7	--
		9/26/2016		0.0	0		0.0	0.0	20.2	0.4	--
		12/12/2016		0.0	0		0.0	0.0	20.8	0.4	0.0
		8/21/2017		0.0	0		0.0	0.0	18.8	1.8	0.0
		5/30/2018		0.0	0	0	0.0	0.0	21.9	0.2	0.0
MW-11S	South of Building 13	6/15/2016		0.0	0		0.0	0.0	--	0.1	--
		9/26/2016		0.0	0		0.0	0.0	20.2	0.1	--
		12/12/2016		0.0	0		0.0	0.0	20.9	0.1	0.0
		8/21/2017		0.1	0		0.0	0.0	15.9	0.1	0.2
		11/9/2017		0	0		0.2	0	20.9	0	--
		5/30/2018		0	0	0	0	0	22.4	0	0.0
MW-16I	East side of SWMU 1	6/15/2016		0.0	0		0.0	0.0	--	0.0	--
		9/26/2016		0.0	0		0.0	0.0	20.4	0.0	--
		12/12/2016		0.0	0		0.0	0.0	20.9	0.2	0.0
		8/21/2017		0.0	0		0.0	0.0	19.7	0.5	0.1
		11/9/2017		0	0		0.2	0	20.9	0.1	0
		5/30/2018	+0.09600	0	0	1	0	0	20.4	0.3	0
		6/15/2016		0.0	0		0.0	0.0	--	0.6	--

Table 7-2. Subslab and Monitoring Well Headspace Vapor Field Measurements

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Location	Building	Date	Field Measurements								
			Differential Pressure Across Slab (in. WC)	**PID** (ppm)	**Hydrogen Sulfide** (ppm)	**Lower Explosive Limit** (%)	**Methane** (% vol)	**Carbon Monoxide** (ppm)	**Oxygen** (%vol)	**Carbon Dioxide** (% vol)	**Sulfur Dioxide** (ppm)
MW-17	South side of SWMU 1	9/26/2016		0.0	0		0.0	0.0	14.4	3.4	--
		12/12/2016		0.0	0		1.7	0.0	9.2	3.9	0.0
		8/21/2017		0.0	0		6.2	0.0	7.6	8.0	0.1
		11/9/2017		0.6	0		10.1	0	2.9	12.7	0
		5/30/2018	-0.00520	0	0	87	5.1	0	0.7	8.6	0
MW-18	Southwest side of SWMU 1	6/15/2016		0.0	0		0.0	0.0	--	3.0	--
		9/26/2016		0.0	0		0.0	0.0	3.7	11.9	--
		12/12/2016		0.0	0		0.0	0.0	4.8	4.9	0.0
		8/21/2017		0.1	0		3.3	0.0	4.7	6.1	0.0
		11/9/2017		0.3	0		0.5	0	9.9	4.6	0
		5/30/2018	+0.00789	0	0	19	0.9	0	2.5	5.3	0
MW-19	Northeast of Building 4, adjacent to Building 12	6/15/2016		0.0	6		28.3	0.0	10.7	2.3	--
		8/18/2016	+0.06000	--	0	>100	26.0	0	9.1	3.3	--
		9/26/2016		0.6	6		9.0	0.0	16.6	1.2	--
		12/12/2016		0.0	15		20.0	0.0	4.8	4.9	0.0
		12/14/2016	+8.03000	--	--	--	--	--	--	--	--
		5/10/2017	>10	--	--	--	--	--	--	--	--
		8/21/2017		0.0	4		37.9	0.0	0.8	5.1	0.1
		11/8/2017		2.5	26		37.4	0	0.5	5.6	0
		5/30/2018	>10	0	1	>100	33.1	0	2.5	3.6	0
		6/7/2018	+8.39000	--	--	--	--	--	--	--	--
MW-20	Offsite, north of site	6/15/2016		0.0	0		0.0	0.0	--	2.3	--
		9/26/2016		0.0	0		0.0	0.0	16.6	4.4	--
		12/12/2016		0.0	0		0.0	0.0	20.9	0.0	0.0
		8/21/2017		0.0	0		0.0	0.0	18.9	1.2	0.0
		5/30/2018		0.0	0	0	0.0	0.0	18.9	2.4	0.0
MW-21	South of Building 4	4/22/2016			0	--	1.3	--	12.3	0.2	
		6/15/2016		1.6	0		0.3	0.1	--	0.0	--
		8/18/2016	+1.18000	--	1	>100	51.0	0	18	0.0	--
		9/26/2016		0.0	1		20.1	0.0	16.4	0.0	--
		12/12/2016		0.0	8		20.5	1.0	7.3	0.1	0.0
		8/21/2017		0.0	1		65.2	0.0	1.5	0.0	0.4
		11/8/2017		0	0		3.9	0	20.8	0	0
		5/30/2018	--	0	1	>100	26.3	0	9.2	0	0
MW-23	Southwest of Building 4	6/15/2016		0.0	0		0.0	0.0	--	3.2	--
		9/26/2016		0.0	0		0.0	0.0	15.6	2.1	--
		12/12/2016		0.0	0		0.0	0.0	13	1.6	0.0
		8/21/2017		0.0	0		0.0	0.0	16.4	3.1	0.7
		11/8/2017		0.2	0		0	0	20.7	0.2	0
		5/30/2018		0	0	0	0	0	17.7	2.3	0
MW-24	South of Building 13	6/15/2016		0.0	0		10.2	0.0	--	7.5	--
		9/26/2016		0.1	0		9.2	0.0	17.2	3.5	--
		12/12/2016		0.0	0		0.0	0.0	21.1	0.7	0.0
		8/21/2017		0.3	24		10.2	0.0	1.3	17.5	0.1
		11/8/2017		0	0		0.2	0	21.8	0.1	0
		5/30/2018		0	0	7	0.4	0	8.7	10.2	0.05
MW-26	Southeast of SWMU 1	6/15/2016		0.0	0		0.0	0	--	0.0	--
		9/26/2016		0.0	0		0.0	0	16.4	4.6	--
		12/12/2016		0.0	0		0.0	0	20.0	2.0	0.0
		8/21/2017		0.1	0		0.0	0	9.2	8.2	0.1
		11/9/2017		1.1	0		0.1	0	18.2	3.5	0
		5/30/2018	-0.00200	0	0	2	0.1	0	8.5	6.1	0
MW-27	SWMU 1	6/15/2016		0.0	0		0.0	0	--	2.4	--
MW-28	SWMU 1	6/15/2016		0.0	0		0.0	0	--	0.8	--
		6/15/2016		0.1	0		0.1	0	--	7.5	--

Table 7-2. Subslab and Monitoring Well Headspace Vapor Field Measurements

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Location	**Building**	**Date**	**Field Measurements**								
			Differential Pressure Across Slab (in. WC)	**PID** (ppm)	**Hydrogen Sulfide** (ppm)	**Lower Explosive Limit** (%)	**Methane** (% vol)	**Carbon Monoxide** (ppm)	**Oxygen** (%vol)	**Carbon Dioxide** (% vol)	**Sulfur Dioxide** (ppm)
MW-30	South of Building 13	9/26/2016		0.0	0		0.0	0	1.6	13.5	--
		12/12/2016		0.0	0		0.0	0	3.1	8.8	0.0
		8/21/2017		0.7	0		0.0	0	0.7	14.8	0.1
		5/30/2018		0.0	0	0	0.0	0	3.6	8.6	0.2
MW-31	South of Building 4	4/22/2016			0	--	2.1	--	14.1	0.1	
		6/15/2016		0.0	0		13.0	0	--	0.0	--
		8/18/2016	+0.00000	--	1	>100	72.5	0	4.6	0.29	--
		9/26/2016		1.2	6		48.2	0	12.0	0.0	--
		9/26/2016		0.0	3		7.4	3	7.6	0.1	0.0
		8/21/2017		0.0	0		13.1	1	2.6	0.1	0.6
		11/8/2017		0	4		33	0	6.9	0	0
		6/7/2018	--	0	0	>100	5.6	0	13.1	0	0.05
MW-33	Building 4	4/21/2016	--	--	152	>100	27.0	3	12.1	10.5	--
		12/14/2016	+0.16500	--	--	--	--	--	--	--	--
		6/1/2018	>10	--	--	--	--	--	--	--	--
MW-34	Building 4	4/21/2016	--	--	0	28	1.4	10	19.4	0.2	--
		6/15/2016		0.0	2		38.0	0.1	10.3	2.3	--
		9/26/2016		0.2	0		6.2	0	19.0	0.0	--
		12/14/2016	+0.12100	--	--	--	--	--	--	--	--
MW-35	**Building** 3	4/22/2016			49	--	0.0	2	17.8	0.7	
		6/15/2016		0.0	0		0.0	0	17.6	16.7	--
		8/18/2016	+0.10000	--	0	0	0.0	3	18.3	0.4	--
		9/26/2016		0.0	0		0.0	0	20.5	0.0	--
		12/12/2016		0.0	0		0.0	0	20.7	0.1	0.0
		12/14/2016	+0.26000	--	--	--	--	--	--	--	--
		8/21/2017		0.1	0		0.0	0	9.3	2.2	0.0
		5/30/2018	--	0.0	0	8	0.4	0	0.3	1.0	0.1
MW-36	Building 3	6/15/2016		0.3	0		0.0	0	18.3	1.3	--
		9/26/2016		0.0	0		0.0	0	20.5	0.0	--
		12/12/2016		0.2	0		0.0	0	18.5	1.1	0.0
		12/14/2016	+0.08700								
		5/10/2017	+0.10000								
		8/21/2017		0.1	0		0.0	0	10.7	1.3	0.0
		11/9/2017		0	0		0.1	0	20.9	0.1	0
		5/30/2018	-1.89000	0	0	0	0	3	21.5	0.2	0
MW-37	Building 3	6/15/2016		0.0	0		0.0	0	--	1.2	--
		9/26/2016		0.0	0		0.0	0	20.3	0.0	--
		12/12/2016		2.0	0		0.0	0	20.9	0.3	0.0
		8/21/2017		0.0	0		0.0	0	20.5	0.1	0.0
		5/30/2018		0.0	0	0	0.0	0	22.2	0.0	0.0
PZ-01	Building 4	4/21/2016	--	0.0	0	95	7.9	7	17.9	0.4	--
		6/15/2016		0.0	>15		44.2	0	10.0	3.8	--
		9/26/2016		0.0	28		37.4	0	12.1	3.3	--
		12/12/2016		--	58		65.9	2	2.8	7.6	--
PZ-03	Building 7 Tank Storage	9/26/2016		0.1	0		0.0	0	20.5	0.1	--
		12/12/2016		0.0	0		0.2	0	19.9	0.4	0.0
		12/14/2016	+0.35200	--	--	--	--	--	--	--	--
		8/21/2017		10.6	>80		>2.5	0	--	--	0.0
		11/9/2017		3.8	22		0.9	0	15.4	2.7	0
		6/6/2018	>10	0.8	21	--	1.9	0	12.1	--	--
PZ-04	South of Building 4	6/15/2016		0.0	0		0.0	0.1	19.8	0.2	--
		8/19/2016	--	--	--	--	--	--	--	--	--
		9/26/2016		0.0	0		0.0	0	20.7	0.1	--
		12/12/2016		0.0	0		0.0	0	21.3	0.2	0.0
		8/21/2017		0.0	0		0.0	0	20.4	0.1	0.4

Table 7-2. Subslab and Monitoring Well Headspace Vapor Field Measurements

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Location	Building	Date	Field Measurements								
			Differential Pressure Across Slab (in. WC)	**PID** (ppm)	**Hydrogen Sulfide** (ppm)	**Lower Explosive Limit** (%)	**Methane** (% vol)	**Carbon Monoxide** (ppm)	**Oxygen** (%vol)	**Carbon Dioxide** (% vol)	**Sulfur Dioxide** (ppm)
		5/30/2018	--	0.0	0	0	0.0	0	21.4	0.0	0.0
PZ-06	South of Building 4	6/15/2016		0.0	0		0.0	0	--	0.0	--
		9/26/2016		0.0	0		0.0	0	20.6	0.0	--
		12/12/2016		0.0	0		0.0	0	21.3	0.1	0.0
		8/21/2017		0.0	0		0.0	0	19.8	0.3	0.3
		11/8/2017		0	0		0	0	20.7	0	0
		5/30/2018		0	0	0	0	0	21.4	0	0
PZ-07R	Southwest of Building 4	6/15/2016		0.0	0		0.6	0	--	2.9	--
		9/26/2016		1.7	0		30.1	0	4.4	6.7	--
		12/12/2016		0.0	0		0.0	0	19.7	2.1	0.0
		8/21/2017		0.1	0		1.0	0	10.9	6.1	0.4
		11/8/2017		0	0		0.7	0	20.1	1.6	0
		5/30/2018		0	0	5	0.3	0	20.7	0.4	0
TW-01	SWMU 1	9/26/2016		0.0	0		0.0	0	13.5	6.0	--
		12/12/2016		0.0	0		0.3	0	3.6	10.2	0.0
		8/21/2017		0.0	0		4.4	0	11.5	6.6	0.0
		11/9/2017		1.7	0		0.6	0	20.6	1	0
		5/30/2018	-0.00912	0	0	2	0.1	0	20.8	0.2	0
TW-02	SWMU 1	6/15/2016		0.2	0		0.0	0	--	1.2	0.0

Notes:

"--" = not sampled/not measured. See footnotes for explanations.

">" = measurements were in excess of 500ppm hydrogen sulfide or 5% methane by volume.

%vol = percent volume per volume

in. WC = inches of water column.

Positive pressures indicate higher pressure below the slab. Negative pressures indicate lower pressure below the slab.

PID = photoionization detector

ppm = parts per million

SWMU = solid waste management unit

Table 7-3. Analytical Results for Subslab Soil Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	SG-7R	SV-01	SV-02	SV-03	SV-04	SV-06	SV-07	SV-08	SV-09	SV-10	SV-11	SV-11	SV-13	SV-14	SV-15	SV-15	SV-16
			Sample ID:	WAT-SG-7R-053118	WAT-SV01-060718	WAT-SV02-060618	WAT-SV03-060718	WAT-SV04-060718	WAT-SV06-060118	WAT-SV07-053018	WAT-SV08-053018	WAT-SV09-060818	WAT-SV10-060818	WAT-SV11-060818	DUP-SV-060818	WAT-SV13-060718	WAT-SV14-060718	WAT-SV15-060518	DUP-SV-060518	WAT-SV16-060718
			Sample Date:	5/31/2018	6/7/2018	6/6/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	5/30/2018	6/8/2018	6/8/2018	6/8/2018	6/8/2018	6/7/2018	6/7/2018	6/5/2018	6/5/2018	6/7/2018
Analyte	**CAS#**	**Screening Level**	**Source**																	
Fixed Gases by EPA Method 3C (%volume)																				
Carbon Dioxide	124-38-9	--	--	**13.6**	**0.0430 J**	**0.652 J**	**0.231 J**	**0.266 J**	1.9 U	**0.297 J**	1.9 U	**0.732 J**	**0.449 J**	**0.305 J**	**0.311 J**	**1.64 J**	**0.331 J**	**36.8**	**38.4**	**0.712 J**
Methane	74-82-8	4	LEL	**4.65**	0.58 U	0.58 U	0.58 U	0.58 U	**31.4**	**0.437 J**	**0.173 J**	**0.0640 J**	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U	**28.8**	**30.6**	0.58 U
Nitrogen	7727-37-9	--	--	**76.7**	**78.1**	**79.6**	**77.1**	**79.4**	**68.4**	**78.9**	**79.1**	**78.9**	**80.1**	**79.4**	**80.3**	**84.9**	**80.0**	**6.56 J**	**6.32 J**	**80.0**
Oxygen	7782-44-7	--	--	**1.74**	**21.6**	**21.2**	**21.1**	**21.8**	**3.16**	**20.4**	**20.0**	**20.7**	**21.0**	**20.9**	**21.1**	**16.7**	**20.7**	**0.229 J**	**0.474 J**	**20.7**
Low Level Sulfurs by TO-15 (ug/m3)																				
1-Propanethiol	107-03-9	--	--	**820**	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	**18,000**	**17,000**	16 U
Carbon Disulfide	75-15-0	103,613	ACGIH TLV	**4,800**	16 U	**5.8 J**	16 U	**5.0 J**	**4.7 J**	16 U	**17**	**5.0 J**	16 U	16 U	16 U	16 U	16 U	**14,000**	**13,000**	**4.6 J**
Carbonyl Sulfide	463-58-1	409,000	ACGIH TLV	120 U	12 U	**26**	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	120 U	120 U	12 U
Dimethyl Sulfide	624-92-0	--	--	**370**	19 U	19 U	19 U	19 U	**11 J**	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	**1,300**	**1,200**	19 U
Ethyl Mercaptan	75-08-1	42,263	ACGIH TLV	**1,000**	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	**24,000**	**22,000**	13 U
Hydrogen Sulfide	7783-06-4	46,353	ACGIH TLV	**23,000,000**	**26**	**32**	**39**	**54**	**62**	**20**	**24**	**18**	**43**	**49**	**39**	**39**	**37**	**180,000,000**	**180,000,000**	**32**
Isopropyl Mercaptan	75-33-2	--	--	**17,000**	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	**650,000**	**580,000**	16 U
Methyl Mercaptan	74-93-1	32,720	ACGIH TLV	**15,000**	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	**230,000**	**210,000**	9.8 U
Volatile Organic Compounds by TO-15 (ug/m3)																				
1,1-Dichloroethane	75-34-3	2,555	VISL	**550**	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**170**	**160 J**	20 U
1,2-Dichloroethane	107-06-2	157	VISL	40 U	20 U	20 U	20 U	**61**	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	81 U	81 U	20 U
1,2-Dichloropropane	78-87-5	409	VISL	**130**	23 U	23 U	23 U	**39**	23 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	92 U	92 U	23 U
Acetone	67-64-1	4,526,000	VISL	**180**	24 U	24 U	24 U	**47**	**890**	**33**	**390**	24 U	24 U	24 U	24 U	24 U	**46**	**4,100**	**4,300**	**49**
Benzene	71-43-2	524	VISL	**77**	16 U	16 U	16 U	16 U	16 U	16 U	**19**	**18**	16 U	16 U	16 U	16 U	16 U	**170**	**160 J**	16 U
Carbon Disulfide	75-15-0	103,613	ACGIH TLV	**6,900**	16 U	16 U	16 U	**78**	16 U	16 U	**31**	16 U	16 U	16 U	16 U	16 U	16 U	**18,000**	**19,000**	16 U
Chlorobenzene	108-90-7	7,300	VISL	46 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	**110 J**	**110 J**	23 U
Chloroform	67-66-3	178	VISL	**150**	24 U	**160**	**83**	**4,800**	24 U	**1,100**	**120**	24 U	24 U	24 U	24 U	**80**	**370**	**15,000**	**15,000**	**87**
cis-1,2-Dichloroethene	156-59-2	--	--	**740**	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**670**	**620 J**	20 U
Cyclohexane	110-82-7	876,000	VISL	**45**	17 U	17 U	17 U	17 U	17 U	17 U	**44**	17 U	17 U	17 U	17 U	17 U	17 U	69 U	69 U	17 U
Ethylbenzene	100-41-4	1,635	VISL	43 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	**2,400**	**2,500**	22 U
Heptane	142-82-5	--	--	41 U	20 U	20 U	20 U	20 U	20 U	20 U	**52**	20 U	20 U	20 U	20 U	20 U	20 U	**1,100**	**1,100 J**	20 U
Hexane	110-54-3	102,200	VISL	35 U	18 U	18 U	18 U	18 U	**27**	18 U	**54**	18 U	18 U	18 U	18 U	18 U	18 U	**1,700**	**1,600**	18 U
Isopropyl alcohol	67-63-0	29,200	VISL	25 U	12 U	12 U	12 U	12 U	12 U	**14**	**19**	12 U	12 U	12 U	12 U	12 U	12 U	49 U	49 U	12 U
Methyl Ethyl Ketone	78-93-3	730,000	VISL	59 U	29 U	29 U	29 U	29 U	29 U	29 U	**43**	29 U	29 U	29 U	29 U	29 U	29 U	120 U	120 U	29 U
Methyl Isobutyl Ketone	108-10-1	438,000	VISL	**11,000**	41 U	41 U	41 U	41 U	41 U	41 U	**270**	41 U	41 U	41 U	41 U	41 U	41 U	**65,000**	**72,000**	41 U
Methylene Chloride	75-09-2	87,600	VISL	**39**	17 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U	17 U	**34**	**7,900**	**7,900**	17 U
Tetrachloroethylene	127-18-4	5,840	VISL	68 U	34 U	34 U	34 U	**57**	34 U	34 U	34 U	34 U	34 U	34 U	34 U	34 U	34 U	140 U	140 U	34 U
Toluene	108-88-3	730,000	VISL	**1,100**	19 U	19 U	19 U	19 U	19 U	19 U	**35**	19 U	19 U	19 U	19 U	19 U	19 U	**9,800**	**11,000**	19 U
trans-1,2-Dichloroethene	156-60-5	--	--	**120**	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**230**	79 U	20 U
Trichloroethene	79-01-6	292	VISL	54 U	27 U	27 U	27 U	**93**	27 U	**100**	27 U	27 U	27 U	**460**	**510**	27 U	27 U	**260**	**250 J**	27 U
Vinyl chloride	75-01-4	929	VISL	**120**	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	51 U	51 U	13 U
Xylene, m,p-	179601-23-1	14,600	1330-20-7	**93**	43 U	43 U	43 U	43 U	43 U	43 U	43 U	43 U	43 U	43 U	43 U	43 U	43 U	**28,000**	**27,000**	43 U
Xylene, o-	95-47-6	14,600	VISL	43 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	**12,000**	**12,000**	22 U
Volatile Organic Compounds TICs by TO-15 (ppbv)[a]																				
(1R)-2,6,6-Trimethylbicyclo[3.1.1]	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**190 N**	**160 N**	- -
(E)-3-Methyl-2-Hexene	--	--	--	- -	- -	- -	- -	- -	**3.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1,1,3,3,3-Pentafluoro-2-(Trifluoro	--	--	--	- -	**11 N**	- -	**7.3 N**	**5.7 N**	- -	**4.0 N**	- -	**47 N**	**180 N**	**3.1 N**	**3.5 N**	**68 N**	**76 N**	- -	- -	- -
1,2-Cyclopentanediol, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1,3,2-Dioxaphosphorinane, 2-Butoxy	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**7.7 N**	- -	- -	- -	- -	- -	- -	- -
1,4-Dibromoheptane	--	--	--	- -	- -	- -	- -	- -	- -	**3.5 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
10-Methylnonadecane	56862-62-5	--	--	- -	- -	- -	- -	- -	**6.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Butanethiol	109-79-5	--	--	**23 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**310 N**	**300 N**	- -
1-Butene, 2-Methyl-	563-46-2	--	--	- -	- -	- -	- -	- -	**9.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Butene, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**150 N**	- -
1-Butene, 4,4-Dichloro-1,1,2,3,3,4	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**45 N**	- -	- -	- -
1-Decene, 5-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Ethyl-2,2,6-Trimethylcyclohexane	--	--	--	- -	- -	- -	- -	- -	- -	- -	**20 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Ethyl-3-Methylcyclohexane (c,t)	--	--	--	- -	- -	- -	- -	- -	**3.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1H,1H,7H-Dodecafluoro-1-Heptanol	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**8.3 N**	**4.7 N**	- -	- -	- -	- -	- -	- -	- -
1-Heptadecyne	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**70 N**	- -	- -
1-Heptafluorobutyryloxydecane	--	--	--	- -	- -	- -	- -	- -	- -	- -	**68 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Heptanol, 2-Propyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**7.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Heptene	--	--	--	- -	- -	- -	- -	- -	- -	**3.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Heptene, 5-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**18 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Hexanol, 2-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2.6 N**	**4.2 N**	- -	- -	- -	- -	**5.4 N**
1-Hexene, 2,4,4-Triethyl-	--	--	--	**12 N**	- -	- -	- -	- -	**20 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Hexene, 3,3,5-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**60 N**	- -
1-Hexene, 3,3-Dimethyl-	--	--	--	**15 N**	- -	- -	- -	- -	**4.2 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Hexene, 5-Methyl-	--	--	--	**28 N**	- -	- -	- -	- -	- -	**21 N**	**37 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Iodoundecane	--	--	--	- -	- -	- -	- -	- -	- -	- -	**36 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Isopropyl-2,2-Dimethylpropyliden	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**130 N**	- -
1-Octadecene	--	--	--	- -	- -	- -	- -	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Octene	--	--	--	- -	- -	- -	- -	- -	**3.1 N**	- -	**5.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Octene, 3-Ethyl-	--	--	--	**120 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Pentanol, 2,2-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**24 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Pentene, 2,3-Dimethyl-	--	--	--	**30 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Pentene, 2,4-Dimethyl-	--	--	--	**58 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Pentene, 3-Ethyl-3-Methyl-	--	--	--	- -	- -	- -	- -	- -	**4.8 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Pentene, 4-Methyl-	--	--	--	- -	- -	- -	- -	- -	**97 N**	- -	- -	- -	- -	- -	- -	- -	- -	**240 N**	**160 N**	- -
1-Propanethiol	107-03-9	--	--	**110 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2500 N**	**2800 N**	- -
1-Propanol, 2-(1-Methylethoxy)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**84 N**	**88 N**	- -
1-Propene, 1-Methoxy-2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**410 N**	**360 N**	- -
1-Propene, 2-Methyl-	--	--	--	**79 N**	- -	- -	- -	- -	**93 N**	- -	**6.9 N**	- -	- -	- -	- -	- -	- -	**1100 N**	**440 N**	- -
1-Tetradecene	--	--	--	**33 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2,2-Dimethyl-1-oxa-2-Silacyclo-3,5	--	--	--	**69 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**400 N**	- -

Table 7-3. Analytical Results for Subslab Soil Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	SG-7R	SV-01	SV-02	SV-03	SV-04	SV-06	SV-07	SV-08	SV-09	SV-10	SV-11	SV-11	SV-13	SV-14	SV-15	SV-15	SV-16
			Sample ID:	WAT-SG-7R-053118	WAT-SV01-060718	WAT-SV02-060618	WAT-SV03-060718	WAT-SV04-060718	WAT-SV06-060118	WAT-SV07-053018	WAT-SV08-053018	WAT-SV09-060818	WAT-SV10-060818	WAT-SV11-060818	DUP-SV-060818	WAT-SV13-060718	WAT-SV14-060718	WAT-SV15-060518	DUP-SV-060518	WAT-SV16-060718
			Sample Date:	5/31/2018	6/7/2018	6/6/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	5/30/2018	6/8/2018	6/8/2018	6/8/2018	6/8/2018	6/7/2018	6/7/2018	6/5/2018	6/5/2018	6/7/2018
Analyte	**CAS#**	**Screening Level**	**Source**																	
2,3-Dimethyl-2-Heptene	--	--	--	- -	- -	- -	- -	- -	- -	**8.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2,3-Dimethyl-3-Heptene	--	--	--	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -	- -	- -	- -	**140 N**	- -	- -
2,4-Pentadienenitrile, 2-Amino-4-m	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**200 N**	- -	- -
2,5-Heptadien-4-one, 2,6-Dimethyl-	--	--	--	**14 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2,6-Dimethyl-6-Trifluoroacetoxyoct	--	--	--	- -	- -	- -	- -	- -	7.0 N	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2,6-Octadiene, 2,7-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**760 N**	- -	- -
2-Butanethiol	--	--	--	**200 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**980 N**	**910 N**	- -
2-Butanethiol, 2-Methyl-	--	--	--	**18 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**280 N**	**270 N**	- -
2-Butanol, 3-(2,2-Dimethylpropoxy)	--	--	--	**20 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Buten-1-ol, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**330 N**	**660 N**	- -
2-Butenal, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**210 N**	- -	- -
2-Butendioic Acid, Dimethyl Ester,	--	--	--	- -	- -	- -	**7.8 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Butene	--	--	--	- -	- -	- -	- -	- -	**19 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Butene, 2,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**180 N**	**300 N**	- -
2-Butene, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**9.3 N**	- -	- -	- -	- -	- -	- -	**230 N**	**9100 N**	- -
2-Butenoic Acid, Ethyl Ester, (-Z)	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**170 N**	- -	- -
2-Cyclohexen-1-ol	--	--	--	**64 N**	- -	- -	- -	- -	- -	**74 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Heptanol, 2,6-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**4.8 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Heptanone, 4,6-Dimethyl-	--	--	--	**21 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Heptene, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Hexanol, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	**5.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Hexene, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**15 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Hexene, 3-Methyl-, (Z)-	--	--	--	**54 N**	- -	- -	- -	- -	**40 N**	**49 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Nonene, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**5.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Nonynoic Acid, Methyl Ester	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**160 N**	- -
2-Octanol, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2100 N**	- -	- -
2-Octene, 4-Ethyl-	--	--	--	- -	- -	- -	- -	- -	**5.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Octene, 4-Ethyl-, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	**3.0 N**	**13 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentanethiol	--	--	--	**210 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**360 N**	**230 N**	- -
2-Pentanethiol, 2-Methyl-	--	--	--	**21 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentanethiol, 4-Methyl-	--	--	--	**20000 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**40000 N**	**39000 N**	- -
2-Pentanone, 3-[(Acetyloxy)methyl]	--	--	--	- -	- -	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentanone, 3-Ethyl-3-Methyl-	--	--	--	- -	- -	- -	- -	- -	**10 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentenal, 2-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**7.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentene, 2,3,4-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentene, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**670 N**	- -
2-Pentene, 3,4-Dimethyl-, (E)-	--	--	--	**16 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentene, 3-Ethyl-	--	--	--	**19 N**	- -	- -	- -	- -	**24 N**	**3.6 N**	**83 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentene, 3-Ethyl-2-Methyl-	--	--	--	- -	- -	- -	- -	- -	**17 N**	**5.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentene, 4-Methyl-	--	--	--	- -	- -	- -	- -	**6.3 N**	**32 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentene, 4-Methyl-, (Z)-	--	--	--	**35 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Propanethiol (Isopropyl Mercaptan)	75-33-2	--	--	**2500 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**8400 N**	- -
2-Propanethiol, 2-Methyl-	--	--	--	**200 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Propanol, 1-(2-Methoxy-1-Methyle	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2000 N**	- -
2-Propanol, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	**12 N**	**2.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Propenoic Acid, 2-Methyl-, 1,2-e	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**420 N**	- -	- -
2-Propenoic Acid, 2-Methyl-, Ethyl	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**73 N**	**140 N**	- -
2-Undecenal	--	--	--	- -	- -	- -	- -	- -	- -	**8.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Undecene, 2,5-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3,4-Diethyl-2-Hexene	--	--	--	- -	- -	- -	- -	- -	**9.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3,4-Dimethyl-2-Pentene(c,t)	--	--	--	- -	- -	- -	- -	- -	- -	**5.3 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3,5-Dimethyl-3-Heptene	--	--	--	- -	- -	- -	- -	- -	**8.7 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Buten-2-ol, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**160 N**	**150 N**	- -
3-Butyn-2-ol, 2-Methyl-	--	--	--	**320 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**270 N**	**250 N**	- -
3-Dodecene, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	**7.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Ethyl-2-Methyl-1-Heptene	--	--	--	- -	- -	- -	- -	- -	- -	**5.7 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Ethyl-3-Hexene	--	--	--	- -	- -	- -	- -	- -	**4.4 N**	- -	**18 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Ethyl-3-Methylheptane	--	--	--	**32 N**	- -	- -	- -	- -	- -	**30 N**	**52 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Ethyl-3-Pentyl Methylphosphonofl	--	--	--	- -	- -	- -	- -	- -	- -	- -	**24 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Ethyl-4-Methyl-2-Pentene	--	--	--	- -	- -	- -	- -	- -	**7.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Heptene, 2,6-Dimethyl-	--	--	--	**26 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Heptene, 3-Ethyl-	--	--	--	- -	- -	- -	- -	- -	**15 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Heptene, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Heptene, 4-Propyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**17 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Hexene, 1,1,2,2,5,5,6,6-Octafluo	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	- -	- -
3-Hexene, 2,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**6.5 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Hexene, 2-Methyl-, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Methoxybut-1-ene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**94 N**	- -
3-Pentanethiol	616-31-9	--	--	**34 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**120 N**	- -	- -
3-Pentanethiol, 2-Methyl-	1639-04-9	--	--	**40 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Pentanol, 3-Ethyl-	597-49-9	--	--	**33 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Penten-2-one, 4-Methyl-	--	--	--	- -	- -	- -	- -	- -	**4.3 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Undecene, 7-Methyl-, (Z)-	--	--	--	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4-Ethylcyclohexene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**60 N**	- -
4-Methyl-2-Hexene,c&t	--	--	--	- -	- -	- -	- -	- -	- -	**6.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4-Nonene	--	--	--	- -	- -	- -	- -	- -	- -	**3.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4-Nonene, 3-Methyl-, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**21 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
5-Methyl-2-(2-Methyl-2-Tetrahydrof	--	--	--	- -	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5-Undecene, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5-Undecene, 3-Methyl-, (E)-	--	--	--	- -	- -	- -	- -	- -	**5.6 N**	**19 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
5-Undecene, 9-Methyl-, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**130 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
6,6-Dimethylhepta-2,4-Diene	--	--	--	**280 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Table 7-3. Analytical Results for Subslab Soil Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	SG-7R	SV-01	SV-02	SV-03	SV-04	SV-06	SV-07	SV-08	SV-09	SV-10	SV-11	SV-11	SV-13	SV-14	SV-15	SV-15	SV-16
			Sample ID:	WAT-SG-7R-053118	WAT-SV01-060718	WAT-SV02-060618	WAT-SV03-060718	WAT-SV04-060718	WAT-SV06-060118	WAT-SV07-053018	WAT-SV08-053018	WAT-SV09-060818	WAT-SV10-060818	WAT-SV11-060818	DUP-SV-060818	WAT-SV13-060718	WAT-SV14-060718	WAT-SV15-060518	DUP-SV-060518	WAT-SV16-060718
			Sample Date:	5/31/2018	6/7/2018	6/6/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	5/30/2018	6/8/2018	6/8/2018	6/8/2018	6/8/2018	6/7/2018	6/7/2018	6/5/2018	6/5/2018	6/7/2018
Analyte	**CAS#**	**Screening Level**	**Source**																	
6-Dodecene, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	13 N	- -	- -	- -	- -	- -	- -	- -	- -	- -
Acetaldehyde	75-07-0	--	--	- -	- -	- -	- -	75 N	51 N	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	9.3 N
Benzene, (1-Methylethyl)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**120 N**	**87 N**	- -
Benzene, 1,3,5-Trichloro-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**9.4 N**	- -	- -	- -	- -	- -	- -	- -	- -
Bicyclo[2.2.1]heptane, 2-Ethyl-	--	--	--	**31 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**95 N**	- -
Bicyclo[2.2.1]heptane, 7,7-Dimethy	--	--	--	**15 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Bicyclo[3.2.1]octane	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**130 N**	- -	- -
Bicyclo[5.1.0]octane	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	260 N	- -
Butane	106-97-8	--	--	**68 N**	- -	- -	- -	- -	**150 N**	- -	**37 N**	- -	- -	- -	- -	- -	- -	**330 N**	- -	**32 N**
Butane, 1,1'-[Ethylidenebis(oxy)]b	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2300 N**	- -
Butane, 1,1'-oxybis[3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**350 N**	**360 N**	- -
Butane, 1-Bromo-	--	--	--	**32 N**	- -	- -	- -	- -	**25 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Butane, 2,2'-[Methylenebis(oxy)]bi	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**150 N**	**140 N**	- -
Butane, 2,2-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**17 N**	- -	**6.8 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Butane, 2-iodo-2,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**5.7 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Butane, 2-Methyl-	--	--	--	**49 N**	- -	- -	- -	- -	**87 N**	**4.0 N**	**23 N**	- -	**6.5 N**	- -	- -	- -	**6.3 N**	**290 N**	**270 N**	**3.0 N**
Butanedioic Acid, Methyl-, Dimethy	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2900 N**	**2900 N**	- -
Butanoic Acid, 2-Methylbutyl Ester	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**520 N**	- -
Butanoic Acid, 3-oxo-, 1,1-Dimethy	--	--	--	**29 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Butyric Acid, Neopentyl Ester	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**270 N**	- -
Camphene	--	--	--	**30 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Carbonyl Sulfide	463-58-1	--	--	- -	- -	**3.0 N**	- -	**8.1 N**	- -	- -	- -	- -	- -	- -	- -	**4.8 N**	**5.6 N**	- -	- -	- -
Cyclobutanone, 2-(1,1-Dimethylethy	--	--	--	**53 N**	- -	- -	- -	- -	**8.5 N**	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cycloheptane	--	--	--	- -	- -	- -	- -	- -	**6.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,1,3-Trimethyl-	--	--	--	**120 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**510 N**	**450 N**	- -
Cyclohexane, 1,1-Dimethyl-2-Propyl	--	--	--	- -	- -	- -	- -	- -	**5.7 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,2,3-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**59 N**	- -	- -
Cyclohexane, 1,2-Diethyl-1-Methyl-	--	--	--	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,2-Dimethyl-, cis-	--	--	--	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,2-Dimethyl-, trans-	--	--	--	**15 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,3,5-Trimethyl-, (1.	--	--	--	- -	- -	- -	- -	- -	- -	- -	**6.4 N**	- -	- -	- -	- -	- -	- -	**380 N**	- -	- -
Cyclohexane, 1-Bromo-2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**6.2 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1-Ethyl-1,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**5.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1-Ethyl-2-Methyl-, tr	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**65 N**	- -	- -
Cyclohexane, 1-Ethyl-4-Methyl-, ci	--	--	--	- -	- -	- -	- -	- -	- -	- -	**4.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 2,4-Diisopropyl-1,1-d	--	--	--	- -	- -	- -	- -	- -	**4.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 2-Propyl-1,1,3-Trimet	--	--	--	- -	- -	- -	- -	- -	**4.8 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, Decafluorobis(Trifluo	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**7.0 N**	- -	- -	- -	**22 N**
Cyclohexane, Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**6.6 N**	- -	- -	- -	- -	- -	- -	**250 N**	**250 N**	- -
Cyclohexane, Methyl-	--	--	--	**17 N**	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -	- -	**120 N**	**110 N**	- -
Cyclohexene, 3,3,5-Trimethyl-	--	--	--	**59 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexene, 3,5,5-Trimethyl-	--	--	--	**300 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclooctanone	--	--	--	- -	- -	- -	- -	- -	- -	**43 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, (2-Methylpropyl)-	--	--	--	**39 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, 1,2,3-Trimethyl-, (1	--	--	--	- -	- -	- -	- -	- -	- -	- -	**25 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, 1,2-Dimethyl-, cis-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**3.7 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, 1,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**32 N**	**11 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, 1-Isobutylidene-3-me	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**120 N**	- -	- -
Cyclopentane, 1-Methyl-2-Methylene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**59 N**	- -	- -
Cyclopentane, Decafluoro-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**8.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, Methyl-	--	--	--	- -	- -	- -	- -	- -	**5.0 N**	- -	**19 N**	- -	- -	- -	- -	- -	- -	- -	**200 N**	- -
Cyclopentane, Propyl-	--	--	--	- -	- -	- -	- -	- -	**5.3 N**	**3.4 N**	**14 N**	- -	- -	- -	- -	- -	- -	**250 N**	**250 N**	- -
Cyclopentasiloxane, Decamethyl-	--	--	--	- -	**14 N**	- -	**11 N**	- -	- -	**23 N**	**35 N**	- -	**65 N**	**37 N**	**37 N**	- -	- -	**160 N**	**140 N**	**11 N**
Cyclopropane, (1,2-Dimethylpropyl)	--	--	--	- -	- -	- -	- -	- -	**8.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopropane, 1,1-Dichloro-2-Methy	--	--	--	- -	- -	- -	- -	- -	- -	**7.2 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopropane, 1,1-Diethyl-	--	--	--	- -	- -	- -	- -	- -	**4.4 N**	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopropane, 1,1-Dimethyl-	--	--	--	**340 N**	- -	- -	- -	- -	**53 N**	- -	**6.4 N**	- -	- -	- -	- -	- -	- -	**6500 N**	**2400 N**	- -
Cyclopropane, 1,2-Dimethyl-, cis-	--	--	--	- -	- -	- -	- -	- -	**9.2 N**	- -	**14 N**	- -	- -	- -	- -	- -	- -	- -	**570 N**	- -
Cyclopropane, 1-Ethyl-2-Methyl-, c	--	--	--	- -	- -	- -	- -	**3.2 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopropane, Ethenylmethylene-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -
Cyclotetrasiloxane, Octamethyl-	--	--	--	**52 N**	**12 N**	**140 N**	**140 N**	**8.0 N**	**45 N**	**580 N**	**2200 N**	**9.3 N**	**1100 N**	**580 N**	**640 N**	**6.0 N**	- -	**550 N**	**520 N**	**13 N**
Cyclotrisiloxane, Hexamethyl-	--	--	--	**21 N**	**30 N**	**20 N**	**32 N**	**5.8 N**	**11 N**	**51 N**	**180 N**	**3.3 N**	**37 N**	**29 N**	**31 N**	**4.1 N**	- -	**80 N**	**74 N**	**8.7 N**
Decane	--	--	--	- -	- -	- -	- -	- -	- -	- -	**40 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Decane, 2,2,-Trimethyl-(isomer)	--	--	--	- -	- -	- -	- -	- -	- -	**16 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Decane, 3,3,4-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2400 N**	**2300 N**	- -
Decane, 4-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**3.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Decanoic Acid, Nonadecafluoro-	--	--	--	- -	**18 N**	- -	**3.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -
di-iso-Amyl Oxalate	--	--	--	**21 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**890 N**	**920 N**	- -
Diisopropyl Ether	--	--	--	**35 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Dimethyl Sulfide	624-92-0	--	--	**55 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**250 N**	**260 N**	- -
di-tert-Butyl Malonate	--	--	--	- -	- -	- -	- -	- -	**22 N**	**27 N**	**49 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
D-Limonene	--	--	--	- -	- -	- -	- -	- -	- -	- -	**29 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Dodecane, 2,6,10-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	**3.2 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Dodecanoic Acid, Tricosafluoro-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**34 N**	**27 N**	- -	- -	**12 N**	- -	- -	- -	- -
Eicosane	--	--	--	- -	- -	- -	- -	- -	- -	**27 N**	**8.5 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Ethane, 1,1,1-Trifluoro-	--	--	--	- -	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Ethane, 1-Chloro-1,1-Difluoro-	75-68-3	--	--	- -	- -	- -	- -	- -	**56 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Ethane-1,1-diol Dibutanoate	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2400 N**	**1000 N**	- -
Ethanethiol (Ethyl Mercaptan)	75-08-1	--	--	**120 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2600 N**	**2900 N**	- -
Ethanol	--	--	--	- -	- -	- -	- -	- -	**16 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**15 N**
Ether, tert-Butyl Isopropylidenecy	--	--	--	- -	- -	- -	- -	- -	- -	**5.0 N**	**13 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -

Table 7-3. Analytical Results for Subslab Soil Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	SG-7R	SV-01	SV-02	SV-03	SV-04	SV-06	SV-07	SV-08	SV-09	SV-10	SV-11	SV-11	SV-13	SV-14	SV-15	SV-15	SV-16
			Sample ID:	WAT-SG-7R-053118	WAT-SV01-060718	WAT-SV02-060618	WAT-SV03-060718	WAT-SV04-060718	WAT-SV06-060118	WAT-SV07-053018	WAT-SV08-053018	WAT-SV09-060818	WAT-SV10-060818	WAT-SV11-060818	DUP-SV-060818	WAT-SV13-060718	WAT-SV14-060718	WAT-SV15-060518	DUP-SV-060518	WAT-SV16-060718
			Sample Date:	5/31/2018	6/7/2018	6/6/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	5/30/2018	6/8/2018	6/8/2018	6/8/2018	6/8/2018	6/7/2018	6/7/2018	6/5/2018	6/5/2018	6/7/2018
Analyte	**CAS#**	**Screening Level**	**Source**																	
Furan, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**230 N**	**270 N**	- -
Furan, Tetrahydro-2-(Methoxymethyl	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**300 N**	- -	- -
Heptadecane	--	--	--	**16 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptadecane, 8-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**62 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptane, 2,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**3.3 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptane, 2,4-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**3.7 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptane, 2,6-Dimethyl-	--	--	--	**130 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**180 N**	**180 N**	- -
Heptane, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**96 N**	- -
Heptane, 3-Ethyl-	--	--	--	- -	- -	- -	- -	- -	**34 N**	**22 N**	**42 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptane, 3-Ethyl-5-Methylene-	--	--	--	- -	- -	- -	- -	- -	71 N	52 N	86 N	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptane, 3-Methylene-	--	--	--	23 N	- -	- -	- -	- -	42 N	24 N	53 N	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptane, 4-Propyl-	--	--	--	- -	- -	- -	- -	- -	- -	**6.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexadecane	--	--	--	- -	- -	- -	- -	- -	- -	**17 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexadecane, 1-Chloro-	--	--	--	**19 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexadecane, 2,6,10,14-Tetramethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**100 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexane, 1-(Hexyloxy)-2-Methyl-	--	--	--	- -	- -	- -	- -	- -	**5.8 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexane, 1-(Hexyloxy)-5-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**28 N**	- -	- -	- -	- -	- -	**3.5 N**	- -	- -	- -
Hexane, 1,1,1,2,2,3,3,4,4,5,5,6,6-	--	--	--	- -	- -	- -	**3.3 N**	- -	- -	- -	- -	- -	**2.7 N**	- -	- -	- -	**7.2 N**	- -	- -	- -
Hexane, 1,1,1,2,2,3,3,4,4,5,6,6,6-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.1 N**	- -	- -	- -	- -
Hexane, 1,1,1,2,2,3,3,4,5,5,6,6,6-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**30 N**	- -	- -	- -	- -	- -	- -	- -	- -
Hexane, 1,1'-oxybis-	--	--	--	- -	- -	- -	- -	- -	**9.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexane, 1-Ethoxy-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**240 N**	- -	- -
Hexane, 2,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**440 N**	- -	- -
Hexane, 2,4-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**110 N**	- -	- -
Hexane, 2,5-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**5.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexane, 3-Ethyl-	--	--	--	**39 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexane, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**6.0 N**	- -	- -	- -	- -	- -	- -	**130 N**	**130 N**	- -
Hexane, 3-Methyl-4-Methylene-	--	--	--	- -	- -	- -	- -	- -	**77 N**	**20 N**	**42 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexatriacontane	--	--	--	- -	- -	- -	- -	- -	- -	- -	**27 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hydrogen Sulfide	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.0 N**	- -	- -	- -	- -	- -	- -
Hydroxylamine, o-(3-Methylbutyl)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2800 N**	- -	- -
Isobutane	--	--	--	**98 N**	- -	- -	- -	- -	**120 N**	**9.4 N**	**29 N**	- -	- -	- -	- -	- -	- -	**150 N**	- -	- -
Isopropylcyclobutane	--	--	--	- -	- -	- -	- -	- -	- -	- -	**3.5 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Limonene	--	--	--	**16 N**	- -	- -	- -	- -	**6.7 N**	**17 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Methane, Trifluoro-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**3.5 N**	**18 N**	- -	- -	- -	- -	- -	- -	- -
Methanesulfonyl Chloride	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**4.1 N**
Methanethiol (Methyl Mercaptan)	74-93-1	--	--	**1600 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**23000 N**	**30000 N**	- -
Methyl Alcohol	--	--	--	- -	- -	- -	- -	**33 N**	**61 N**	**99 N**	**81 N**	- -	- -	- -	- -	- -	**38 N**	- -	- -	- -
n-Butyl Ether	--	--	--	- -	- -	**5.0 N**	- -	- -	- -	- -	**4.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nonadecane	--	--	--	**57 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nonane	71-55-6	--	--	**130 N**	- -	- -	- -	- -	- -	**8.2 N**	**12 N**	- -	- -	- -	- -	- -	- -	**590 N**	**590 N**	- -
Nonane, 2,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**3.7 N**	- -	**6.5 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nonane, 3,7-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**30 N**	**51 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nonane, 3-Methylene-	--	--	--	- -	- -	- -	- -	- -	**16 N**	**30 N**	**56 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nonane, 5-Methyl-5-Propyl-	--	--	--	**19 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Octadecane, 1-Chloro-	--	--	--	- -	- -	- -	- -	- -	- -	**17 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Octane	--	--	--	- -	- -	- -	- -	- -	**4.4 N**	- -	**9.3 N**	- -	- -	- -	- -	- -	- -	- -	**120 N**	- -
Octane, 2,5-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**3.2 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Octane, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	**3.7 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Octane, 3-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**290 N**	- -	- -
Octane, 3-Methyl-	--	--	--	**42 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**220 N**	**160 N**	- -
Octane, 4-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**6.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Octanoic Acid, Pentadecafluoro-, a	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**8.4 N**	- -	- -	- -	**39 N**	- -	- -	- -	- -
Oxirane, 3-Ethyl-2,2-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**150 N**	- -
Pentanal, 2,2-Dimethyl-, Hydrazone	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**380 N**	- -
Pentane	109-66-0	--	--	- -	- -	- -	- -	- -	**57 N**	- -	- -	- -	**4.6 N**	- -	- -	- -	**4.2 N**	- -	- -	- -
Pentane, 1,1'-oxybis-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**550 N**	**2700 N**	- -
Pentane, 2,2'-oxybis-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**8100 N**	**7700 N**	- -
Pentane, 2,3,3,4-Tetramethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	**85 N**	- -
Pentane, 2,3,4-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**61 N**	- -	- -
Pentane, 2,4-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**5.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 2-Bromo-	--	--	--	**94 N**	- -	- -	- -	- -	- -	- -	**27 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	**150 N**	- -	- -	- -	- -	- -	- -	- -	- -	**1200 N**	**1300 N**	- -
Pentane, 3,3-Diethyl-	--	--	--	**60 N**	- -	- -	- -	- -	**88 N**	**40 N**	**71 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 3,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**3.8 N**	- -	- -	- -	- -	- -	- -	- -	**270 N**	**230 N**	- -
Pentane, 3-Ethyl-3-Methyl-	--	--	--	- -	- -	- -	- -	- -	**55 N**	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	**18 N**	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 3-Methylene-	--	--	--	**15 N**	- -	- -	- -	- -	**8.9 N**	**5.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Perfluoro(2-Methylpentane)	--	--	--	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Propanamide, 2,2-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**19000 N**	**18000 N**	- -
Propane	--	--	--	- -	- -	- -	- -	- -	**2000 N**	**11 N**	**64 N**	- -	- -	- -	- -	- -	- -	- -	- -	**2.8 N**
Propane, 1,2,3-Trichloro-	--	--	--	- -	- -	- -	- -	**10 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Propane, 2-(Methylthio)-	1551-21-9	--	--	**27 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Propane, 2,2-Dimethyl-	463-82-1	--	--	- -	- -	- -	- -	- -	- -	- -	**41 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Propanoic Acid, 2,2-Dimethyl-, met	--	--	--	**79 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Propanoic Acid, 2-Methyl-, 1-Methy	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**1000 N**	- -	- -
Propanoic Acid, Nonyl Ester	--	--	--	- -	- -	- -	- -	- -	**14 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sulfur Dioxide	--	--	--	**28 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Tetradecane	--	--	--	- -	- -	- -	- -	- -	- -	**5.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.8 N**
Thiazole, 4,5-Dihydro-4-Methyl-2-a	--	--	--	**18 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Thiophene, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**130 N**	- -
trans-1,4-Diethylcyclohexane	--	--	--	- -	- -	- -	- -	- -	**4.5 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Table 7-3. Analytical Results for Subslab Soil Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	SG-7R	SV-01	SV-02	SV-03	SV-04	SV-06	SV-07	SV-08	SV-09	SV-10	SV-11	SV-11	SV-13	SV-14	SV-15	SV-15	SV-16
			Sample ID:	WAT-SG-7R-053118	WAT-SV01-060718	WAT-SV02-060618	WAT-SV03-060718	WAT-SV04-060718	WAT-SV06-060118	WAT-SV07-053018	WAT-SV08-053018	WAT-SV09-060818	WAT-SV10-060818	WAT-SV11-060818	DUP-SV-060818	WAT-SV13-060718	WAT-SV14-060718	WAT-SV15-060518	DUP-SV-060518	WAT-SV16-060718
			Sample Date:	5/31/2018	6/7/2018	6/6/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	5/30/2018	6/8/2018	6/8/2018	6/8/2018	6/8/2018	6/7/2018	6/7/2018	6/5/2018	6/5/2018	6/7/2018
Analyte	**CAS#**	**Screening Level**	**Source**																	
trans-4-Decene	--	--	--	- -	- -	- -	- -	- -	- -	- -	**23 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Tridecane, 1-iodo-	--	--	--	- -	- -	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Tridecane, 3-Methylene-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**32 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Trimethylphosphine	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**76000 N**	**73000 N**	- -
Undecane, 2,7-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**38 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Undecane, 3,8-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**14 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Undecane, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**9.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Alkane: Branched (unknown) 1	--	--	--	**33 N**	- -	- -	- -	- -	**11 N**	- -	**30 N**	- -	- -	- -	- -	- -	- -	**110 N**	- -	- -
Alkane: Branched (unknown) 2	--	--	--	**14 N**	- -	- -	- -	- -	**7.9 N**	- -	**14 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Alkane: Branched (unknown) 3	--	--	--	- -	- -	- -	- -	- -	**6.2 N**	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Alkane: Branched (unknown) 4	--	--	--	- -	- -	- -	- -	- -	**3.1 N**	- -	**6.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Alkane: Straight-Chain (unknown) 1	--	--	--	- -	- -	- -	- -	- -	**43 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Unknown 1	--	--	--	28 N	50 N	57 N	58 N	60 N	**18 N**	- -	**7.8 N**	79 N	120 N	70 N	67 N	78 N	72 N	150 N	- -	6.9 N
Unknown 2	--	--	--	13 N	11 N	- -	- -	14 N	**- -**	- -	**- -**	8.1 N	72 N	- -	- -	55 N	59 N	- -	- -	- -
Unknown 3	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	**10 N**	**6.0 N**	- -	- -	- -
Unknown 4	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**9.8 N**	- -	- -	**6.1 N**	**3.0 N**	- -	- -	- -
Unknown 5	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**7.9 N**	- -	- -	**4.5 N**	**3.0 N**	- -	- -	- -
Unknown 6	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2.7 N**	- -	- -	- -	- -

Notes:

Notes:

ACGIH TLV = American Conference of Governmental Industrial Hygienists
Threshold Limit Value

LEL = Screening level based on the LEL (lower explosive limit) of 5% methane by volume.

VISL = VOC criteria for a commercial exposure scenario were calculated using the Vapor Intrusion Screening Level (VISL) Calculator Version 3.5.1 (EPA, 2016) (May 2016 Regional Screening Levels) for subslab concentrations with a 10-5 target cancer risk, a hazard quotient of 1, and the default 0.03 attenuation factor.

[a] Screening levels not applied to TICs

Bold indicates the analyte was detected

Table 7-4. Analytical Results for Select Sulfur Compounds, 2016 to 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

	Analyte:	1-Propanethiol	Carbon Disulfide	Carbonyl Sulfide	Dimethyl Sulfide	Ethyl Mercaptan	Hydrogen Sulfide	Isopropyl Mercaptan	Methyl Mercaptan
	CAS #:	107-03-9	75-15-0	463-58-1	624-92-0	75-08-1	7783-06-4	75-33-2	74-93-1
Location	**Sample Date**	**Results** (µg/m^3)							
MW-01	6/8/2018	16 U	16 U	12 U	19 U	13 U	**35**	16 U	9.8 U
MW-02	6/8/2018	16 U	**19**	**16**	19 U	13 U	**21**	16 U	9.8 U
MW-03	4/21/2016	**4400**	**1900**	- -	- -	**6700**	**21000000**	**190000**	**22000**
MW-03	5/31/2018	**12,000**	**2,800**	120 U	190 U	**11,000**	**26,000,000**	**330,000**	**19,000**
MW-19	8/18/2016	- -	- -	- -	- -	- -	4.7 U	- -	- -
MW-19	6/7/2018	160 U	160 U	120 U	190 U	130 U	**900**	160 U	98 U
MW-21	8/18/2016	- -	- -	- -	- -	- -	4.7 U	- -	- -
MW-21	6/7/2018	160 U	160 U	120 U	190 U	130 U	**3,600**	160 U	98 U
MW-31	8/18/2016	- -	- -	- -	- -	- -	5.0 U	- -	- -
MW-31	6/7/2018	160 U	160 U	**240**	190 U	130 U	**5,700**	160 U	98 U
MW-33	4/21/2016	840 U	440 U	- -	- -	690 U	**9300000**	**7100**	**3100**
MW-33	6/1/2018	**1,300**	**1,800**	**210**	190 U	**840**	**13,000,000**	**190**	**240**
MW-34	4/21/2016	8.4 U	4.4 U	- -	- -	6.9 U	**110**	8.4 U	5.3 U
MW-34	5/30/2018	160 U	**64 J**	**240**	190 U	130 U	**750,000**	160 U	**35 J**
MW-35	8/18/2016	- -	- -	- -	- -	- -	4.7 U	- -	- -
MW-35	6/8/2018	16 U	**4.9 J**	12 U	19 U	13 U	**35**	16 U	9.8 U
PZ-01	4/21/2016	8.4 UJ	4.4 UJ	- -	- -	6.9 UJ	**17 J**	8.4 UJ	5.3 UJ
PZ-01	5/30/2018	160 U	160 U	**61 J**	190 U	130 U	**4,200**	160 U	98 U
PZ-03	6/6/2018	16 U	**480**	**73 J**	19 U	13 U	**16**	16 U	9.8 U
PZ-04	6/8/2018	16 U	**10 J**	**12 J**	19 U	13 U	**43**	16 U	9.8 U
SG-7A	8/19/2016	- -	- -	- -	- -	- -	**21**	- -	- -
SG-7R	8/19/2016	- -	- -	- -	- -	- -	**2100000**	- -	- -
SG-7R	5/31/2018	**820**	**4,800**	120 U	**370**	**1,000**	**23,000,000**	**17,000**	**15,000**
SV-01	5/8/2017	16 U	16 U	12 U	19 U	13 U	**110 J**	16 U	9.8 U
SV-01	6/7/2018	16 U	16 U	12 U	19 U	13 U	**26**	16 U	9.8 U
SV-02	5/8/2017	16 U	**8.7 J**	12 U	19 U	13 U	**620 J**	16 U	9.8 U
SV-02	6/6/2018	16 U	**5.8 J**	**26**	19 U	13 U	**32**	16 U	9.8 U
SV-03	5/8/2017	16 U	16 U	12 U	19 U	13 U	**1,100 J**	16 U	9.8 U
SV-03	6/7/2018	16 U	16 U	12 U	19 U	13 U	**39**	16 U	9.8 U
SV-04	5/8/2017	16 U	16 U	12 U	19 U	13 U	**3,700**	**4.8 J**	**3.3 J**
SV-04	6/7/2018	16 U	**5.0 J**	12 U	19 U	13 U	**54**	16 U	9.8 U
SV-06	5/9/2017	160 U	160 U	120 U	190 U	130 U	**5,500 J**	160 U	98 U
SV-06	6/1/2018	16 U	**4.7 J**	12 U	**11 J**	13 U	**62**	16 U	9.8 U
SV-07	5/9/2017	16 U	16 U	12 U	19 U	13 U	**12 J**	16 U	9.8 U
SV-07	5/30/2018	16 U	16 U	12 U	19 U	13 U	**20**	16 U	9.8 U
SV-08	5/9/2017	16 U	**28**	12 U	19 U	13 U	**3,300**	**11 J**	**3.0 J**
SV-08	5/30/2018	16 U	**17**	12 U	19 U	13 U	**24**	16 U	9.8 U
SV-09	5/8/2017	16 U	**4.1 J**	12 U	19 U	13 U	7.0 U	16 U	9.8 U
SV-09	6/8/2018	16 U	**5.0 J**	12 U	19 U	13 U	**18**	16 U	9.8 U
SV-10	5/8/2017	16 U	16 U	12 U	19 U	13 U	7.0 U	16 U	9.8 U
SV-10	6/8/2018	16 U	16 U	12 U	19 U	13 U	**43**	16 U	9.8 U
SV-11	5/8/2017	16 U	16 U	12 U	19 U	13 U	**40 J**	16 U	9.8 U
SV-11	6/8/2018	16 U	16 U	12 U	19 U	13 U	**49**	16 U	9.8 U

Table 7-4. Analytical Results for Select Sulfur Compounds, 2016 to 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

	Analyte:	1-Propanethiol	Carbon Disulfide	Carbonyl Sulfide	Dimethyl Sulfide	Ethyl Mercaptan	Hydrogen Sulfide	Isopropyl Mercaptan	Methyl Mercaptan
	CAS #:	107-03-9	75-15-0	463-58-1	624-92-0	75-08-1	7783-06-4	75-33-2	74-93-1
Location	**Sample Date**	**Results** (µg/m^3)							
SV-11	6/8/2018	16 U	16 U	12 U	19 U	13 U	**39**	16 U	9.8 U
SV-13	5/8/2017	16 U	16 U	12 U	19 U	13 U	**28 J**	16 U	9.8 U
SV-13	6/7/2018	16 U	16 U	12 U	19 U	13 U	**39**	16 U	9.8 U
SV-14	5/8/2017	16 U	16 U	12 U	19 U	13 U	**25 J**	16 U	9.8 U
SV-14	6/7/2018	16 U	16 U	12 U	19 U	13 U	**37**	16 U	9.8 U
SV-15	5/9/2017	**12,000**	**9,300**	120 U	**1,100 J**	**18,000**	**150,000,000**	**230,000**	**110,000**
SV-15	6/5/2018	**18,000**	**14,000**	120 U	**1,300**	**24,000**	**180,000,000**	**650,000**	**230,000**
SV-16	6/7/2018	16 U	**4.6 J**	12 U	19 U	13 U	**32**	16 U	9.8 U

Notes:

Bold indicates the analyte was detected

Where parent and field duplicate sample results are available, the greatest concertation is shown.

- - = Not analyzed

-- = Not available

CAS # = Chemical Abstracts Service Registry Number

J = The analyte was positively identified; the associated numerical value is the approximate concentration.

N = There is presumptive evidence of the analyte (tentatively identified compound).

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

µg/m^3 = micrograms per cubic meter

Table 7-5. Analytical Results for Well Headspace Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	MW-01	MW-02	MW-03	MW-19	MW-19	MW-21	MW-31	MW-33	MW-34	MW-35	PZ-01	PZ-03	PZ-04
			Sample ID:	WAT-MW01-060818	WAT-MW02-060818	WAT-MW03-053118	WAT-MW19-060718	DUP-MW-060718	WAT-MW21-060718	WAT-MW31-060718	WAT-MW33-060118	WAT-MW34-053018	WAT-MW35-060818	WAT-PZ01-053018	WAT-PZ03-060618	WAT-PZ04-060818
			Sample Date:	6/8/2018	6/8/2018	5/31/2018	6/7/2018	6/7/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	6/8/2018	5/30/2018	6/6/2018	6/8/2018
Analyte	**CAS#**	**Screening Level**	**Source**													
Fixed Gases by EPA Method 3C (%volume)																
Carbon Dioxide	124-38-9	--	--	**1.29 J**	**0.907 J**	**18.9**	**3.26**	**3.21**	**0.187 J**	**0.0420 J**	**10.2**	**3.64**	**0.315 J**	**3.66**	**3.21**	**0.208 J**
Methane	74-82-8	4	LEL	0.58 U	0.58 U	**47.8**	**42.1**	**41.5**	**14.3**	**16.4**	**77.4**	**80.8**	0.58 U	**40.7**	**0.838**	0.58 U
Nitrogen	7727-37-9	--	--	**78.7**	**78.6**	**25.6**	**56.5**	**54.1**	**74.4**	**68.6**	**12.5**	**21.5**	**78.1**	**48.2**	**82.5**	**78.1**
Oxygen	7782-44-7	--	--	**19**	**20.2**	**4.63**	**0.864 J**	**0.822 J**	**12.1**	**5.38**	**1.02**	**0.983**	**20.1**	**9.1**	**11.3**	**21.1**
Low Level Sulfurs by TO-15 (ug/m3)																
1-Propanethiol	107-03-9	--	--	16 U	16 U	**12,000**	160 U	160 U	160 U	160 U	**1,300**	160 U	16 U	160 U	16 U	16 U
Carbon Disulfide	75-15-0	103,613	ACGIH TLV	16 U	**19**	**2,800**	160 U	160 U	160 U	160 U	**1,800**	**64 J**	**4.9 J**	160 U	**480**	**10 J**
Carbonyl Sulfide	463-58-1	409,000	ACGIH TLV	12 U	**16**	120 U	120 U	120 U	120 U	**240**	**210**	**240**	12 U	**61 J**	**73 J**	**12 J**
Ethyl Mercaptan	75-08-1	42,263	ACGIH TLV	13 U	13 U	**11,000**	130 U	130 U	130 U	130 U	**840**	130 U	13 U	130 U	13 U	13 U
Hydrogen Sulfide	7783-06-4	46,353	ACGIH TLV	**35**	**21**	**26,000,000**	**750**	**900**	**3,600**	**5,700**	**13,000,000**	**750,000**	**35**	**4,200**	**16**	**43**
Isopropyl Mercaptan	75-33-2	--	--	16 U	16 U	**330,000**	160 U	160 U	160 U	160 U	**190**	160 U	16 U	160 U	16 U	16 U
Methyl Mercaptan	74-93-1	32,720	ACGIH TLV	9.8 U	9.8 U	**19,000**	98 U	98 U	98 U	98 U	**240**	**35 J**	9.8 U	98 U	9.8 U	9.8 U
Volatile Organic Compounds by TO-15 (ug/m3)																
1,1-Dichloroethane	75-34-3	2,555	VISL	20 U	20 U	**91**	20 U	20 U	20 U	20 U	**66**	**31**	20 U	**130**	20 U	20 U
1,1-Dichloroethene	75-35-4	29,200	VISL	20 U	20 U	79 U	20 U	**17 J**	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
1,2-Dichloroethane	107-06-2	157	VISL	20 U	20 U	81 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	**27**	20 U
1,2-Dichloropropane	78-87-5	409	VISL	23 U	23 U	92 U	23 U	23 U	23 U	23 U	**73**	23 U	23 U	23 U	**35**	23 U
Acetone	67-64-1	4,526,000	VISL	24 U	**190**	**560**	**92**	**84**	**230**	**890**	**310**	**31**	**31**	**22 J**	24 U	**41**
Benzene	71-43-2	524	VISL	16 U	16 U	**140**	16 U	16 U	16 U	16 U	**220**	16 U	16 U	**17**	16 U	16 U
Carbon Disulfide	75-15-0	103,613	ACGIH TLV	16 U	**42**	**3,200**	16 U	16 U	16 U	**99**	**2,200**	**83**	**24**	16 U	**620**	**20**
Chlorobenzene	108-90-7	7,300	VISL	23 U	23 U	**310**	23 U	23 U	23 U	23 U	**97**	23 U	23 U	23 U	23 U	23 U
Chloroethane	75-00-3	1,460,000	VISL	13 U	13 U	53 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	**17**	13 U	13 U
Chloroform	67-66-3	178	VISL	**2,900**	**28**	98 U	24 U	24 U	24 U	24 U	24 U	24 U	**26**	24 U	24 U	24 U
cis-1,2-Dichloroethene	156-59-2	--	--	20 U	20 U	**460**	**430**	**450**	20 U	20 U	**180**	**31**	20 U	**52**	20 U	20 U
Cyclohexane	110-82-7	876,000	VISL	17 U	17 U	**200**	**75**	**69**	17 U	**48**	**190**	17 U	17 U	**64**	17 U	17 U
Ethylbenzene	100-41-4	1,635	VISL	22 U	22 U	**580**	22 U	22 U	22 U	22 U	**57**	22 U	22 U	22 U	22 U	22 U
Freon 12	75-71-8	14,600	VISL	25 U	25 U	99 U	**130,000 J**	**100,000 J**	25 U	**44**	25 U	25 U	25 U	**130**	25 U	25 U
Heptane	142-82-5	--	--	20 U	20 U	**220**	**45**	**44**	20 U	20 U	**38**	20 U	20 U	20 U	20 U	20 U
Hexane	110-54-3	102,200	VISL	18 U	18 U	**560**	**73**	**68**	18 U	18 U	**530**	18 U	18 U	**23**	18 U	18 U
Methyl Isobutyl Ketone	108-10-1	438,000	VISL	41 U	41 U	**4,400**	41 U	41 U	41 U	**26 J**	**110**	41 U	41 U	41 U	41 U	41 U
Methylene Chloride	75-09-2	87,600	VISL	17 U	17 U	**680**	17 U	17 U	17 U	17 U	**49**	17 U	17 U	17 U	17 U	17 U
Tetrahydrofuran	109-99-9	292,000	VISL	15 U	**35**	59 U	**17**	**17**	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U
Toluene	108-88-3	730,000	VISL	19 U	19 U	**8,600**	19 U	19 U	19 U	19 U	**1,300**	19 U	19 U	**19**	19 U	19 U
trans-1,2-Dichloroethene	156-60-5	--	--	20 U	20 U	**130**	**1,600**	**1,600**	20 U	20 U	**42**	20 U	20 U	**210**	20 U	20 U
Trichloroethene	79-01-6	292	VISL	27 U	27 U	110 U	**110**	**120**	27 U	27 U	**29**	27 U	27 U	27 U	27 U	27 U
Vinyl Chloride	75-01-4	929	VISL	13 U	13 U	51 U	**210**	**200**	13 U	13 U	13 U	13 U	**16**	**300**	13 U	13 U
Xylene, m,p-	179601-23-1	14,600	1330-20-7	43 U	43 U	**3,000**	43 U	43 U	43 U	43 U	**72**	43 U	43 U	43 U	43 U	43 U
Xylene, o-	95-47-6	14,600	VISL	22 U	22 U	**1,700**	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U
Volatile Organic Compounds TICs by TO-15 (ppbv)^{a}																
(+)-4-Carene	--	--	--	- -	- -	- -	- -	- -	- -	- -	**72 N**	- -	- -	- -	- -	- -
(1R)-2,6,6-Trimethylbicyclo[3.1.1]	--	--	--	- -	- -	**450 N**	- -	- -	**48 N**	**130 N**	- -	- -	- -	- -	- -	- -
(1S)-2,6,6-Trimethylbicyclo[3.1.1]	--	--	--	- -	- -	- -	- -	- -	- -	**4.6 N**	- -	- -	- -	- -	- -	- -
(E)-3-Methyl-2-Hexene	--	--	--	- -	- -	- -	- -	**15 N**	**11 N**	- -	- -	- -	- -	**86 N**	- -	- -
(s)-3-Ethyl-4-Methylpentanol	--	--	--	- -	- -	- -	**4.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
(tert-Butoxymethyl)oxirane	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**16 N**	- -
1,1,3,3,3-Pentafluoro-2-(Trifluoro	--	--	--	**74 N**	- -	- -	- -	- -	- -	- -	- -	- -	**93 N**	- -	- -	**160 N**
1,1'-Bicyclopentyl-1,1'-diol	--	--	--	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	- -	**4.7 N**	- -
1,1-Dimethylbutyl(Prop-2-Enyl)sulf	--	--	--	- -	- -	- -	- -	- -	- -	- -	**18 N**	- -	- -	- -	- -	- -
1,2-Cyclopentanediol, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**4.4 N**	- -	- -	- -	- -
1,3-Butadiene, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	**4.0 N**	- -	- -	- -	- -	- -	- -	- -
1,5-Cyclooctadiene, 1,5-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**6.3 N**	- -	- -	- -	- -	- -	- -	- -
1,5-Heptadiene, 3,3,5-Trimethyl-	--	--	--	- -	- -	**98 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.alpha.,2.beta.,3.alpha.,4.beta.-	--	--	--	- -	- -	- -	**8.6 N**	- -	- -	**17 N**	- -	- -	- -	- -	- -	- -
1-Butanethiol	109-79-5	--	--	- -	- -	**210 N**	- -	- -	- -	- -	**17 N**	- -	- -	- -	- -	- -
1-Butene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**4.7 N**	- -	- -	- -	- -
1-Butene, 1,1,2,3,3,4,4,4-Octafluo	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**25 N**
1-Butene, 2-Ethyl-3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	- -
1-Butene, 2-Methyl-	563-46-2	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**6.4 N**	- -	- -	**9.7 N**	- -
1-Butene, 3-Butoxy-2-Methyl-	--	--	--	- -	- -	**280 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Butene, 3-Methyl-	--	--	--	- -	- -	- -	- -	**12 N**	- -	- -	**77 N**	- -	- -	- -	- -	- -
1-Decanol, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.7 N**	- -
1H,1H,7H-Dodecafluoro-1-Heptanol	--	--	--	- -	**2.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Heptene, 5-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**19 N**	**22 N**	- -	**21 N**	- -	- -
1-Hexanol, 2-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**20 N**	- -	- -	**3.3 N**
1-Hexen-3-One	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**60 N**	- -	**120 N**	- -	- -
1-Hexene, 2,4,4-Triethyl-	--	--	--	- -	- -	- -	**10 N**	- -	- -	**9.5 N**	**15 N**	- -	- -	**10 N**	- -	- -
1-Hexene, 2,5-Dimethyl-	--	--	--	- -	- -	- -	**5.5 N**	**4.5 N**	- -	- -	- -	- -	- -	- -	- -	- -
1-Hexene, 3,4,5-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	- -

Table 7-5. Analytical Results for Well Headspace Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	MW-01	MW-02	MW-03	MW-19	MW-19	MW-21	MW-31	MW-33	MW-34	MW-35	PZ-01	PZ-03	PZ-04
			Sample ID:	WAT-MW01-060818	WAT-MW02-060818	WAT-MW03-053118	WAT-MW19-060718	DUP-MW-060718	WAT-MW21-060718	WAT-MW31-060718	WAT-MW33-060118	WAT-MW34-053018	WAT-MW35-060818	WAT-PZ01-053018	WAT-PZ03-060618	WAT-PZ04-060818
			Sample Date:	6/8/2018	6/8/2018	5/31/2018	6/7/2018	6/7/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	6/8/2018	5/30/2018	6/6/2018	6/8/2018
Analyte	**CAS#**	**Screening Level**	**Source**													
1-Hexene, 4-Ethyl-	--	--	--	- -	- -	- -	- -	**14 N**	- -	- -	- -	- -	- -	- -	- -	- -
1-Hexene, 5,5-Dimethyl-	--	--	--	- -	- -	- -	- -	**3.5 N**	- -	- -	- -	- -	- -	- -	- -	- -
1-Hexene, 5-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**8.9 N**	**25 N**	**15 N**	- -	- -	- -	- -
1-Iodoundecane	--	--	--	- -	- -	- -	- -	- -	- -	**14 N**	- -	**6.4 N**	- -	- -	- -	- -
1-Nonanol, 2,2,3,3,4,4,5,5,6,6,7,7	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.3 N**
1-Octanol, 2-Butyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -
1-Pentene, 2,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**7.9 N**	**18 N**	- -	- -	**24 N**	- -	- -
1-Pentene, 2,4,4-Trimethyl-	--	--	--	- -	- -	- -	**3.7 N**	- -	**43 N**	**4.5 N**	- -	- -	**6.2 N**	- -	- -	**11 N**
1-Pentene, 2,4-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**3.8 N**	- -	- -	- -	- -
1-Pentene, 2-Methyl-	--	--	--	- -	- -	- -	**29 N**	**27 N**	- -	- -	**21 N**	**9.2 N**	- -	- -	- -	- -
1-Pentene, 4-Methyl-	--	--	--	- -	- -	- -	**6.0 N**	- -	- -	- -	**180 N**	**160 N**	- -	**33 N**	- -	- -
1-Propanamine	--	--	--	- -	**2.5 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Propanethiol	107-03-9	--	--	- -	- -	**2000 N**	- -	- -	- -	- -	**110 N**	- -	- -	- -	- -	- -
1-Propanol, 2-(1-Methylethoxy)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**7.4 N**	- -
1-Propene, 1,1,3,3,3-Pentafluoro-	--	--	--	**59 N**	**82 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Propene, 2-Methyl-	--	--	--	- -	- -	**1400 N**	- -	**5.8 N**	**400 N**	- -	**470 N**	**450 N**	- -	**30 N**	**68 N**	- -
1-Propene, 3-Chloro-	--	--	--	- -	- -	**260 N**	- -	- -	- -	- -	**110 N**	- -	- -	**14 N**	**230 N**	- -
1-Propene, 3-Chloro-1,1,3,3-Tetraf	--	--	--	- -	**4.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1-Propene, -Chloro-(isomer)	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**60 N**	- -
1-Tridecene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**9.2 N**	- -	- -	- -	- -
1-Undecene, 4-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**25 N**	- -	- -
2(5H)-Furanone, 5,5-Dimethyl-	--	--	--	- -	- -	**52 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2,2,4-Trimethyl-3-Hexene	--	--	--	- -	- -	- -	- -	- -	- -	**2.9 N**	- -	- -	- -	- -	- -	- -
2,2'-Bifuran, Octahydro-	--	--	--	- -	- -	**530 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2,3-Dimethyl-1-Hexene	--	--	--	- -	- -	- -	**6.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2,6-Octadiene, 2,7-Dimethyl-	--	--	--	- -	- -	**640 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Butanethiol	--	--	--	- -	- -	**1300 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Butanethiol, 2-Methyl-	--	--	--	- -	- -	**210 N**	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	- -
2-Buten-1-ol, 2-Methyl-	--	--	--	- -	- -	**210 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Buten-1-ol, 3-Methyl-	--	--	--	- -	- -	**360 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Butene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**20 N**	- -
2-Butene, 2,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**42 N**	- -
2-Butene, 2-Methyl-	--	--	--	- -	- -	- -	**13 N**	- -	**31 N**	- -	- -	- -	- -	- -	- -	- -
2-Cyclohexen-1-ol	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**7.2 N**	- -	- -
2-Decene, 3-Methyl-, (Z)-	--	--	--	- -	- -	- -	- -	**3.6 N**	- -	- -	- -	- -	- -	- -	- -	- -
2-Heptanol, 2,6-Dimethyl-	--	--	--	- -	- -	**650 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Heptanone	--	--	--	- -	- -	- -	- -	- -	**3.3 N**	- -	- -	- -	- -	- -	- -	- -
2-Heptene, 3-Methyl-	--	--	--	- -	- -	- -	- -	**16 N**	- -	- -	- -	- -	- -	- -	- -	- -
2-Hexanol, 2,3-Dimethyl-	--	--	--	- -	- -	**310 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Hexenal, 2-Ethyl-	--	--	--	- -	- -	- -	**2.9 N**	- -	- -	- -	- -	**6.7 N**	- -	- -	- -	- -
2-Hexene, 3-Methyl-, (Z)-	--	--	--	- -	- -	- -	**17 N**	- -	- -	**34 N**	- -	**35 N**	- -	- -	**23 N**	- -
2-Hexene, 4-Methyl-, (E)-	--	--	--	- -	- -	- -	**5.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Hexene, 5-Methyl-, (E)-	--	--	--	- -	- -	**71 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2H-Pyran, 2-(1,1-Dimethylethoxy)te	--	--	--	- -	- -	- -	- -	**5.2 N**	- -	- -	- -	- -	- -	- -	- -	- -
2H-Pyran, Tetrahydro-2-[(Tetrahydr	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**3.4 N**	- -	- -	- -	- -
2H-Pyran-2-One, Tetrahydro-6,6-dim	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.1 N**
2-Methylene-Cyclopentanol	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**4.4 N**	- -
2-Nonene, (E)-	--	--	--	- -	- -	- -	- -	**4.6 N**	- -	- -	- -	- -	- -	- -	- -	- -
2-Octene, (Z)-	--	--	--	- -	- -	- -	**3.5 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Octene, 2,6-Dimethyl-	--	--	--	- -	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	**26 N**	- -
2-Pentanethiol	--	--	--	- -	- -	**720 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentanethiol, 4-Methyl-	--	--	--	- -	- -	**78000 N**	- -	- -	- -	- -	**4700 N**	**6.6 N**	- -	- -	- -	- -
2-Pentanone, 3-Ethyl-3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**5.1 N**	- -	- -	- -	- -
2-Pentenal, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**6.2 N**	- -	- -	- -	- -
2-Pentenal, 2-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.5 N**	- -
2-Pentenal, 2-Methyl-	--	--	--	- -	- -	- -	- -	**4.1 N**	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentene	--	--	--	- -	- -	- -	- -	- -	- -	**7.8 N**	- -	- -	- -	- -	- -	- -
2-Pentene, 1-(Pentyloxy)-, (E)-	--	--	--	- -	- -	**110 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Pentene, 2,4,4-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**3.3 N**	- -	- -	- -	- -	**3.9 N**	- -
2-Pentene, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**16 N**	- -	- -	- -	- -	- -
2-Pentene, 3-Ethyl-	--	--	--	- -	- -	**46 N**	- -	- -	- -	- -	- -	**8.0 N**	- -	**28 N**	- -	- -
2-Pentene, 3-Methyl-, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**38 N**	**11 N**	- -	- -	- -	- -
2-Pentene, 3-Methyl-, (Z)-	--	--	--	- -	- -	**92 N**	- -	- -	- -	- -	**26 N**	- -	- -	- -	- -	- -
2-Pentene, 4,4-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -
2-Pentene, 4,4-Dimethyl-, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**3.0 N**	- -	- -	- -	- -
2-Pentene, 4-Methyl-	--	--	--	- -	- -	- -	- -	**33 N**	- -	- -	**51 N**	**190 N**	- -	- -	- -	- -
2-Pentene, 4-Methyl-, (Z)-	--	--	--	- -	- -	**80 N**	**34 N**	- -	- -	**2.8 N**	- -	- -	- -	- -	- -	- -
2-Pentene, 5-Butoxy-, (E)-	--	--	--	- -	- -	- -	- -	**9.2 N**	- -	- -	- -	- -	- -	- -	- -	- -
2-Propanethiol (Isopropyl Mercaptan)	75-33-2	--	--	- -	- -	**76000 N**	- -	**4.0 N**	- -	**19 N**	**410 N**	- -	- -	- -	- -	- -

Table 7-5. Analytical Results for Well Headspace Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	MW-01	MW-02	MW-03	MW-19	MW-19	MW-21	MW-31	MW-33	MW-34	MW-35	PZ-01	PZ-03	PZ-04
			Sample ID:	WAT-MW01-060818	WAT-MW02-060818	WAT-MW03-053118	WAT-MW19-060718	DUP-MW-060718	WAT-MW21-060718	WAT-MW31-060718	WAT-MW33-060118	WAT-MW34-053018	WAT-MW35-060818	WAT-PZ01-053018	WAT-PZ03-060618	WAT-PZ04-060818
			Sample Date:	6/8/2018	6/8/2018	5/31/2018	6/7/2018	6/7/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	6/8/2018	5/30/2018	6/6/2018	6/8/2018
Analyte	**CAS#**	**Screening Level**	**Source**													
2-Propanol, 1-Chloro-	--	--	--	- -	- -	- -	- -	- -	- -	**3.7 N**	- -	- -	- -	- -	- -	- -
2-Propenoic Acid, 2-Methyl-, Ethyl	--	--	--	- -	- -	**380 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2-Undecene, 3-Methyl-, (Z)-	--	--	--	- -	- -	- -	- -	**3.1 N**	- -	- -	- -	- -	- -	- -	- -	- -
2-Undecene, 4,5-Dimethyl-, [R@,R@-	--	--	--	- -	- -	- -	- -	**5.1 N**	- -	- -	- -	- -	- -	- -	**6.3 N**	- -
2-Undecene, 4,5-Dimethyl-, [R@,S@-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**18 N**	- -	- -	- -	- -	- -
3-(3,3-Dimethyloxiran-2-yl)-2,2-di	--	--	--	- -	- -	**42 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3,4-Diethyl-2-Hexene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**4.7 N**	- -
3,4-Dimethyl-2-Pentene(c,t)	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**3.6 N**	- -	- -	- -	- -
3-Bromooctane	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**5.4 N**	- -
3-Butyn-2-ol, 2-Methyl-	--	--	--	- -	- -	**800 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Dodecene, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**16 N**	- -	- -
3-Dodecene, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**30 N**	- -	- -	- -	- -
3-Ethyl-2-Methyl-1-Heptene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**4.6 N**	- -
3-Ethyl-3-Hexene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**4.1 N**	- -	**14 N**	**7.4 N**	- -
3-Ethyl-3-Methylheptane	--	--	--	- -	- -	- -	- -	**9.0 N**	**16 N**	**23 N**	**27 N**	**20 N**	- -	**54 N**	- -	- -
3-Ethyl-3-Pentyl Methylphosphonofl	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**3.0 N**	- -	- -	- -	- -
3-Ethyl-4-Methyl-2-Pentene	--	--	--	- -	- -	- -	**25 N**	- -	- -	**3.7 N**	- -	- -	- -	- -	- -	- -
3-Heptanol	--	--	--	- -	- -	**71 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Hepten-2-One, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**5.0 N**
3-Heptene	--	--	--	- -	- -	- -	- -	**6.4 N**	- -	- -	- -	- -	- -	- -	- -	- -
3-Heptene, (E)-	--	--	--	- -	- -	- -	**6.2 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Heptene, 2,2,3,5,6-Pentamethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**14 N**	- -	- -	- -	- -	- -
3-Heptene, 3-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**16 N**	- -	- -
3-Heptene, 3-Methyl-	--	--	--	- -	- -	- -	**58 N**	**83 N**	- -	- -	**34 N**	- -	- -	- -	- -	- -
3-Heptene, 4-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2.8 N**	- -
3-Heptene, 4-Methyl-	--	--	--	- -	- -	- -	**5.4 N**	- -	- -	**4.7 N**	- -	- -	- -	- -	- -	- -
3-Heptene, 4-Propyl-	--	--	--	- -	- -	- -	**3.9 N**	- -	- -	**5.8 N**	- -	- -	- -	**12 N**	- -	- -
3-Hexene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**17 N**	- -	- -
3-Hexene, 2-Methyl-, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	**9.1 N**	- -
3-Hexene, 2-Methyl-, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**14 N**	- -	- -	- -	- -	- -
3-Hexene, 3-Ethyl-2,5-Dimethyl-	--	--	--	- -	- -	- -	**2.7 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Hexene, 3-Methyl-, (Z)-	--	--	--	- -	- -	- -	**3.2 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Methylheptyl Acetate	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2.8 N**	- -	- -	- -
3-Methylpenta-1,3-Diene-5-ol, (E)-	--	--	--	- -	- -	- -	**3.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Octen-2-One	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.8 N**	- -
3-Pentanethiol	616-31-9	--	--	- -	- -	**290 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Pentanol, 2-Methyl-	--	--	--	- -	- -	**3200 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Undecene, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**18 N**	- -	- -
3-Undecene, 9-Methyl-, (E)-	--	--	--	- -	- -	- -	**3.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
3-Undecene, 9-Methyl-, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.5 N**	- -
4-Decene, 3-Methyl-, (E)-	--	--	--	- -	- -	- -	- -	**9.8 N**	- -	- -	- -	- -	- -	**14 N**	- -	- -
4-Decene, 8-Methyl-, (E)-	--	--	--	- -	- -	- -	**3.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
4-Ethyl-2-Hexene	--	--	--	- -	- -	- -	**4.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
4-Heptanol, 3,5-Dimethyl-,	--	--	--	- -	- -	**90 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4-Methyl-2-Hexene,c&t	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**8.8 N**	- -	- -
4-Octene, 2,3,6-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**5.0 N**	- -
4-Tetradecene, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	**4.4 N**	- -	- -	- -	- -	- -	- -
4-Undecene, 7-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**6.3 N**	- -	- -	- -	- -	- -	- -
5-Dodecene, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**18 N**	- -	- -	- -	- -	- -
5-Ethyl-1-Nonene	--	--	--	- -	- -	- -	- -	- -	- -	- -	**16 N**	**8.4 N**	- -	- -	- -	- -
5-Ethyldecane	--	--	--	- -	- -	- -	- -	- -	- -	**3.8 N**	- -	- -	- -	- -	- -	- -
5-Methyl-3-Heptene	--	--	--	- -	- -	- -	- -	**4.0 N**	- -	- -	- -	- -	- -	- -	- -	- -
5-Octadecene, (E)-	--	--	--	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	- -	- -
5-Octen-4-One, 7-Methyl-	--	--	--	- -	- -	- -	- -	**3.5 N**	- -	- -	- -	- -	- -	- -	- -	- -
5-Undecene, (E)-	--	--	--	- -	- -	- -	- -	**3.1 N**	**5.9 N**	- -	- -	**8.7 N**	- -	- -	- -	- -
5-Undecene, (Z)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.9 N**	- -
5-Undecene, 3-Methyl-, (E)-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**15 N**	- -	- -	- -	- -	- -
6-Dodecene, (E)-	--	--	--	- -	- -	- -	**16 N**	- -	- -	**6.3 N**	- -	- -	- -	- -	- -	- -
6-Methyl-3-Heptyne	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**6.8 N**	- -
8-Octadecenal	--	--	--	- -	- -	- -	**5.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Acetaldehyde	75-07-0	--	--	- -	**22 N**	- -	- -	- -	- -	**42 N**	- -	- -	- -	- -	- -	**30 N**
Acetic Acid, Cyano-, 1,1-Dimethyle	--	--	--	- -	- -	- -	- -	- -	- -	**3.5 N**	- -	- -	- -	- -	- -	- -
Benzaldehyde	--	--	--	- -	**4.7 N**	- -	- -	- -	- -	**6.1 N**	- -	- -	- -	- -	- -	- -
Benzene, 1,2,3-Trimethyl-	--	--	--	- -	- -	**58 N**	- -	- -	- -	- -	- -	- -	- -	**7.6 N**	- -	- -
Bicyclo[2.2.1]heptan-2-ol, 2,3,3-t	--	--	--	- -	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	- -
Bicyclo[2.2.1]heptane, 2,2,3-Trime	--	--	--	- -	- -	- -	- -	- -	- -	- -	**130 N**	- -	- -	- -	- -	- -
Bicyclo[2.2.1]heptane, 2,2-Dimethy	--	--	--	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -	- -
Bicyclo[2.2.1]heptane, 7,7-Dimethy	--	--	--	- -	- -	- -	- -	- -	- -	- -	**25 N**	- -	- -	- -	- -	- -
Butane	106-97-8	--	--	- -	**72 N**	- -	**220 N**	**210 N**	**43 N**	**58 N**	**1600 N**	**47 N**	- -	**180 N**	**30 N**	**84 N**

Table 7-5. Analytical Results for Well Headspace Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	MW-01	MW-02	MW-03	MW-19	MW-19	MW-21	MW-31	MW-33	MW-34	MW-35	PZ-01	PZ-03	PZ-04
			Sample ID:	WAT-MW01-060818	WAT-MW02-060818	WAT-MW03-053118	WAT-MW19-060718	DUP-MW-060718	WAT-MW21-060718	WAT-MW31-060718	WAT-MW33-060118	WAT-MW34-053018	WAT-MW35-060818	WAT-PZ01-053018	WAT-PZ03-060618	WAT-PZ04-060818
			Sample Date:	6/8/2018	6/8/2018	5/31/2018	6/7/2018	6/7/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	6/8/2018	5/30/2018	6/6/2018	6/8/2018
Analyte	**CAS#**	**Screening Level**	**Source**													
Butane, 1-(1-Methylpropoxy)-	--	--	--	- -	- -	- -	- -	- -	**4.8 N**	- -	- -	- -	- -	- -	- -	- -
Butane, 1,1,1,2,3,3,4,4,4-Nonafluo	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**240 N**	- -
Butane, 1,1'-[Ethylidenebis(oxy)]b	--	--	--	- -	- -	- -	- -	- -	- -	- -	**96 N**	- -	- -	- -	- -	- -
Butane, 1-Chloro-2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**24 N**	- -	- -	- -	- -	- -
Butane, 1-Chloro-3,3-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**31 N**	- -	- -	- -	- -	- -	- -	- -
Butane, 1-Cyclopropylidene-5-(Tetr	--	--	--	- -	- -	- -	**7.1 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Butane, 2,2,3,3-Tetramethyl-	--	--	--	- -	- -	- -	- -	**5.4 N**	- -	- -	- -	- -	- -	- -	- -	- -
Butane, 2,2,3-Trimethyl-	--	--	--	- -	- -	- -	**12 N**	**11 N**	- -	**4.4 N**	- -	- -	- -	**15 N**	- -	- -
Butane, 2,2'-[Methylenebis(oxy)]bi	--	--	--	- -	- -	**430 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Butane, 2,2-Dimethyl-	--	--	--	- -	- -	- -	**38 N**	**37 N**	**4.6 N**	**33 N**	**70 N**	**25 N**	- -	**130 N**	- -	- -
Butane, 2,3-Dimethyl-	--	--	--	- -	- -	- -	**22 N**	**21 N**	- -	- -	- -	- -	- -	- -	- -	- -
Butane, 2-Cyclopropyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**24 N**	- -	- -
Butane, 2-Methyl-	--	--	--	- -	- -	**85 N**	**110 N**	**110 N**	**41 N**	**120 N**	**640 N**	**110 N**	**7.4 N**	**270 N**	**16 N**	- -
Butanedioic Acid, Methyl-, Dimethy	--	--	--	- -	- -	**6500 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Butanoic Acid, 2-Butoxy-1-Methyl-2	--	--	--	- -	- -	- -	- -	- -	- -	- -	**21 N**	- -	- -	- -	- -	- -
-Butene, 2-Methyl-(isomer)	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**12 N**	- -
Camphene	--	--	--	- -	- -	- -	- -	- -	**13 N**	**34 N**	- -	- -	- -	- -	- -	- -
Carbonyl Sulfide	463-58-1	--	--	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
cis-1-Butyl-2-Methylcyclopropane	--	--	--	- -	- -	- -	- -	**3.6 N**	**3.8 N**	- -	- -	- -	- -	**16 N**	**4.0 N**	- -
cis-1-Methoxy-1-Butene	--	--	--	- -	- -	**69 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
cis-2,3-Dimethylthiophane	--	--	--	- -	- -	**93 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclobutane, 1,2-Diethyl-	--	--	--	- -	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclobutanone, 2-(1,1-Dimethylethy	--	--	--	- -	- -	- -	**3.2 N**	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -
Cyclobutanone, 2,3,3-Trimethyl-	--	--	--	- -	- -	- -	- -	**2.8 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, (1,2-Dimethylbutyl)-	--	--	--	- -	- -	- -	- -	- -	**3.1 N**	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,1,3,5-Tetramethyl-,	--	--	--	- -	- -	- -	- -	- -	**7.4 N**	- -	- -	- -	- -	**25 N**	**6.2 N**	- -
Cyclohexane, 1,1,3-Trimethyl-	--	--	--	- -	- -	- -	**6.6 N**	**6.2 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,1-Dimethyl-2-Propyl	--	--	--	- -	- -	- -	**4.3 N**	- -	- -	**8.1 N**	- -	**9.5 N**	- -	- -	- -	- -
Cyclohexane, 1,2,3-Trimethyl-	--	--	--	- -	- -	- -	- -	**3.1 N**	- -	- -	**13 N**	- -	- -	**8.4 N**	- -	- -
Cyclohexane, 1,2,3-Trimethyl-, (1.	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**15 N**	- -	- -
Cyclohexane, 1,2,4-Trimethyl-	--	--	--	- -	- -	- -	**5.8 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,2,4-Trimethyl-, (1.	--	--	--	- -	- -	- -	**5.0 N**	**5.7 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,2-Diethyl-1-Methyl-	--	--	--	- -	- -	- -	- -	**3.5 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,3,5-Trimethyl-, (1.	--	--	--	- -	- -	**40 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,3-Dimethyl-, cis-	--	--	--	- -	- -	- -	**8.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,3-Dimethyl-, trans-	--	--	--	- -	- -	- -	- -	**3.4 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1,4-Dimethyl-	--	--	--	- -	- -	- -	- -	**8.1 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1-Methyl-2-Propyl-	--	--	--	- -	- -	- -	- -	- -	**5.8 N**	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, 1-Methyl-4-(1-Methyle	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**7.4 N**	- -	- -
Cyclohexane, 2-Propyl-1,1,3-Trimet	--	--	--	- -	- -	- -	- -	**3.1 N**	**6.4 N**	- -	- -	**6.8 N**	- -	- -	**3.9 N**	- -
Cyclohexane, 3-Ethyl-5-Methyl-1-pr	--	--	--	- -	- -	- -	**4.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexane, Dodecafluoro-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.1 N**	- -	- -	**3.8 N**
Cyclohexane, Methyl-	--	--	--	- -	- -	**79 N**	**20 N**	**21 N**	- -	**9.7 N**	**23 N**	- -	- -	**8.5 N**	**3.8 N**	- -
Cyclohexanecarboxylic Acid, 1-Prop	--	--	--	- -	- -	- -	- -	**5.4 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexanecarboxylic Acid, 4-Prop	--	--	--	- -	- -	- -	- -	- -	- -	**16 N**	- -	- -	- -	- -	- -	- -
Cyclohexanone, 2-Pentyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**32 N**	- -	- -	- -	- -	- -
Cyclohexanone, 4-(1,1-Dimethylethy	--	--	--	- -	- -	- -	- -	- -	**4.2 N**	**5.6 N**	- -	- -	- -	- -	- -	- -
Cyclohexanone, 4-Ethyl-	--	--	--	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclohexanone, 4-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**5.7 N**	- -	- -	- -	- -	- -	- -
Cyclooctanone	--	--	--	- -	- -	- -	- -	**3.6 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, 1,1,2-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**5.3 N**	- -
Cyclopentane, 1,1,3,3-Tetramethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**14 N**	**7.8 N**	- -	- -	- -	- -
Cyclopentane, 1,1,3,4-Tetramethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.8 N**	- -
Cyclopentane, 1,1,3-Trimethyl-	--	--	--	- -	- -	- -	**5.8 N**	**5.6 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, 1,1,3-Trimethyl-3-(2	--	--	--	- -	- -	- -	- -	**5.7 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, 1,2,3-Trimethyl-, (1	--	--	--	- -	- -	- -	- -	**6.1 N**	- -	**7.5 N**	- -	- -	- -	- -	- -	- -
Cyclopentane, 1,2,4-Trimethyl-, (1	--	--	--	- -	- -	- -	- -	- -	- -	- -	**22 N**	- -	- -	- -	- -	- -
Cyclopentane, 1,2-Dimethyl-, trans	--	--	--	- -	- -	- -	- -	**4.2 N**	- -	- -	**72 N**	- -	- -	- -	- -	- -
Cyclopentane, 1,3-Dimethyl-	--	--	--	- -	- -	- -	- -	**26 N**	- -	**41 N**	- -	- -	- -	- -	- -	- -
Cyclopentane, 1-Ethyl-2-Methyl-, c	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.9 N**	- -
Cyclopentane, Decafluoro-	--	--	--	- -	**3.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, Hexyl-	--	--	--	- -	- -	- -	- -	**4.0 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopentane, Methyl-	--	--	--	- -	- -	- -	**7.5 N**	**7.0 N**	- -	- -	- -	**2.7 N**	- -	- -	- -	- -
Cyclopentane, Pentyl-	--	--	--	- -	- -	- -	- -	- -	**26 N**	- -	- -	- -	- -	- -	- -	- -
Cyclopentanone	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2.9 N**
Cyclopentanone, 2-Methyl-3-(1-Oxop	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**23 N**	- -	- -
Cyclopentanone, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**24 N**	- -	- -	- -	- -	- -
Cyclopentasiloxane, Decamethyl-	--	--	--	- -	**7.2 N**	- -	- -	- -	- -	- -	**100 N**	- -	**3.4 N**	- -	**7.6 N**	**4.2 N**
Cyclopentene, 1-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**9.9 N**	- -

Table 7-5. Analytical Results for Well Headspace Gas Samples, May and June 2018
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	MW-01	MW-02	MW-03	MW-19	MW-19	MW-21	MW-31	MW-33	MW-34	MW-35	PZ-01	PZ-03	PZ-04
			Sample ID:	WAT-MW01-060818	WAT-MW02-060818	WAT-MW03-053118	WAT-MW19-060718	DUP-MW-060718	WAT-MW21-060718	WAT-MW31-060718	WAT-MW33-060118	WAT-MW34-053018	WAT-MW35-060818	WAT-PZ01-053018	WAT-PZ03-060618	WAT-PZ04-060818
			Sample Date:	6/8/2018	6/8/2018	5/31/2018	6/7/2018	6/7/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	6/8/2018	5/30/2018	6/6/2018	6/8/2018
Analyte	**CAS#**	**Screening Level**	**Source**													
Cyclopropane, 1,1,2,3-Tetramethyl-	--	--	--	- -	- -	**89 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopropane, 1,1-Diethyl-	--	--	--	- -	- -	- -	**4.3 N**	- -	- -	**7.4 N**	- -	- -	- -	- -	- -	- -
Cyclopropane, 1,1-Dimethyl-	--	--	--	- -	- -	**5800 N**	- -	- -	**5.6 N**	**13 N**	**73 N**	**35 N**	- -	**47 N**	**5.9 N**	- -
Cyclopropane, 1,2,3-Trimethyl-	--	--	--	- -	- -	- -	- -	**3.8 N**	- -	- -	- -	- -	- -	- -	- -	- -
Cyclopropane, 1,2-Dimethyl-, cis-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**160 N**	**37 N**	- -	**13 N**	- -	- -
Cyclopropane, 1,2-Dimethyl-, trans	--	--	--	- -	- -	**80 N**	- -	- -	- -	- -	**270 N**	- -	- -	- -	**6.9 N**	- -
Cyclopropane, 1-Methyl-2-(1-Methyl	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**35 N**	- -	- -
Cyclopropanecarboxylic Acid,3-Meth	--	--	--	- -	- -	**250 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cyclotetrasiloxane, Octamethyl-	--	--	--	**4.0 N**	**34 N**	- -	**22 N**	**15 N**	**25 N**	**35 N**	**240 N**	**26 N**	**10 N**	**47 N**	**92 N**	**6.8 N**
Cyclotrisiloxane, Hexamethyl-	--	--	--	**2.6 N**	**130 N**	- -	**18 N**	- -	**11 N**	- -	**120 N**	**52 N**	**5.1 N**	**14 N**	**58 N**	**4.8 N**
Decane	--	--	--	- -	- -	- -	- -	- -	**45 N**	- -	- -	**12 N**	- -	- -	- -	- -
Decane, 2,2,8-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**5.6 N**	- -
Decane, 2,3,7-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**49 N**	- -	- -
Decane, 2,6,8-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	**6.9 N**	- -	- -	- -	- -	- -	- -	- -
Decane, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**8.7 N**	- -	- -
Decane, 3-Ethyl-3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**5.4 N**	- -	- -	- -	**15 N**	- -	- -
Decane, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**14 N**	- -	- -	- -	- -	- -	- -
Decane, 4-Methylene-	--	--	--	- -	- -	- -	**3.9 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Decanoic Acid, Nonadecafluoro-	--	--	--	**13 N**	- -	- -	- -	- -	- -	- -	- -	- -	**59 N**	- -	- -	- -
Dibutyl-Cyanamime	--	--	--	- -	- -	- -	- -	- -	- -	**9.2 N**	- -	- -	- -	- -	- -	- -
Diethyl Sulfide	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.6 N**	- -
Difluoromethyl Trifluoromethanesul	--	--	--	**18 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Diisopropyl Ether	--	--	--	- -	- -	**210 N**	- -	- -	- -	- -	**22 N**	**24 N**	- -	**240 N**	- -	- -
Diisopropyl Sulfide	--	--	--	- -	- -	**50 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
di-tert-Butyl Malonate	--	--	--	- -	- -	**47 N**	- -	**8.3 N**	**14 N**	- -	- -	- -	- -	- -	- -	- -
D-Limonene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**16 N**	- -	**28 N**	- -	- -
Dodecane	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**12 N**	- -
Dodecane, 2,6,11-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**23 N**	- -	- -
Dodecane, 4-Methyl-	--	--	--	- -	- -	**60 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Dodecanoic Acid, Tricosafluoro-	--	--	--	**47 N**	**19 N**	- -	- -	- -	- -	- -	- -	- -	**18 N**	- -	- -	- -
Eicosane	--	--	--	- -	- -	- -	- -	- -	**2.6 N**	- -	- -	- -	- -	**100 N**	- -	- -
Ethane, 1-Chloro-1,1-Difluoro-	75-68-3	--	--	- -	- -	**170 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Ethane-1,1-Diol Dibutanoate	--	--	--	- -	- -	**5000 N**	- -	- -	- -	- -	**33 N**	- -	- -	- -	- -	- -
Ethanethiol (Ethyl Mercaptan)	75-08-1	--	--	- -	- -	**1400 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Ether, 3-Butenyl Pentyl	--	--	--	- -	- -	- -	- -	- -	- -	- -	**47 N**	- -	- -	- -	- -	- -
Furan, 2,5-Dihydro-3,4-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**15 N**	- -	- -
Furan, 2,5-Dimethyl-	--	--	--	- -	- -	**50 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Furan, 2-Methyl-	--	--	--	- -	- -	**150 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Furan, Tetrahydro-2-(Methoxymethyl	--	--	--	- -	- -	**56 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptacosane	--	--	--	- -	- -	- -	**6.7 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptadecane	--	--	--	- -	- -	- -	- -	- -	**8.4 N**	**45 N**	- -	**45 N**	- -	- -	- -	- -
Heptadecane, 8-Methyl-	--	--	--	- -	- -	- -	- -	**22 N**	- -	- -	- -	- -	- -	- -	**10 N**	- -
Heptane, 2,2,3,3,5,6,6-Heptamethyl	--	--	--	- -	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -	- -	**3.7 N**	- -
Heptane, 2,4,6-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**6.9 N**	- -
Heptane, 2,5-Dimethyl-	--	--	--	- -	- -	- -	**4.8 N**	**5.2 N**	- -	- -	- -	- -	- -	- -	- -	- -
Heptane, 2,6-Dimethyl-	--	--	--	- -	- -	- -	**2.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptane, 2-Methyl-	--	--	--	- -	- -	- -	**5.9 N**	**6.3 N**	- -	**3.5 N**	- -	- -	- -	- -	- -	- -
Heptane, 3,3,4-Trimethyl-	--	--	--	- -	- -	**92 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Heptane, 3,3'-[oxybis(Methylene)]b	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**11 N**	- -	- -
Heptane, 3,4,5-Trimethyl-	--	--	--	- -	- -	- -	- -	**9.8 N**	- -	- -	- -	- -	- -	**18 N**	**3.0 N**	- -
Heptane, 3-Ethyl-	--	--	--	- -	- -	- -	**7.9 N**	- -	**22 N**	- -	- -	**14 N**	- -	**36 N**	**6.9 N**	- -
Heptane, 3-Ethyl-2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**13 N**	- -	**4.9 N**	- -	- -	- -	- -
Heptane, 3-Ethyl-5-Methylene-	--	--	--	- -	- -	- -	**23 N**	- -	- -	- -	**86 N**	**32 N**	- -	**98 N**	**27 N**	- -
Heptane, 3-Methyl-	--	--	--	- -	- -	- -	**9.8 N**	- -	- -	- -	- -	**2.9 N**	- -	- -	- -	- -
Heptane, 3-Methylene-	--	--	--	- -	- -	- -	- -	- -	- -	**11 N**	**19 N**	**14 N**	- -	**51 N**	**4.5 N**	- -
Heptane, 4,4-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**25 N**	- -	- -
Heptane, 4-Methyl-	--	--	--	- -	- -	- -	**3.0 N**	- -	- -	- -	**55 N**	- -	- -	- -	- -	- -
Heptane, 4-Propyl-	--	--	--	- -	- -	- -	**2.8 N**	- -	- -	- -	- -	- -	- -	- -	**2.6 N**	- -
Heptanoic Acid, 3,5,5-Triethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -
Hexadecane	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**8.5 N**	- -	- -
Hexane, 1,1,1,2,2,3,3,4,4,5,5,6,6-	--	--	--	**5.7 N**	**8.0 N**	- -	- -	- -	- -	- -	- -	- -	**9.0 N**	- -	- -	**17 N**
Hexane, 2,2,5,5-Tetramethyl-	--	--	--	- -	- -	- -	- -	**3.2 N**	- -	**9.5 N**	- -	- -	- -	- -	- -	- -
Hexane, 2,2,-Trimethyl-(isomer)	--	--	--	- -	- -	- -	**3.2 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hexane, 2,4-Dimethyl-	--	--	--	- -	- -	- -	**8.1 N**	**8.0 N**	- -	**7.0 N**	- -	- -	- -	- -	- -	- -
Hexane, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**3.0 N**	- -	- -	- -	- -
Hexane, 2-Methyl-4-Methylene-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**5.7 N**	- -
Hexane, 3,3-Dimethyl-	--	--	--	- -	- -	- -	**4.7 N**	**5.0 N**	- -	- -	- -	**3.5 N**	- -	- -	- -	- -
Hexane, 3-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**14 N**	- -
Hexane, 3-Methyl-	--	--	--	- -	- -	- -	**13 N**	**13 N**	- -	**5.4 N**	**13 N**	- -	- -	- -	- -	- -

Table 7-5. Analytical Results for Well Headspace Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	MW-01	MW-02	MW-03	MW-19	MW-19	MW-21	MW-31	MW-33	MW-34	MW-35	PZ-01	PZ-03	PZ-04
			Sample ID:	WAT-MW01-060818	WAT-MW02-060818	WAT-MW03-053118	WAT-MW19-060718	DUP-MW-060718	WAT-MW21-060718	WAT-MW31-060718	WAT-MW33-060118	WAT-MW34-053018	WAT-MW35-060818	WAT-PZ01-053018	WAT-PZ03-060618	WAT-PZ04-060818
			Sample Date:	6/8/2018	6/8/2018	5/31/2018	6/7/2018	6/7/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	6/8/2018	5/30/2018	6/6/2018	6/8/2018
Analyte	**CAS#**	**Screening Level**	**Source**													
Hexane, 3-Methyl-4-Methylene-	--	--	--	- -	- -	- -	**14 N**	- -	- -	**17 N**	- -	**10 N**	- -	**47 N**	- -	- -
Hydrogen Sulfide	--	--	--	- -	- -	- -	**32 N**	**1700 N**	**160 N**	**1900 N**	- -	- -	- -	**110 N**	- -	- -
Hydroxylamine, o-Decyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**7.8 N**	- -	- -
Isobutane	--	--	--	- -	- -	- -	**150 N**	**140 N**	**62 N**	**320 N**	**790 N**	**120 N**	- -	**560 N**	**20 N**	- -
Isopropylcyclobutane	--	--	--	- -	- -	- -	**4.4 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Limonene	--	--	--	- -	- -	- -	**4.4 N**	**3.4 N**	- -	- -	**17 N**	- -	- -	- -	- -	- -
Methane, Trifluoro-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.8 N**	- -	- -	**12 N**
Methanethiol (Methyl Mercaptan)	74-93-1	--	--	- -	- -	**2700 N**	- -	**17 N**	- -	**8.8 N**	**140 N**	**5.2 N**	- -	- -	- -	- -
Methyl Alcohol	--	--	--	- -	- -	- -	- -	- -	- -	**15 N**	- -	- -	- -	- -	- -	- -
Naphthalene, Decahydro-, trans-	--	--	--	- -	- -	- -	- -	- -	**15 N**	- -	- -	- -	- -	- -	- -	- -
n-Butyl Ether	--	--	--	- -	- -	**22000 N**	- -	- -	- -	**13 N**	- -	- -	- -	- -	- -	- -
Nonadecane	--	--	--	- -	- -	- -	- -	- -	- -	- -	**19 N**	- -	- -	- -	- -	- -
Nonane	71-55-6	--	--	- -	- -	- -	- -	- -	**16 N**	- -	- -	**5.8 N**	- -	**12 N**	- -	- -
Nonane, 2,8-Dimethyl-4-Methylene-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**9.4 N**	- -	- -
Nonane, 2-bromo-5-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**27 N**	- -	- -	- -	- -	- -
Nonane, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	- -	- -	- -
Nonane, 3,7-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**22 N**	- -	- -	- -	- -
Nonane, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	**9.9 N**	- -	- -	- -	- -	- -	- -	- -
Nonane, 3-Methylene-	--	--	--	- -	- -	- -	- -	- -	**5.3 N**	- -	- -	- -	- -	**58 N**	- -	- -
Nonane, 4,5-Dimethyl-	--	--	--	- -	- -	- -	- -	**8.8 N**	- -	- -	- -	- -	- -	- -	- -	- -
Nonane, 4-Methylene-	--	--	--	- -	- -	- -	- -	- -	**4.1 N**	- -	- -	- -	- -	- -	- -	- -
Nonane, 5-Methyl-5-Propyl-	--	--	--	- -	- -	- -	- -	- -	**33 N**	- -	**25 N**	- -	- -	**36 N**	- -	- -
Octadecane	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**31 N**	- -
Octanal, 7-Hydroxy-3,7-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**47 N**	- -	- -	- -	- -	- -
Octane, 1,1'-oxybis-	--	--	--	- -	- -	- -	- -	- -	**28 N**	- -	- -	- -	- -	- -	- -	- -
Octane, 2,3,3-Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**14 N**	- -
Octane, 2,6-Dimethyl-	--	--	--	- -	- -	- -	- -	**6.4 N**	**6.0 N**	- -	- -	- -	- -	- -	- -	- -
Octane, 2-Methyl-	--	--	--	- -	- -	- -	- -	**3.7 N**	- -	- -	- -	- -	- -	- -	- -	- -
Octane, 3-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**7.2 N**	- -	- -
Octane, 6-Ethyl-2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**3.0 N**	- -	- -	- -	- -	- -	- -
Oxirane, (1-Methylbutyl)-	--	--	--	- -	- -	- -	- -	- -	- -	**4.4 N**	- -	- -	- -	- -	- -	- -
Pentacosane	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**11 N**	- -
Pentadecane	--	--	--	- -	- -	- -	- -	- -	- -	**3.3 N**	- -	- -	- -	- -	- -	- -
Pentadecane, 2,6,10,14-Tetramethyl	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**29 N**	- -	- -
Pentafluoroethane	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**2.8 N**	- -	- -	- -
Pentanal, 2,2-Dimethyl-, Hydrazone	--	--	--	- -	- -	**600 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane	109-66-0	--	--	- -	- -	- -	**31 N**	**30 N**	**24 N**	**15 N**	**390 N**	- -	- -	**28 N**	**9.2 N**	**6.2 N**
Pentane, 1,1'-oxybis-	--	--	--	- -	- -	**5800 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 1-bromo-3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**9.6 N**	- -	- -
Pentane, 2,2,4-Trimethyl-	--	--	--	- -	- -	- -	**5.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 2,2'-[Ethylidenebis(oxy)]	--	--	--	- -	- -	**16000 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 2,2'-oxybis-	--	--	--	- -	- -	**1100 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 2,3,3,4-Tetramethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**6.1 N**	- -	- -	- -	**15 N**	- -	- -
Pentane, 2,3-Dimethyl-	--	--	--	- -	- -	- -	**8.8 N**	**8.4 N**	- -	**4.6 N**	- -	- -	- -	- -	- -	- -
Pentane, 2,4-Dimethyl-	--	--	--	- -	- -	- -	**11 N**	**11 N**	- -	- -	- -	- -	- -	- -	- -	- -
Pentane, 2-bromo-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**290 N**	- -	- -	- -	- -	- -
Pentane, 2-Methyl-	--	--	--	- -	- -	**960 N**	**49 N**	**47 N**	**11 N**	**33 N**	- -	**39 N**	- -	**33 N**	**9.5 N**	- -
Pentane, 3,3-Diethyl-	--	--	--	- -	- -	- -	**14 N**	- -	**8.0 N**	**29 N**	**26 N**	**24 N**	- -	**55 N**	**21 N**	- -
Pentane, 3,3-Dimethyl-	--	--	--	- -	- -	- -	- -	**6.5 N**	- -	**3.1 N**	- -	- -	- -	- -	- -	- -
Pentane, 3-Ethyl-3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	**12 N**	- -	- -	- -	- -	- -	- -
Pentane, 3-Methyl-	--	--	--	- -	- -	- -	**21 N**	**20 N**	**5.4 N**	**13 N**	- -	- -	- -	- -	**5.1 N**	- -
Pentane, 3-Methylene-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**46 N**	**6.5 N**	- -
Propanal, 2,2-Dimethyl-	--	--	--	- -	**4.3 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Propane	--	--	--	- -	- -	- -	- -	- -	**260 N**	- -	- -	**340 N**	**20 N**	- -	- -	**16 N**
Propane, 1-(1,1-Dimethylethoxy)-2-	--	--	--	- -	- -	- -	**10 N**	- -	- -	- -	- -	**18 N**	- -	**44 N**	- -	- -
Propane, 2-(Methylthio)-	--	--	--	- -	- -	**92 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Propane, 2,2'-[Methylenebis(oxy)]b	--	--	--	- -	- -	- -	- -	- -	- -	**18 N**	- -	- -	- -	- -	- -	- -
Propane, 2,2-Dimethyl-	--	--	--	- -	- -	- -	**52 N**	**32 N**	- -	**32 N**	- -	**71 N**	- -	**380 N**	- -	- -
Propanoic Acid, 2-Methyl-, 1-Methy	--	--	--	- -	- -	**2300 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Propanoic Acid, 2-Methyl-, 3-Methy	--	--	--	- -	- -	**5200 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Propanoyl chloride, 2,2-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	- -
Pyrrolidine	--	--	--	- -	- -	**840 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Silane, Dichlorodimethyl-	--	--	--	- -	**5.3 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Silane, Tetramethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**4.9 N**	- -	- -	- -	- -	- -	- -
Silanol, Trimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**13 N**
Silanol, Trimethyl-, Propanoate	--	--	--	- -	**2.6 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sulfurous Acid, bis(2-Methylpropyl	--	--	--	- -	- -	- -	- -	- -	- -	- -	**29 N**	- -	- -	- -	- -	- -
Tetracontane, 3,5,24-Trimethyl-	--	--	--	- -	- -	- -	- -	**9.0 N**	**20 N**	**3.3 N**	- -	- -	- -	- -	- -	- -
Tetradecane, 1-Chloro-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**30 N**	- -	- -	- -	- -	- -

Table 7-5. Analytical Results for Well Headspace Gas Samples, May and June 2018

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

			Location:	MW-01	MW-02	MW-03	MW-19	MW-19	MW-21	MW-31	MW-33	MW-34	MW-35	PZ-01	PZ-03	PZ-04
			Sample ID:	WAT-MW01-060818	WAT-MW02-060818	WAT-MW03-053118	WAT-MW19-060718	DUP-MW-060718	WAT-MW21-060718	WAT-MW31-060718	WAT-MW33-060118	WAT-MW34-053018	WAT-MW35-060818	WAT-PZ01-053018	WAT-PZ03-060618	WAT-PZ04-060818
			Sample Date:	6/8/2018	6/8/2018	5/31/2018	6/7/2018	6/7/2018	6/7/2018	6/7/2018	6/1/2018	5/30/2018	6/8/2018	5/30/2018	6/6/2018	6/8/2018
Analyte	**CAS#**	**Screening Level**	**Source**													
Tetradecane, 6,9-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**9.3 N**	- -	- -
Thiophene	--	--	--	- -	- -	- -	- -	- -	- -	- -	**11 N**	- -	- -	- -	**4.2 N**	- -
Thiophene, 2,3-Dimethyl-	--	--	--	- -	- -	**56 N**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Thiophene, 2,5-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	**15 N**	- -	- -	- -	- -	- -
Thiophene, 2-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**11 N**	- -
Thiophene, 3-Methyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**6.1 N**	- -
trans-1-Butyl-2-Methylcyclopropane	--	--	--	- -	- -	- -	- -	- -	**48 N**	- -	- -	- -	- -	- -	- -	- -
trans-2,3-Dimethylthiophane	--	--	--	- -	- -	**130 N**	- -	- -	- -	- -	**38 N**	- -	- -	- -	- -	- -
trans-3-Decene	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**9.6 N**	- -	**16 N**	- -	- -
Tridecane	--	--	--	- -	- -	- -	- -	**11 N**	- -	- -	- -	- -	- -	**52 N**	- -	- -
Tridecane, 1-iodo-	--	--	--	- -	- -	- -	- -	**8.2 N**	- -	- -	- -	- -	- -	- -	- -	- -
Tridecane, 6-Methyl-	--	--	--	- -	- -	- -	**3.2 N**	- -	- -	- -	- -	- -	- -	**13 N**	- -	- -
Undecane	--	--	--	- -	- -	- -	- -	- -	**8.9 N**	- -	- -	**5.0 N**	- -	**9.7 N**	- -	- -
Undecane, ,-Dimethyl-(isomer)	--	--	--	- -	- -	- -	- -	**3.3 N**	- -	- -	- -	- -	- -	- -	- -	- -
Undecane, 2,4-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	**6.3 N**	- -	- -	- -	- -	- -	- -	- -
Undecane, 3,8-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**12 N**	- -	**30 N**	- -	- -
Undecane, 3-Methylene-	--	--	--	- -	- -	- -	- -	- -	- -	**5.6 N**	- -	**18 N**	- -	**16 N**	- -	- -
Undecane, 4,4-Dimethyl-	--	--	--	- -	- -	- -	- -	**3.7 N**	- -	- -	- -	- -	- -	- -	- -	- -
Undecane, 5,6-Dimethyl-	--	--	--	- -	- -	- -	- -	- -	- -	**4.1 N**	- -	- -	- -	- -	- -	- -
Undecane, 5-Ethyl-	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**3.4 N**	- -	- -	- -	- -
Undecane, 6-Methyl-	--	--	--	- -	- -	- -	- -	**5.4 N**	- -	- -	- -	- -	- -	- -	- -	- -
Alkane: Branched (Unknown) 1	--	--	--	- -	- -	- -	**22 N**	**4.2 N**	- -	- -	**62 N**	**28 N**	- -	**9.8 N**	**15 N**	- -
Alkane: Branched (Unknown) 2	--	--	--	- -	- -	- -	**13 N**	- -	- -	- -	- -	**17 N**	- -	**8.9 N**	**6.3 N**	- -
Alkane: Branched (Unknown) 3	--	--	--	- -	- -	- -	**6.8 N**	- -	- -	- -	- -	**8.2 N**	- -	- -	- -	- -
Alkane: Branched (Unknown) 4	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	**3.7 N**	- -	- -	- -	- -
Alkane: Straight-Chain (Unknown) 1	--	--	--	- -	- -	- -	- -	**5.8 N**	**17 N**	**13 N**	- -	- -	- -	**8.4 N**	**2.9 N**	- -
Unknown 1	--	--	--	**70 N**	**87 N**	**180 N**	**46 N**	- -	- -	- -	- -	- -	**79 N**	- -	**890 N**	**110 N**
Unknown 2	--	--	--	**20 N**	**2.5 N**	**81 N**	**4.8 N**	- -	- -	- -	- -	- -	**58 N**	- -	**16 N**	**33 N**
Unknown 3	--	--	--	**4.0 N**	- -	- -	- -	- -	- -	- -	- -	- -	**9.6 N**	- -	**5.8 N**	**7.9 N**
Unknown 4	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	**5.4 N**	- -	**4.3 N**	**6.9 N**
Unknown 5	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**4.2 N**	**6.8 N**
Unknown 6	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**6.1 N**
Unknown 7	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**5.9 N**
Unknown 8	--	--	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**3.6 N**

Notes:

Notes:

ACGIH TLV = American Conference of Governmental Industrial Hygienists
Threshold Limit Value

LEL = Screening level based on the LEL (lower explosive limit) of 5% methane by volume.

VISL = VOC criteria for a commercial exposure scenario were calculated using the Vapor Intrusion Screening Level (VISL) Calculator Version 3.5.1 (EPA, 2016) (May 2016 Regional Screening Levels) for subslab concentrations with a 10-5 target cancer risk, a hazard quotient of 1, and the default 0.03 attenuation factor.

Bold indicates the analyte was detected

Shading indicates the result exceeded screening criteria

- - = Not analyzed

-- = Not available

% = percent

J = The analyte was positively identified; the associated numerical value is the approximate concentration.

N = There is presumptive evidence of the analyte (tentatively identified compound).

ppbv = parts per billion by volume

TIC = tentatively identified compound

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

ug/m3 = micrograms per cubic meter

Table 8-1a

Groundwater Sampling Results for General Chemistry

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

		Location:	MW-01	MW-02		MW-03	MW-19	MW-21	MW-33	MW-34	MW-35	PZ-01	PZ-03	PZ-04		PZ-07R	SV-05	SV-12
		Sample ID:	MW01-061218	MW02-061218	DUP-GW-061218	MW03-060518	MW19-061118	MW21-061218	MW33-060518	MW34-060718	MW35-060518	PZ01-060418	PZ03-060618	PZ04-061118	DUP-GW-061118	PZ07R-060818	SV05-060518	SV12-060418
		Sample Date:	06/12/2018	06/12/2018	06/12/2018	06/05/2018	06/11/2018	06/12/2018	06/05/2018	06/07/2018	06/05/2018	06/04/2018	06/06/2018	06/11/2018	06/11/2018	06/08/2018	06/05/2018	06/04/2018
Analyte	**CAS#**	**TOGS 1.1.1 GA***																
Wet Chemistry (ug/l)																		
Alkalinity, Total	ALK	--	**241,000**	**645,000**	**640,000**	**2,100,000**	- -	**12,700,000**	**1,210,000**	**466,000**	**328,000**	**495,000**	**415,000**	**1,070,000**	- -	**443,000**	- -	- -
Ammonia	7664-41-7	--	**640**	**148**	**147**	**113,000**	- -	**11,600**	**31,800**	**226**	**165**	**710**	**438**	**5,540**	- -	**4,640**	- -	- -
Chloride	16887-00-6	250,000	**618,000**	**478,000**	**433,000**	**681,000**	- -	**336,000**	**816,000**	**59,700**	**502,000**	**158,000**	**543,000**	**408,000**	- -	**1,120,000**	**762,000**	**130,000**
Nitrate	14797-55-8	--	**76 J**	**51 J**	**55 J**	**54 J**	- -	330 U	**59 J**	**91 J**	**47 J**	33 U	33 U	33 U	- -	**44 J**	- -	- -
Nitrogen, Total Kjeldahl	KN	--	**864**	**3,630**	**4,480**	**111,000**	- -	**31,200**	**32,700**	**395**	**332**	**878**	**665**	**6,450**	- -	**6,610**	- -	- -
Orthophosphate	PORTHO	--	**4 J**	**413**	**413**	**233 J**	- -	**15,500**	**431 J**	**2 J**	**2 J**	**1 J**	**3 J**	**461 J**	- -	**31**	- -	- -
Phosphorus, Total	7723-14-0	--	**168**	**401**	**401**	**340**	- -	**19,500**	**445**	**58**	**8 J**	**117**	**45**	**295 J**	- -	**597**	- -	- -
Sulfate	14808-79-8	250,000	**85,500**	**907,000**	**899,000**	**42,000**	- -	**803,000**	**235,000 J**	**128,000**	**192,000**	**73,900**	**209,000**	**1,030,000**	- -	**158,000**	**2,600**	**220,000**
Sulfite	14265-45-3	--	100 U	**170,000**	**160,000**	**770,000**	100 U	**200,000**	**240,000**	100 U	100 U	100 U	100 U	**310,000**	**310,000**	100 U	- -	- -
Sulfide	18496-25-8	50	**170 J**	**17,000 J**	**64,000 J**	**68,000**	- -	**47,000 J**	**66,000**	**3,600**	100 U	**210**	**180 J**	**64,000 J**	- -	**9,300 J**	**33,000**	**8,200**
Sulfur, Total	63705-05-5	--	**31,800**	**340,000**	**346,000**	**230,000**	**25,800**	**392,000 J**	**143,000**	**40,400**	**53,400**	**24,800**	**61,800**	**377,000**	**383,000**	**56,500**	**47,900**	**73,000**
Total Dissolved Solids	TDS	--	**1,400,000**	**2,700,000**	**2,700,000**	**3,200,000**	- -	**18,000,000**	**3,000,000**	**750,000**	**1,400,000**	**890,000**	**1,400,000 J**	**3,200,000**	- -	**1,900,000**	- -	- -
Total Organic Carbon	TOC	--	**6,850**	**11,400**	**11,500**	**158,000**	- -	**67,500**	**32,300**	**1,210**	**690**	**2,050**	**1,370**	**12,000**	- -	**3,560**	- -	- -

Notes:

* - Technical & Operational Guidance Series (TOGS) 1.1.1, New York State Ambient Water Quality Standards and Guidance Values, and Ground Water Effluent Limitations (Class GA). June 1998; modified January 1999; modified April 2000; modified June 2004.

Bold indicates the analyte was detected

Shading indicates the result exceeded screening criteria

- - = Not analyzed

-- = Not available

CAS = Chemical Abstracts Service

J = The analyte was positively identified; the associated numerical value is the approximate concentration.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

ug/l = micrograms per liter

Table 8-1b

Groundwater Sampling Results for Metals

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

		Location:	MW-01	MW-02		MW-03	MW-19	MW-21	MW-33	MW-34	MW-35	PZ-01	PZ-03	PZ-04	PZ-07R
		Sample ID:	MW01-061218	MW02-061218	DUP-GW-061218	MW03-060518	MW19-061118	MW21-061218	MW33-060518	MW34-060718	MW35-060518	PZ01-060418	PZ03-060618	PZ04-061118	PZ07R-060818
		Sample Date:	06/12/2018	06/12/2018	06/12/2018	06/05/2018	06/11/2018	06/12/2018	06/05/2018	06/07/2018	06/05/2018	06/04/2018	06/06/2018	06/11/2018	06/08/2018
Analyte	**CAS#**	**TOGS 1.1.1 GA***													
Metals (ug/l)															
Aluminum	7429-90-5	--	**10.7**	**9.65 J**	**10.5**	**6,480**	**89.5**	**1,330**	**38.4**	**465**	**54.8**	**678**	**26.6**	**61.8**	**10.3**
Arsenic	7440-38-2	25	**12.43**	**0.70**	**0.68**	**217.3**	**5.44**	**3,106**	**18.68**	**12.97**	**8.37**	**19.37**	**36.68**	**0.69**	**6.25**
Calcium	7440-70-2	--	**100,000**	**172,000**	**164,000**	**303,000**	**153,000**	**6,820**	**337,000**	**73,300**	**169,000**	**104,000**	**144,000**	**75,300**	**146,000 J**
Chromium	7440-47-3	50	**1.33**	**3.54**	**3.35**	**48.58**	- -	- -	**219.9**	**0.98 J**	- -	**1.78**	**0.48 J**	**3.21**	**1.99**
Iron	7439-89-6	300	**2,610**	**204**	**196**	**2,840**	**2,840**	**788**	**41.8 J**	**1,550**	**1,370**	**5,380**	**2,460**	**141**	**6,230**
Magnesium	7439-95-4	35,000	**15,400**	**19,600**	**18,600**	**110,000**	**43,200**	**4,330**	**73,000**	**67,600**	**72,000**	**70,300**	**79,900**	**20,700**	**25,700**
Manganese	7439-96-5	300	**147.4**	**35.57**	**33.70**	**435.4**	**902.8**	**37.22**	**528.4**	**30.03**	**182.9**	**109.7**	**126.8**	**12.12**	**218.4**
Potassium	7440-09-7	--	**4,420**	**7,520**	**7,210**	**75,500**	**856**	**4,120**	**25,500**	**2,550**	**4,080**	**3,350**	**4,230**	**10,200**	**11,400**
Silica	7631-86-9	--	**10,000**	**37,400**	**35,600**	**35,500**	- -	**18,200**	**29,800**	**27,600**	**19,400**	**26,500**	**26,100**	**62,100**	**20,200**
Sodium	7440-23-5	20,000	**371,000**	**705,000**	**654,000**	**432,000**	**109,000**	**6,980,000**	**653,000**	**62,600**	**164,000**	**68,500**	**218,000**	**963,000**	**587,000**
Metals, Dissolved (ug/l) **															
Aluminum, Dissolved	7429-90-5	--	3.27 U	**6.62 J**	**7.92 J**	**36.1**	3.27 U	**1,220**	**38.9**	**6.36 J**	3.27 U	3.27 U	**3.37 J**	**6.72 J**	**4.38 J**
Arsenic, Dissolved	7440-38-2	25	**9.25**	**0.56**	**0.53**	**292.5**	**5.30**	**2,418**	**20.14**	**4.92**	**8.32**	**15.71**	**33.80**	**0.49 J**	**5.33**
Chromium, Dissolved	7440-47-3	50	**1.16**	**4.06**	**4.09**	**38.43**	- -	- -	**237.4**	**0.35 J**	- -	0.17 U	**0.18 J**	**3.47**	**1.67**
Iron, Dissolved	7439-89-6	300	**1,750**	**92.8**	**89.4**	**24.1 J**	**2,760**	**1,060 J**	**48.2 J**	**844**	**1,180**	**2,230**	**2,020**	**55.1**	**4,380**
Manganese, Dissolved	7439-96-5	300	**159.8**	**38.43**	**37.53**	**410.1**	**914.9**	**114.4**	**511.7**	**15.85**	**185.9**	**29.66**	**103.1**	**11.58**	**183.0**

Notes:

* - Technical & Operational Guidance Series (TOGS) 1.1.1, New York State Ambient Water Quality Standards and Guidance Values, and Ground Water Effluent Limitations (Class GA). June 1998; modified January 1999; modified April 2000; modified June 2004.

** - The TOGS Class GA Standards for total metals were used as screening criteria for dissolved metals

Bold indicates the analyte was detected

Shading indicates the result exceeded screening criteria

- - = Not analyzed

-- = Not available

CAS = Chemical Abstracts Service

J = The analyte was positively identified; the associated numerical value is the approximate concentration.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

ug/l = micrograms per liter

Table 8-1c

Groundwater Sampling Results for Volatile Organic Compounds

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

		Location:	MW-01	MW-02		MW-03	MW-19	MW-33	MW-34	PZ-01	PZ-03	PZ-04	PZ-07R	SV-05	SV-12
		Sample ID:	MW01-061218	MW02-061218	DUP-GW-061218	MW03-060518	MW19-061118	MW33-060518	MW34-060718	PZ01-060418	PZ03-060618	PZ04-061118	PZ07R-060818	SV05-060518	SV12-060418
		Sample Date	06/12/2018	06/12/2018	06/12/2018	06/05/2018	06/11/2018	06/05/2018	06/07/2018	06/04/2018	06/06/2018	06/11/2018	06/08/2018	06/05/2018	06/04/2018
Analyte	**CAS#**	**TOGS 1.1.1 GA***													
VOC (ug/l)															
1,1,1,2-Tetrachloroethane	630-20-6	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 UJ	0.70 U	0.70 U	0.70 U	0.70 U	0.70 UJ
1,1,1-Trichloroethane	71-55-6	5	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,1,2,2-Tetrachloroethane	79-34-5	5	0.17 U	0.17 U	0.17 U	4.2 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
1,1,2-Trichloroethane	79-00-5	1	0.50 U	0.50 U	0.50 U	12 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	75-34-3	5	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,1-Dichloroethene	75-35-4	5	0.17 U	0.17 U	0.17 U	4.2 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
1,1-Dichloropropene	563-58-6	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,2,3-Trichlorobenzene	87-61-6	--	0.70 U	0.70 U	0.70 U	18 UJ	0.70 U	0.70 U	0.70 U	0.70 UJ	0.70 U	0.70 U	0.70 U	0.70 U	0.70 UJ
1,2,3-Trichloropropane	96-18-4	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,2,4-Trichlorobenzene	120-82-1	5	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,2,4-Trimethylbenzene	95-63-6	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,2-Dibromo-3-chloropropane	96-12-8	--	0.70 UJ	0.70 UJ	0.70 UJ	18 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ
1,2-Dibromoethane	106-93-4	--	0.65 U	0.65 U	0.65 U	16 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
1,2-Dichlorobenzene	95-50-1	3	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,2-Dichloroethane	107-06-2	0.6	0.13 U	0.13 U	0.13 U	3.3 U	0.13 U	0.13 U	0.13 U	0.13 U	**2.6**	0.13 U	0.13 U	0.13 U	0.13 U
1,2-Dichloroethene, cis-	156-59-2	5	0.70 U	0.70 U	0.70 U	18 U	**8.1**	**2.2 J**	0.70 U	**2.5**	0.70 U	0.70 U	0.70 U	**1.3 J**	0.70 U
1,2-Dichloroethene, trans-	156-60-5	5	0.70 U	0.70 U	0.70 U	18 U	**8.5**	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,2-Dichloroethene, Total	540-59-0	--	0.70 U	0.70 U	0.70 U	18 U	**17**	**2.2 J**	0.70 U	**2.5**	0.70 U	0.70 U	0.70 U	**1.3 J**	0.70 U
1,2-Dichloropropane	78-87-5	1	**0.16 J**	0.14 U	0.14 U	3.4 U	0.14 U	**1.0**	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	**1.3**	0.14 U
1,3,5-Trimethylbenzene	108-67-8	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,3-Dichlorobenzene	541-73-1	3	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,3-Dichloropropane	142-28-9	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,3-Dichloropropene, cis-	10061-01-5	0.4	0.14 UJ	0.14 UJ	0.14 UJ	3.6 UJ	0.14 UJ	0.14 UJ	0.14 UJ	0.14 UJ	0.14 UJ	0.14 UJ	0.14 UJ	0.14 UJ	0.14 UJ
1,3-Dichloropropene, trans-	10061-02-6	0.4	0.16 U	0.16 U	0.16 U	4.1 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
1,3-Dichloropropene, Total	542-75-6	--	0.14 U	0.14 U	0.14 U	3.6 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
1,4-Dichlorobenzene	106-46-7	3	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
2-Butanone	78-93-3	50	1.9 UJ	1.9 UJ	1.9 UJ	**48 J**	1.9 UJ	**2.5 J**	1.9 UJ	1.9 UJ	1.9 UJ	1.9 UJ	1.9 UJ	**4.4 J**	1.9 UJ
2-Hexanone	591-78-6	50	1.0 UJ	1.0 UJ	1.0 UJ	25 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	**3.2 J**	1.0 UJ
4-Methyl-2-Pentanone (MIBK)	108-10-1	50 **	1.0 UJ	1.0 UJ	1.0 UJ	**1,200 J**	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	**3.4 J**
1,4-Dioxane	123-91-1	--	61 R	61 R	61 R	1,500 R	61 R	61 R	61 R	61 R	61 R	61 R	61 R	61 R	61 R
2,2-Dichloropropane	594-20-7	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
2-Chlorotoluene	95-49-8	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
4-Chlorotoluene	106-43-4	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Acetone	67-64-1	50	1.5 U	1.5 U	1.5 U	36 U	1.5 U	14 U	1.5 U	1.5 U	1.5 U	1.5 U	1.6 U	5.5 U	1.5 U
Benzene	71-43-2	1	0.16 U	0.16 U	0.16 U	4.0 U	0.16 U	**2.7**	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	**0.32 J**	**0.23 J**
Bromochloromethane	74-97-5	--	0.70 UJ	0.70 UJ	0.70 UJ	18 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ
Bromodichloromethane	75-27-4	50	0.19 UJ	0.19 UJ	0.19 UJ	4.8 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ
Bromoform	75-25-2	50	0.65 U	0.65 U	0.65 U	16 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
Bromobenzene	108-86-1	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Bromomethane	74-83-9	5	0.70 U	0.70 U	0.70 U	18 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ
Butylbenzene, n-	104-51-8	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Butylbenzene, sec-	135-98-8	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Butylbenzene, t-	98-06-6	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Carbon Disulfide	75-15-0	60	1.0 U	**26**	**28**	25 U	1.0 U	**5.2**	1.0 U	1.0 U	1.0 U	**6.0 J**	1.0 U	**5.2**	**1.4 J**
Carbon Tetrachloride	56-23-5	5	0.13 U	0.13 U	0.13 U	3.4 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
Chlorobenzene	108-90-7	5	0.70 U	0.70 U	0.70 U	18 U	0.70 U	**2.0 J**	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	**4.5**
Chloroethane	75-00-3	5	0.70 UJ	0.70 UJ	0.70 UJ	18 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ	0.70 UJ
Chloroform	67-66-3	7	0.70 U	0.70 U	0.70 U	18 U	0.70 U	**0.98 J**	0.70 U	0.70 U	0.70 U	**1.9 J**	0.70 U	0.70 U	0.70 U
Chloromethane	74-87-3	5	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Dibromochloromethane	124-48-1	50	0.15 U	0.15 U	0.15 U	3.7 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
Dibromomethane	74-95-3	--	1.0 UJ	1.0 UJ	1.0 UJ	25 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ
Dichlorodifluoromethane	75-71-8	--	1.0 U	1.0 U	1.0 U	25 U	**62**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	100-41-4	5	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U

Table 8-1c

Groundwater Sampling Results for Volatile Organic Compounds

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

		Location:	MW-01	MW-02		MW-03	MW-19	MW-33	MW-34	PZ-01	PZ-03	PZ-04	PZ-07R	SV-05	SV-12
		Sample ID:	MW01-061218	MW02-061218	DUP-GW-061218	MW03-060518	MW19-061118	MW33-060518	MW34-060718	PZ01-060418	PZ03-060618	PZ04-061118	PZ07R-060818	SV05-060518	SV12-060418
		Sample Date	06/12/2018	06/12/2018	06/12/2018	06/05/2018	06/11/2018	06/05/2018	06/07/2018	06/04/2018	06/06/2018	06/11/2018	06/08/2018	06/05/2018	06/04/2018
Analyte	**CAS#**	**TOGS 1.1.1 GA***													
Hexachlorobutadiene	87-68-3	0.5	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Isopropylbenzene	98-82-8	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Isopropyltoluene, p-	99-87-6	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Methylene Chloride	75-09-2	5	0.70 U	0.70 U	0.70 U	18 U	0.70 U	**1.3 J**	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Naphthalene	91-20-3	10	0.70 U	0.70 U	0.70 U	18 UJ	0.70 UJ	**1.8 J**	0.70 UJ	0.70 UJ	0.70 U	0.70 UJ	0.70 UJ	0.70 U	0.90 UJ
Propylbenzene, n-	103-65-1	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Styrene	100-42-5	5	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
tert-Butyl Methyl Ether	1634-04-4	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Tetrachloroethene	127-18-4	5	0.18 U	0.18 U	0.18 U	4.5 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Toluene	108-88-3	5	0.70 U	0.70 U	0.70 U	**48 J**	0.70 U	**9.3**	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	**4.8**	0.70 U
Trichloroethene	79-01-6	5	0.18 UJ	0.18 UJ	0.18 UJ	4.4 UJ	**1.2 J**	0.18 UJ	**0.22 J**	0.18 UJ	0.18 UJ	0.18 UJ	0.18 UJ	**0.18 J**	0.18 UJ
Trichlorofluoromethane	75-69-4	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Vinyl Acetate	108-05-4	--	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	75-01-4	2	0.07 U	0.07 U	0.07 U	1.8 U	1.2 U	**0.17 J**	0.07 U	**0.66 J**	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Xylene, m- and p-	179601-23-1	--	0.70 U	0.70 U	0.70 U	**18 J**	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Xylene, o-	95-47-6	--	0.70 U	0.70 U	0.70 U	18 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
Xylene, Total	1330-20-7	--	0.70 U	0.70 U	0.70 U	**18 J**	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
VOC TICs (ug/l)															
2-Heptanone, 4,6-Dimethyl-	19549-80-5	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**6.21 J**	- -
2-Pentanone, 3-Methyl-	565-61-7	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**18.1 J**	- -
3-Pentanone, 2-Methyl-	565-69-5	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**22.9 J**	- -
4-Heptanone, 2-Methyl-	626-33-5	--	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	**11.1 J**	- -
4-Methyl-2-Pentanethiol	1639-05-0	--	- -	- -	- -	- -	- -	**35.0 J**	- -	- -	- -	- -	- -	**64.1 J**	- -
4-Methyl-2-Pentanone (MIBK)	108-10-1	50	- -	- -	- -	- -	- -	**8.12 J**	- -	- -	- -	- -	- -	- -	- -
Benzenethiol	108-98-5	--	- -	- -	- -	- -	- -	**4.32 J**	- -	- -	- -	- -	- -	- -	- -
Isopropyl Ether	108-20-3	--	- -	- -	- -	- -	- -	- -	- -	**3.02 J**	- -	- -	- -	- -	- -
Isopropyl Mercaptan	75-33-2	--	- -	- -	- -	**814 J**	- -	- -	- -	- -	- -	- -	- -	**8.12 J**	- -
Methanethiol	74-93-1	--	- -	- -	- -	- -	- -	**3.93 J**	- -	- -	- -	- -	- -	- -	- -
Sulfur Dioxide	7446-09-5	--	- -	- -	- -	- -	- -	- -	- -	- -	**1.40 J**	- -	- -	- -	- -
Unknown With Highest Concentration	UNKNOWN1	--	**9.22 J**	**51.3 J**	**52.5 J**	**916 J**	**3.04 J**	**18.2 J**	- -	**5.46 J**	- -	**13.1 J**	**8.32 J**	**7.45 J**	**11.0 J**
Unknown With Second Highest Concentration	UNKNOWN2	--	- -	**26.2 J**	**28.0 J**	**906 J**	- -	**16.5 J**	- -	- -	- -	**12.5 J**	**1.32 J**	**6.94 J**	**8.03 J**
Unknown With Third Highest Concentration	UNKNOWN3	--	- -	**13.6 J**	**14.2 J**	**372 J**	- -	**6.72 J**	- -	- -	- -	**8.31 J**	- -	**5.00 J**	**2.21 J**
Unknown With Fourth Highest Concentration	UNKNOWN4	--	- -	**9.93 J**	**10.6 J**	**176 J**	- -	**6.51 J**	- -	- -	- -	**6.17 J**	- -	**4.41 J**	**1.81 J**
Unknown With Fifth Highest Concentration	UNKNOWN5	--	- -	**8.26 J**	**8.91 J**	**136 J**	- -	**5.40 J**	- -	- -	- -	**2.98 J**	- -	- -	**1.62 J**
Unknown With Sixth Highest Concentration	UNKNOWN6	--	- -	**7.69 J**	**7.99 J**	**132 J**	- -	**4.66 J**	- -	- -	- -	**2.39 J**	- -	- -	**1.07 J**
Unknown With Seventh Highest Concentration	UNKNOWN7	--	- -	**4.97 J**	**7.15 J**	**126 J**	- -	- -	- -	- -	- -	**2.00 J**	- -	- -	- -
Unknown With Eighth Highest Concentration	UNKNOWN8	--	- -	**3.74 J**	**5.06 J**	**86.5 J**	- -	- -	- -	- -	- -	**1.15 J**	- -	- -	- -
Unknown With Ninth Highest Concentration	UNKNOWN9	--	- -	**3.50 J**	**4.19 J**	**69.2 J**	- -	- -	- -	- -	- -	**1.01 J**	- -	- -	- -
Unknown With Tenth Highest Concentration	UNKNOWN10	--	- -	**2.73 J**	**3.37 J**	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Total Unknown VOCs	TOTAL VOC TICS	--	**9.22 J**	**132 J**	**142 J**	**3,730 J**	**3.04 J**	**109 J**	- -	**8.48 J**	**1.40 J**	**49.6 J**	**9.64 J**	**154 J**	**25.7 J**

Notes:

* - Technical & Operational Guidance Series (TOGS) 1.1.1, New York State Ambient Water Quality Standards and Guidance Values, and Ground Water Effluent Limitations (Class GA). June 1998; modified January 1999; modified April 2000; modified June 2004.

** - There is no TOGS Class GA Standard for MIBK. Per the NYSDEC (2005), the New York State Department of Health (NYSDOH) guidance value for MIBK

Bold indicates the analyte was detected

Shading indicates the result exceeded screening criteria

- - = Not analyzed

-- = Not available

CAS = Chemical Abstracts Service

J = The analyte was positively identified; the associated numerical value is the approximate concentration.

MIBK = Methyl Isobutyl Ketone

Table 8-1c

Groundwater Sampling Results for Volatile Organic Compounds

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

		Location:	MW-01	MW-02		MW-03	MW-19	MW-33	MW-34	PZ-01	PZ-03	PZ-04	PZ-07R	SV-05	SV-12
		Sample ID:	MW01-061218	MW02-061218	DUP-GW-061218	MW03-060518	MW19-061118	MW33-060518	MW34-060718	PZ01-060418	PZ03-060618	PZ04-061118	PZ07R-060818	SV05-060518	SV12-060418
		Sample Date	06/12/2018	06/12/2018	06/12/2018	06/05/2018	06/11/2018	06/05/2018	06/07/2018	06/04/2018	06/06/2018	06/11/2018	06/08/2018	06/05/2018	06/04/2018
Analyte	**CAS#**	**TOGS 1.1.1 GA***													

R = The analyte result was rejected due to quality control issues.
TIC = Tentatively Identified Compound
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
ug/l = micrograms per liter
VOC = Volatile Organic Compound

Table 8-1d

Groundwater Sampling Results for Semivolatile Organic Compounds

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

		Location:	MW-19
		Sample ID:	MW19-061118
		Sample Date:	06/11/2018
Analyte	**CAS#**	**TOGS 1.1.1 GA***	
SVOC (ug/l)			
1,1'-Biphenyl	92-52-4	--	0.46 U
1,2,4,5-Tetrachlorobenzene	95-94-3	--	0.44 U
1,2,4-Trichlorobenzene	120-82-1	5	0.50 U
1,2-Dichlorobenzene	95-50-1	3	0.45 U
1,3-Dichlorobenzene	541-73-1	3	0.40 U
1,4-Dichlorobenzene	106-46-7	3	0.43 U
2,4,5-Trichlorophenol	95-95-4	--	0.77 U
2,4,6-Trichlorophenol	88-06-2	--	0.61 U
2,4-Dichlorophenol	120-83-2	5	0.41 U
2,4-Dimethylphenol	105-67-9	50	1.8 U
2,4-Dinitrophenol	51-28-5	1	6.6 U
2,4-Dinitrotoluene	121-14-2	5	1.2 U
2,6-Dinitrotoluene	606-20-2	5	0.93 U
2-Chlorophenol	95-57-8	--	0.48 U
2-Nitroaniline	88-74-4	5	0.50 U
2-Nitrophenol	88-75-5	--	0.85 U
3,3'-Dichlorobenzidine	91-94-1	5	1.6 U
3-Nitroaniline	99-09-2	5	0.81 U
4,6-Dinitro-2-Methylphenol	534-52-1	--	1.8 U
4-Bromophenyl Phenyl Ether	101-55-3	--	0.38 U
4-Chloro-3-Methylphenol	59-50-7	--	0.35 U
4-Chloroaniline	106-47-8	5	1.1 U
4-Chlorophenyl Phenyl Ether	7005-72-3	--	0.49 U
4-Nitroaniline	100-01-6	--	0.80 U
4-Nitrophenol	100-02-7	--	0.67 U
Acetophenone	98-86-2	--	0.53 U
Benzoic Acid	65-85-0	--	2.6 U
Benzyl Alcohol	100-51-6	--	0.59 U
Bis (2-Chloroethoxy) Methane	111-91-1	5	0.50 U
Bis (2-Chloroethyl) Ether	111-44-4	1	0.50 U
Bis(2-Chloroisopropyl) Ether	108-60-1	--	0.53 U
Bis (2-Ethylhexyl) Phthalate	117-81-7	5	**2.9 J**
Butyl Benzyl Phthalate	85-68-7	50	1.2 U
Carbazole	86-74-8	--	0.49 U
Dibenzofuran	132-64-9	--	0.50 U
Diethylphthalate	84-66-2	50	**1.4 J**
Dimethylphthalate	131-11-3	50	1.8 U
Di-n-Butylphthalate	84-74-2	50	0.39 U
Di-n-Octylphthalate	117-84-0	50	1.3 U
Hexachlorocyclopentadiene	77-47-4	5	0.69 U
Isophorone	78-59-1	50	1.2 U
Methylphenol, 2-	95-48-7	--	0.49 U
Methylphenol, 3- and 4-	65794-96-9	--	0.48 U
Nitrobenzene	98-95-3	0.4	0.77 U
Nitrosodi-n-propylamine, n-	621-64-7	--	0.64 U
Nitrosodiphenylamine, n-	86-30-6	50	0.42 U
Phenol	108-95-2	1	0.57 U
SVOC TICs (ug/l)			
Aldol Condensates	UNKNOWN15	--	**8.94 J**
Total Unknown SVOCs	ADR-01-001	--	**8.94 J**
Low-Level SVOC (ug/l)			
2-Chloronaphthalene	91-58-7	10	0.02 U
2-Methylnaphthalene	91-57-6	--	0.02 U

Table 8-1d

Groundwater Sampling Results for Semivolatile Organic Compounds

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

		Location:	MW-19
		Sample ID:	MW19-061118
		Sample Date:	06/11/2018
Analyte	**CAS#**	**TOGS 1.1.1 GA***	
Acenaphthene	83-32-9	20	**0.06 J**
Acenaphthylene	208-96-8	--	0.01 U
Anthracene	120-12-7	50	0.01 U
Benzo(a)anthracene	56-55-3	0.002	0.02 U
Benzo(a)pyrene	50-32-8	0.002	0.02 U
Benzo(b)fluoranthene	205-99-2	0.002	0.01 U
Benzo(g,h,i)perylene	191-24-2	--	0.01 U
Benzo(k)fluoranthene	207-08-9	0.002	0.01 U
Chrysene	218-01-9	0.002	0.01 U
Dibenzo(a,h)anthracene	53-70-3	--	0.01 U
Fluoranthene	206-44-0	50	**0.28**
Fluorene	86-73-7	50	0.01 U
Hexachlorobenzene	118-74-1	0.04	0.01 U
Hexachlorobutadiene	87-68-3	0.5	0.05 U
Hexachloroethane	67-72-1	5	0.06 U
Indeno(1,2,3-c,d)pyrene	193-39-5	0.002	0.01 U
Naphthalene	91-20-3	10	0.05 U
Pentachlorophenol	87-86-5	1	0.01 UJ
Phenanthrene	85-01-8	50	0.02 U
Pyrene	129-00-0	50	**0.21**

Notes:

* - Technical & Operational Guidance Series (TOGS) 1.1.1, New York State Ambient Water Quality Standards and Guidance Values, and Ground Water Effluent Limitations (Class GA). June 1998; modified January 1999; modified April 2000; modified June 2004.

Bold indicates the analyte was detected

-- = Not available

CAS = Chemical Abstracts Service

J = The analyte was positively identified; the associated numerical value is the approximate concentration.

SVOC = Semivolatile Organic Compound

TIC = Tentatively Identified Compound

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

ug/l = micrograms per liter

Table 10-1. Summary of Passive Radon Sampling Results

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Passive Radon Sampling Results							
Location	**Sample ID**	**Location Description**	**Date Deployed**	**Time Deployed**	**Date Collected**	**Time Collected**	**Radon (pCi/L)**
PR-01	190328	Middle of Tank Storage, 3ft high on ledge	6/8/2018	15:00	6/11/2018	11:25	0.4
PR-02	190335	North Building 9, 5ft high on pipe	6/8/2018	15:02	6/11/2018	11:45	0.1
PR-03	190334	South Building 9, podium 4ft high	6/8/2018	15:04	6/11/2018	11:47	0.2
PR-04	190332	Building 11A, south of oven, 5ft high	6/8/2018	15:06	6/11/2018	11:53	0.1
PR-05	190331	Building 11A, northeast of Building, 7 ft high on pipe	6/8/2018	15:08	6/11/2018	11:54	0.2
PR-06	190336	Building 4 near MW-33, 3ft high on pillar	6/8/2018	15:10	6/11/2018	12:00	0.1
PR-07	190337	Building 4, west side center, 3ft high on scaffold	6/8/2018	15:12	6/11/2018	12:02	0.1
PR-08	190333	Building 4 southwest on pillar, 5ft high	6/8/2018	15:14	6/11/2018	12:10	0.2
PR-09	190329	Building 4 east side, pillar 5ft high	6/8/2018	15:16	6/11/2018	12:13	0.1
PR-10	190330	Building 4 northeast on pillar 4ft high	6/8/2018	15:18	6/11/2018	12:16	0.1
PR-11	190327	Building 4 southeast 4 ft high on pipe	6/8/2018	15:20	6/11/2018	12:21	0.1
PR-12	190326	Building 4 north mezzanine	6/8/2018	15:22	6/11/2018	12:23	0.03
PR-13	190316	Building 4 south mezzanine	6/8/2018	15:24	6/11/2018	12:29	0.1
PR-14	190323	Building 4A 3 ft high on ledge	6/8/2018	15:26	6/11/2018	12:33	0.2
PR-15	190317	Building 3 south, on pipe 4 ft high	6/8/2018	15:28	6/11/2018	12:38	0.1
PR-16	190322	Building 3 inside control room, on shelf 6ft high	6/8/2018	15:30	6/11/2018	12:40	0.1
PR-17	190320	Outside, northeast. Near MW-19	6/8/2018	15:32	6/11/2018	12:47	0.1
PR-18	190325	Outside southeast of Tank Storage 4ft high	6/8/2018	15:34	6/11/2018	11:37	0.1
PR-19	190318	Duplicate at PR-16	6/8/2018	15:30	6/11/2018	12:40	0.1
PR-20	190324	Duplicate at PR-01	6/8/2018	15:00	6/11/2018	11:25	0.3

Notes

ft - feet

pi/L - picocuries per liter

Table 10-2. Historical Site-Specific Attenuation Factors Based on VOCs, 2008 to 2013

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Table 10-2a. November 2008 Sampling Event (CH2M 2010)

Building	**Analyte**	**Indoor Air, Subslab Samples**	**Indoor Air Concentration (μg/m^3)**	**Subslab Vapor Concentration (μg/m^3)**	**Indoor Air/Subslab Ratio**
Building 3	Chloroform	IA-4 ,SG-5	0.16	690	2.3E-04
		IA-4 ,SG-5A	0.16	270	5.9E-04
	Carbon disulfide	IA-4 ,SG-6	1.8	1200	1.5E-03
Building 4	Chloroform	IA-5, SG-7A	0.15	1300	1.2E-04
	Carbon disulfide		2.2	1600	1.4E-03
	Toluene		1.8	280	6.4E-03
	m,p-xylene		1.5	310	4.8E-03
Tank Storage Room (Building 5A)	Chloroform	IA-7, SG-9	0.42	390	1.1E-03
	TCE		0.095	482	2.0E-04
				Site-Specific Attenuation Factor:	**1.E-03**

Table 10-2b. March 2010 Sampling Event (CH2M 2011)

Building	**Analyte**	**Indoor Air, Subslab Samples**	**Indoor Air Concentration (μg/m^3)**	**Subslab Vapor Concentration (μg/m^3)**	**Indoor Air/Subslab Ratio**
Building 4	Carbon disulfide	IA-5/IA-6[1], SG-7A/Dup[2]	14	1000	1.4E-02
	Chloroform		4.3	190	2.3E-02
				Site-Specific Attenuation Factor:	**8.E-03**

Table 10-2c. February 2012 Sampling Event (CH2M 2013a)

Building	**Analyte**	**Indoor Air, Subslab Samples**	**Indoor Air Concentration (μg/m^3)**	**Subslab Vapor Concentration (μg/m^3)**	**Indoor Air/Subslab Ratio**
Building 4	Chloroform	IA-5/IA-6[3], SG-7R	0.28	16000	1.8E-05
	MIBK		120	59000	2.0E-03
	Styrene		0.57	3200	1.8E-04
Tank Storage Room (Building 5A)	Chloroform	IA-7, SG-9	0.42	380	1.1E-03
				Site-Specific Attenuation Factor:	**3.E-04**

Table 10-2d. November 2012 Sampling Event (CH2M 2013b)

Building	**Analyte**	**Indoor Air, Subslab Samples**	**Indoor Air Concentration (μg/m^3)**	**Subslab Vapor Concentration (μg/m^3)**	**Indoor Air/Subslab Ratio**
Building 4	Toluene	IA-5, SG-7A	0.57	330	7.3E-03
				Site-Specific Attenuation Factor	**7.E-03**

Notes

[1] Higher concentration between IA-5 and IA-6 was selected in the calculation.

[2] Higher concentration between SG-7 and its duplicate was selected in the calculation.

[3] Higher concentration between IA-5, IA-6, and IA-9 was selected in the calculation.

μg/m^3 - micrograms per cubic meter

MIBK - methyl isobutyl ketone

m,p-xylenes - meta- and para-xylenes

TCE - trichloroethene

VOC - volatile organic compound

Table 11-1. Results for Subslab Soil Vapor Samples Exceeding Screening Criteria in May and June 2018 Compared to Selected Previous Results

2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Analyte	Year [a]	Maximum Reported Concentration(s) (µg/m^3) [b]	Sampling Location	Building
Chloroform	2018	15,000	SV-15	Building 4
	2018	4,800	SV-04	Building 11A
	2018	1,100	SV-07	Building 4
	2018	370	SV-14	Building 3
	2017	7,300	SV-04	Building 11A
	2017	7,000	SV-15	Building 4
	2016	54,000	WAT-SG-7R	Building 4
	2012	18,000	WAT-SG-7R	Building 4
	2012	380	WAT-SG-9	Tank Storage Area
	2008	24,000	WAT-SG-7	Building 4
Ethylbenzene	2018	2,500	SV-15	Building 4
	2017	3,500	SV-15	Building 4
	2012	630	WAT-SG-7R	Building 4
Trichloroethylene	2018	510	SV-11	Building 12
	2017	420	SV-11	Building 12
	2017	260 J	SV-15	Building 4
	2016	60	WAT-SG-7R	Building 4
	2012	65	WAT-SG-9	Tank Storage Area
	2008	54	WAT-SG-7	Building 4
	2008	520	WAT-SG-9	Tank Storage Area
Xylene, m,p-	2018	28,000	SV-15	Building 4
	2017	47,000	SV-15	Building 4
	2012	2,600	WAT-SG-7R	Building 4
	2008	4,600	WAT-SG-7	Building 4

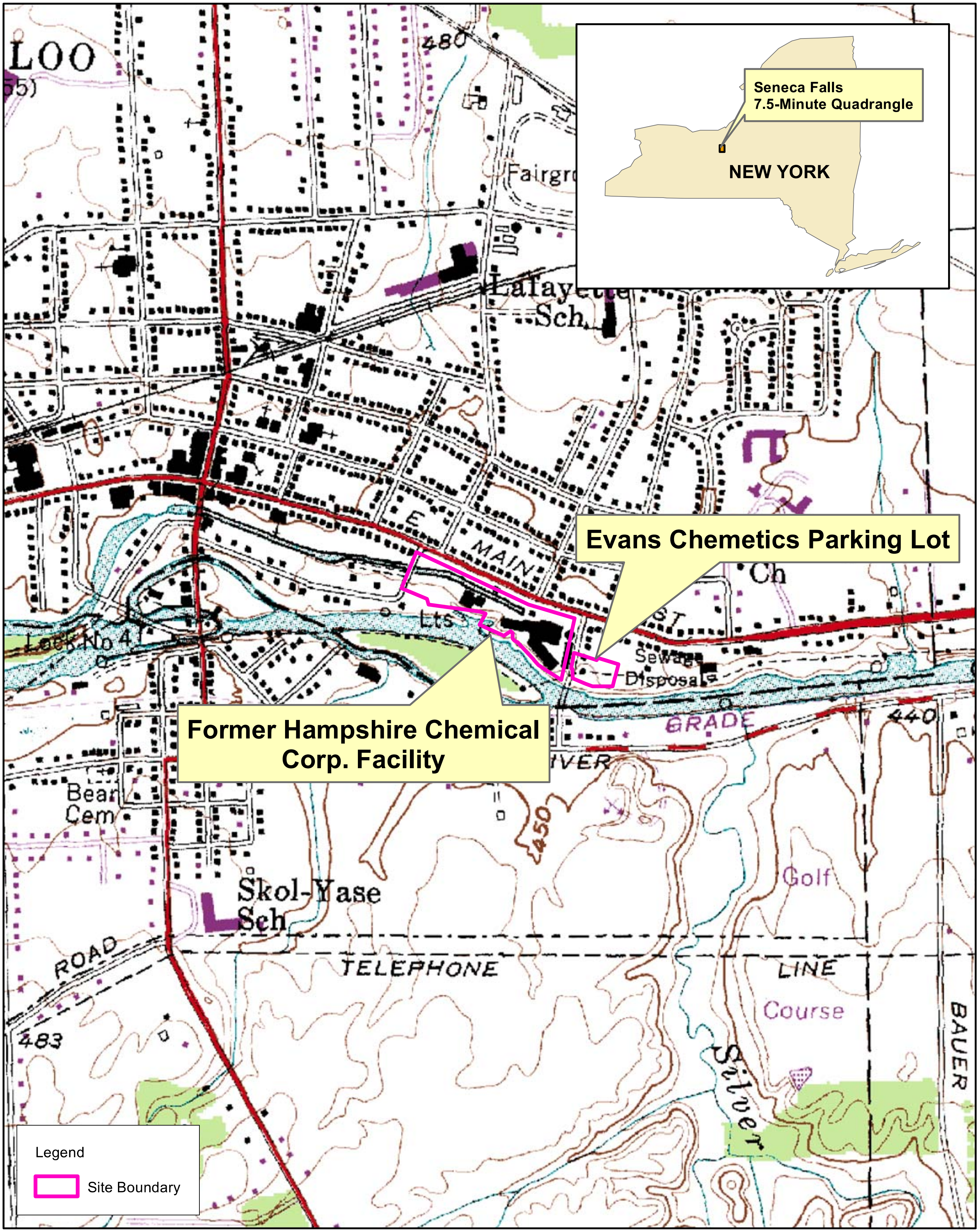
Notes:

[a] 2008, 2012, and 2016 soil vapor sampling results are presented in CH2M (2010), CH2M (2013b), and CH2M (2016), respectively.

[b] Reported concentrations of volatile organic compounds analyzed by Method TO-15.

µg/m^3 = milligrams per cubic meter

Figures



0 500 1,000

Feet

N

Seneca Falls, NY 1953 Photo Revised 1978

Figure 2-1

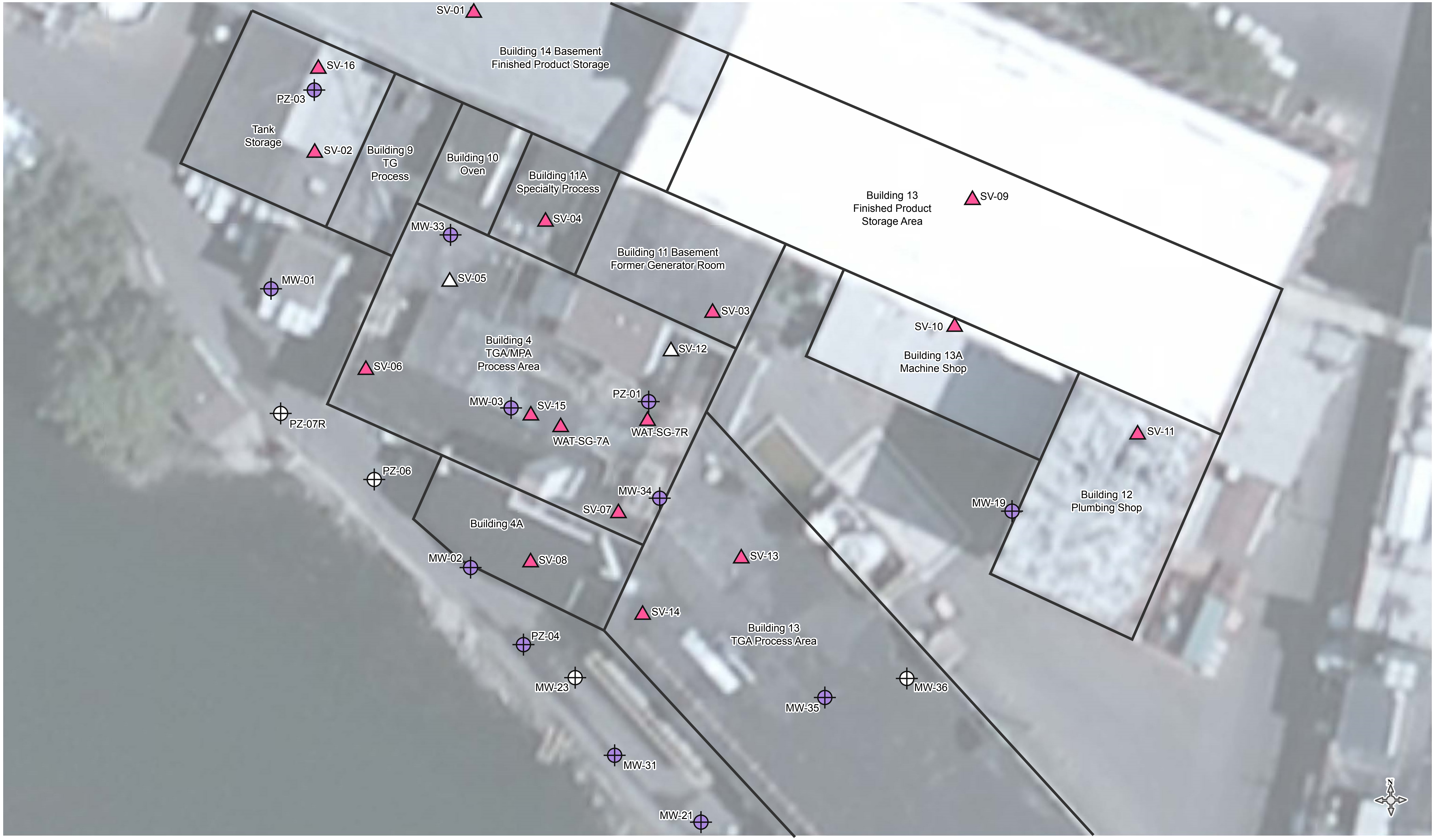
Facility Location Map

2018 Supplemental Building 4 Vapor Investigation

Former Hampshire Chemical Corporation

Waterloo, New York

JACOBS



LEGEND

▲ 2018 Subslab Vapor Sampling Locations

⊕ 2018 Monitoring Well Headspace Vapor Sampling Locations

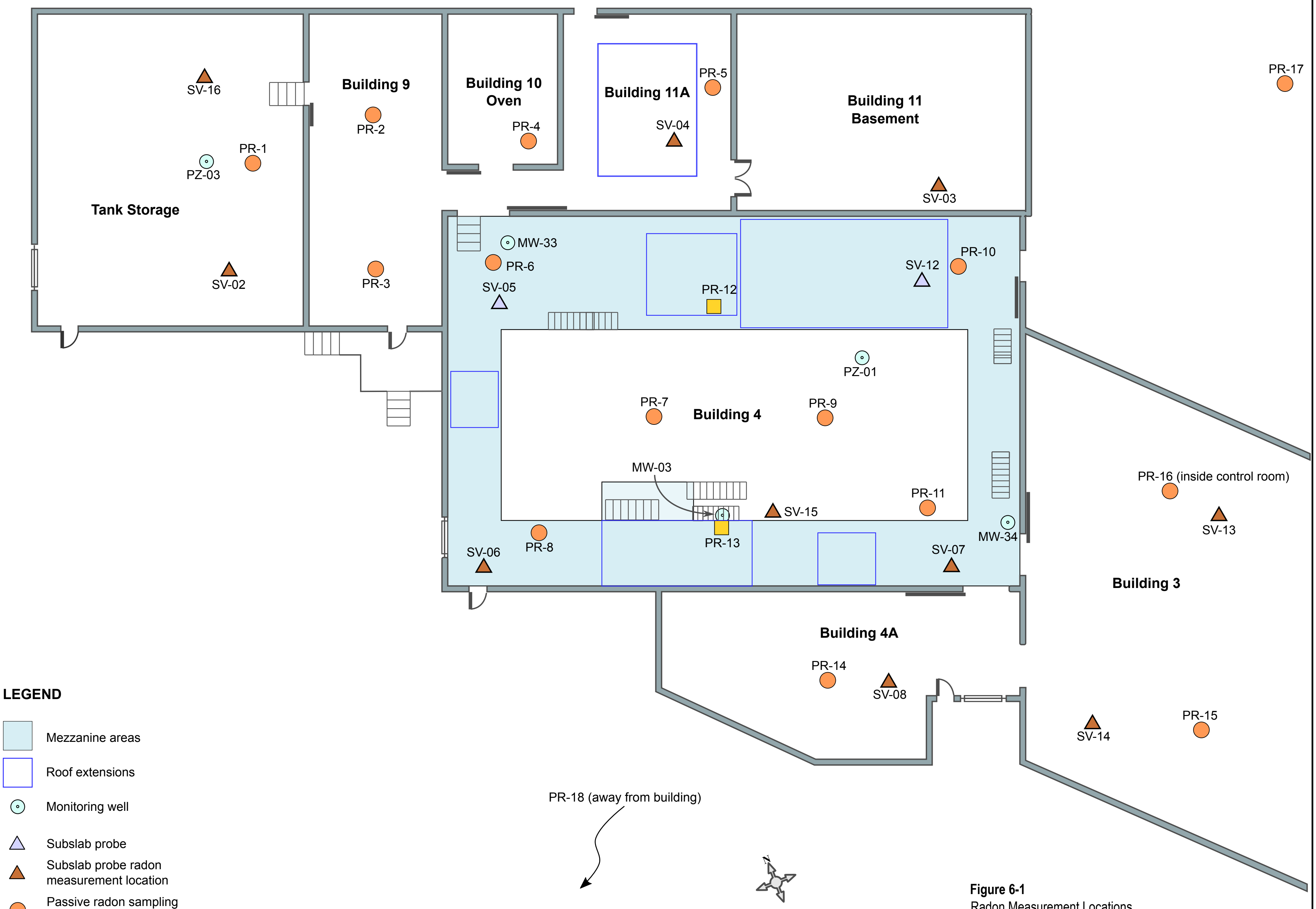
⊕ Monitoring Wells

Notes:
1. Subslab sampling locations are approximate.
2. Monitoring well vapor samples were collected from well headspaces.
3. SV-05 and SV-12 were not sampled in 2017 or 2018 because of high groundwater conditions.
4. WAT-SG-7A could not be located for sampling during 2018.
5. NS = not sampled
6. 2018 results are preliminary and have not been validated.

0 50 100
Approximate scale in feet

Figure 2-2
2018 Subslab and Headspace Vapor Sampling Locations
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York

JACOBS



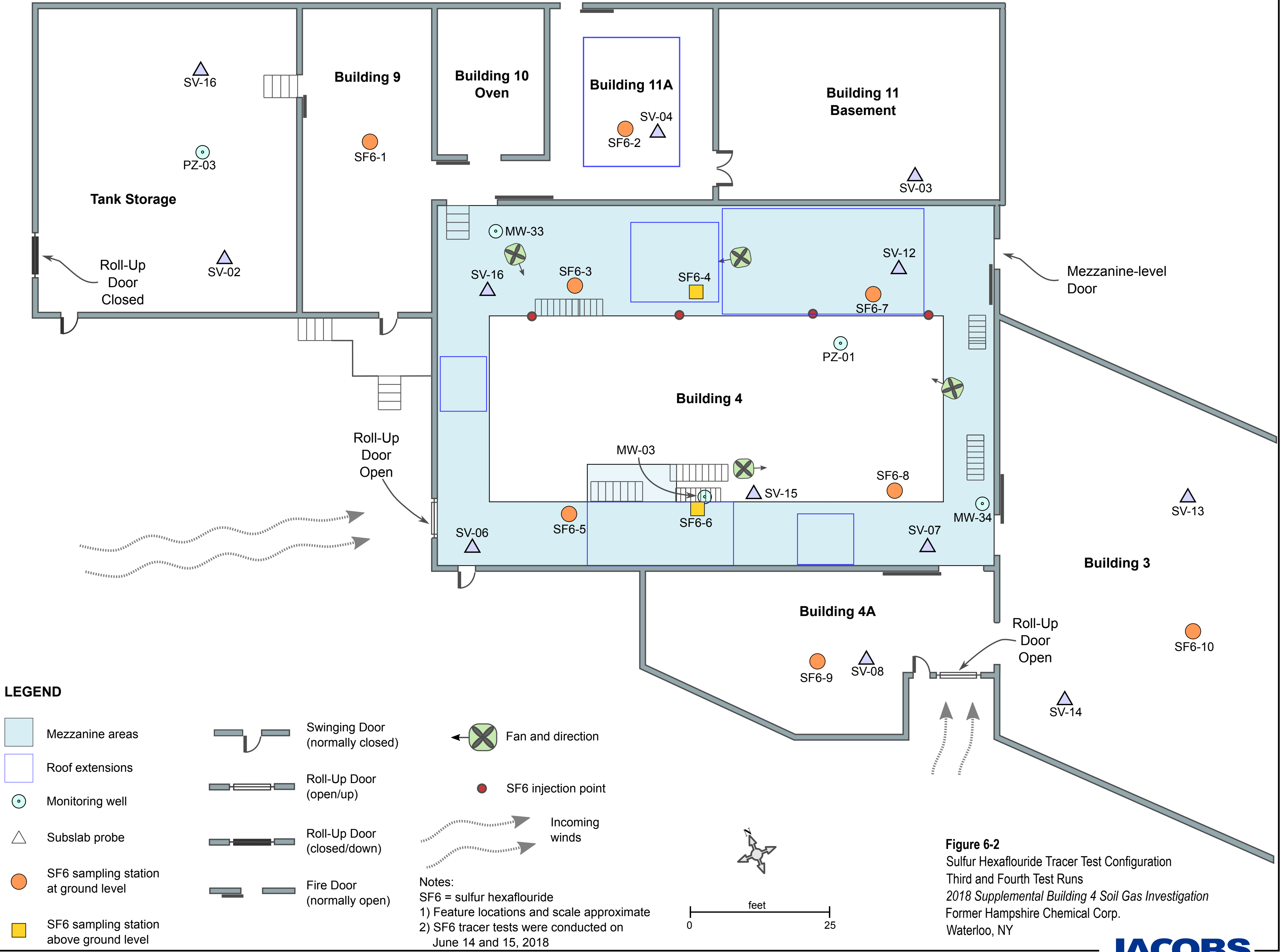
LEGEND

▢	Mezzanine areas
▢	Roof extensions
⊙	Monitoring well
△	Subslab probe
▲	Subslab probe radon measurement location
●	Passive radon sampling at ground level
■	Passive radon sampling above ground level

Notes:
1) Radon measurements not made at SV-05 and SV-12 due to high groundwater conditions.

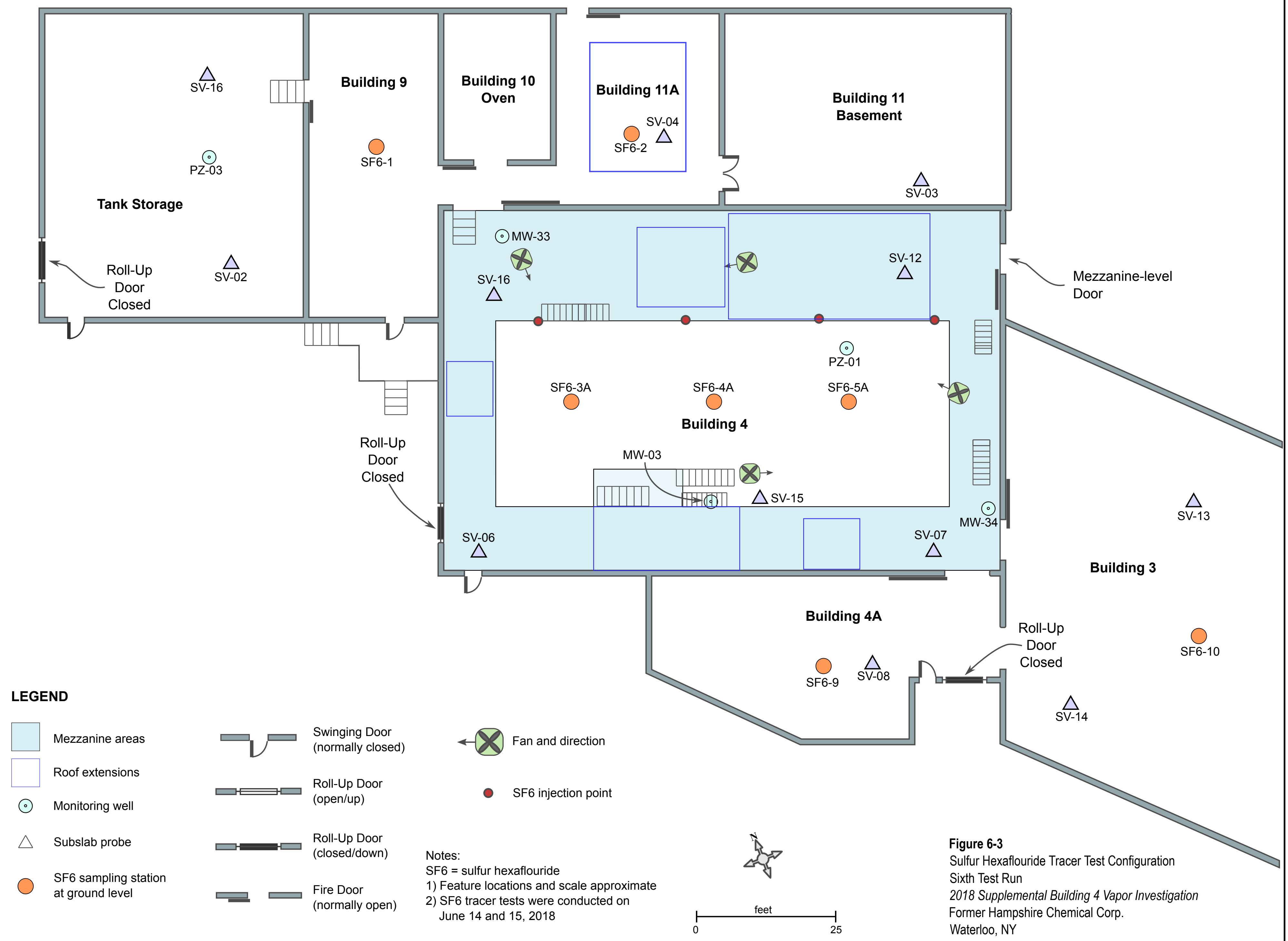
Figure 6-1
Radon Measurement Locations
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, NY

JACOBS



Notes:
SF6 = sulfur hexaflouride
1) Feature locations and scale approximate
2) SF6 tracer tests were conducted on June 14 and 15, 2018

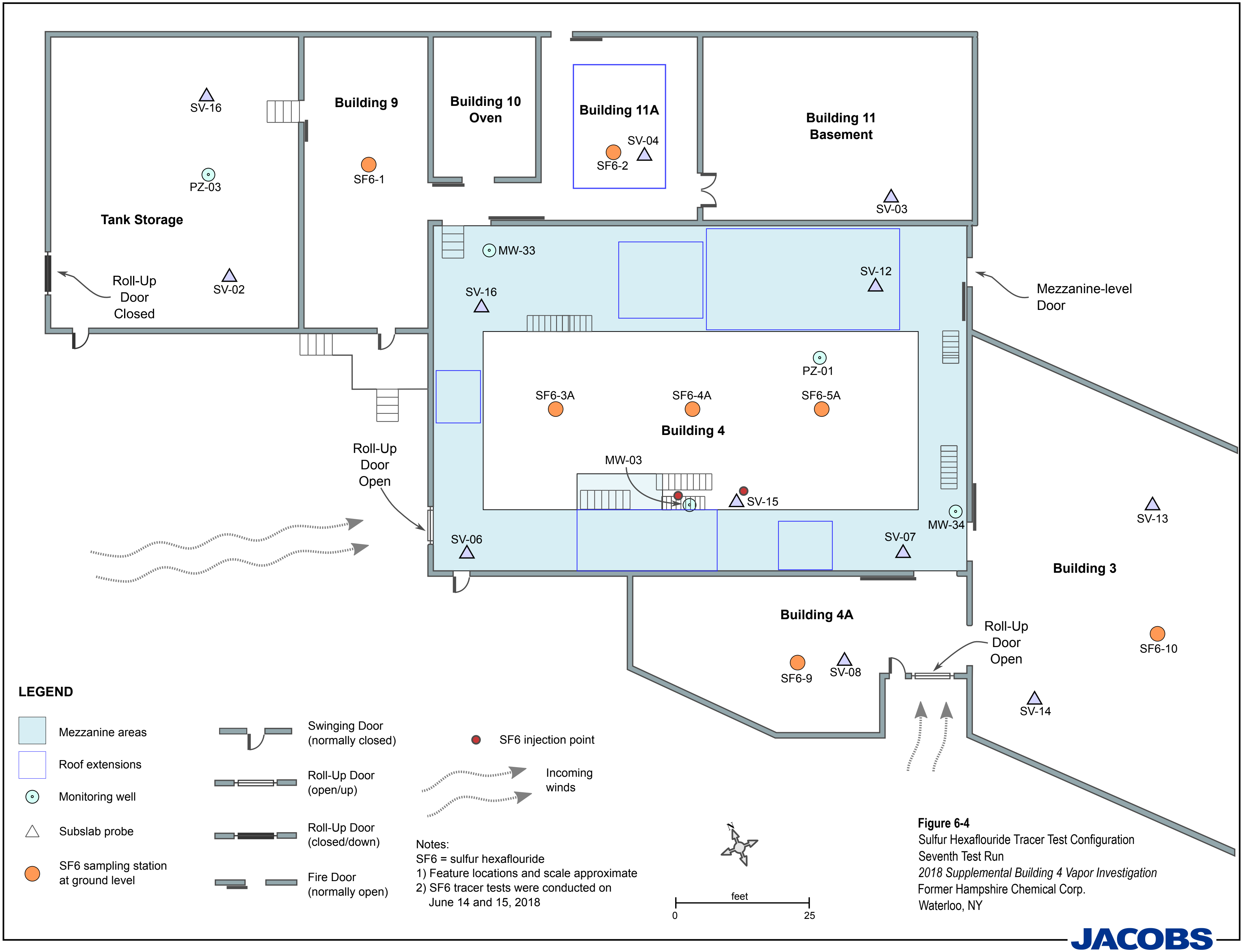
Figure 6-2
Sulfur Hexaflouride Tracer Test Configuration
Third and Fourth Test Runs
2018 Supplemental Building 4 Soil Gas Investigation
Former Hampshire Chemical Corp.
Waterloo, NY



Notes:
SF6 = sulfur hexaflouride
1) Feature locations and scale approximate
2) SF6 tracer tests were conducted on June 14 and 15, 2018

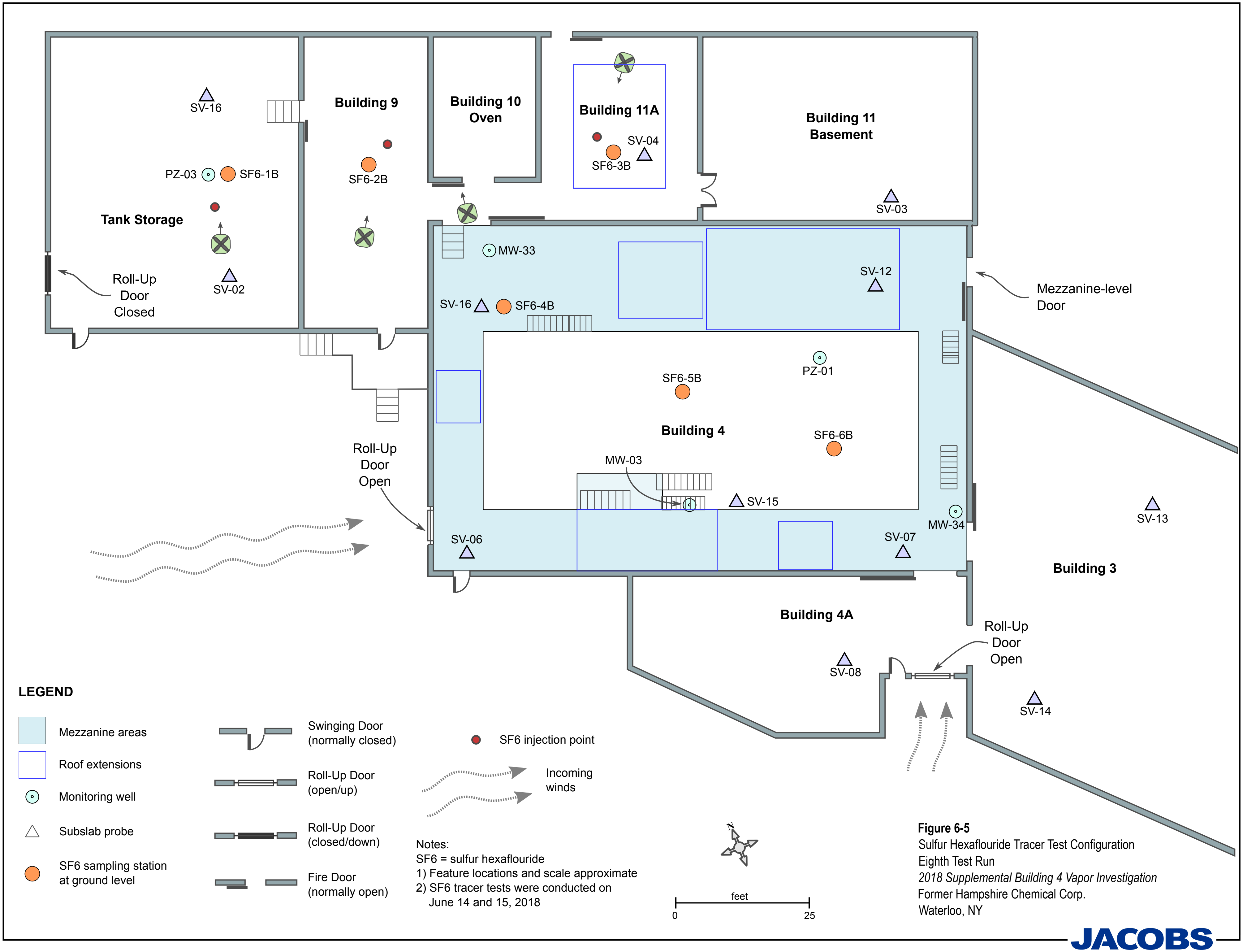
Figure 6-3
Sulfur Hexaflouride Tracer Test Configuration
Sixth Test Run
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, NY

JACOBS



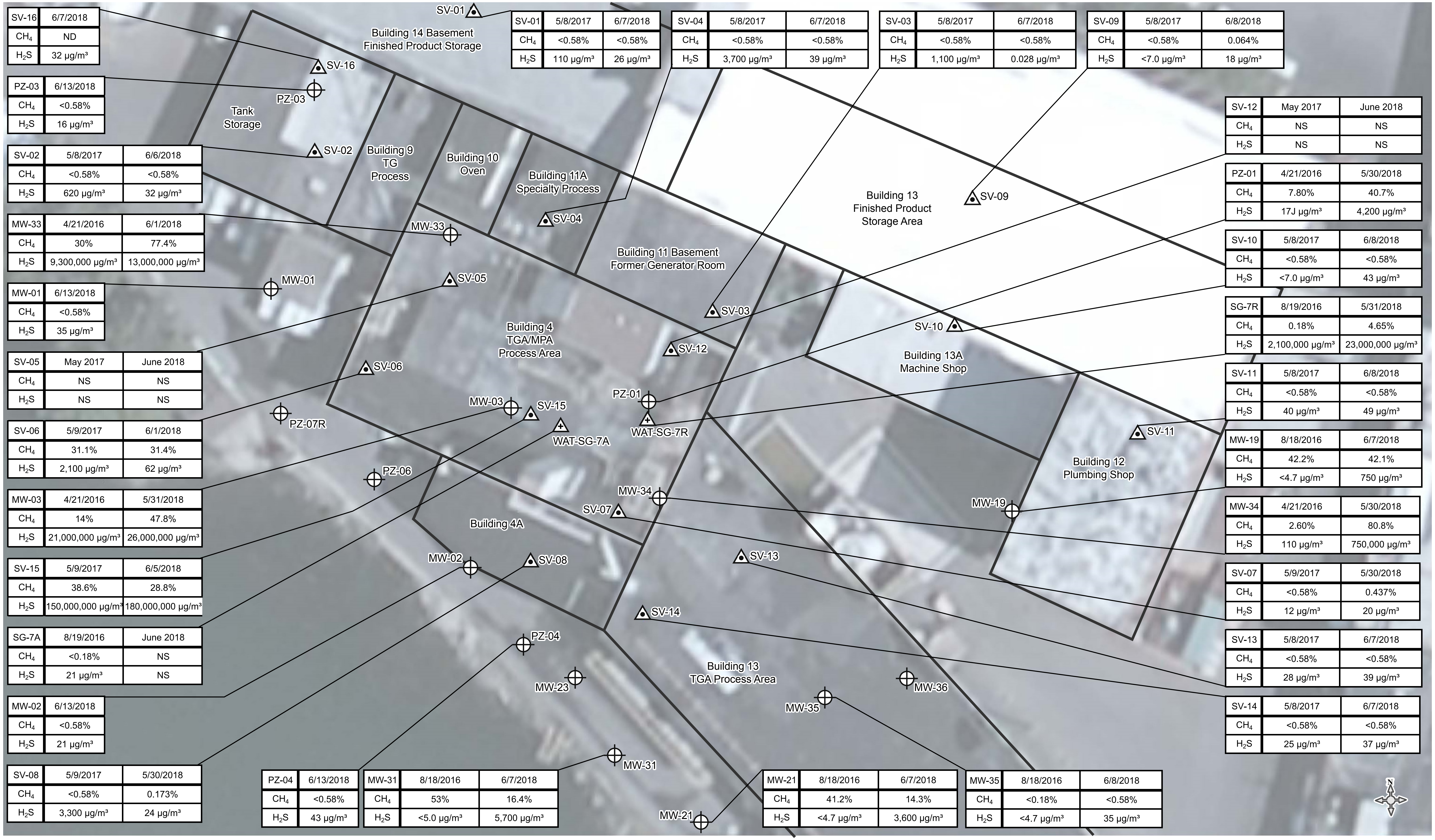
Notes:
SF6 = sulfur hexaflouride
1) Feature locations and scale approximate
2) SF6 tracer tests were conducted on
June 14 and 15, 2018

Figure 6-4
Sulfur Hexaflouride Tracer Test Configuration
Seventh Test Run
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, NY



Notes:
SF6 = sulfur hexaflouride
1) Feature locations and scale approximate
2) SF6 tracer tests were conducted on
June 14 and 15, 2018

Figure 6-5
Sulfur Hexaflouride Tracer Test Configuration
Eighth Test Run
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, NY



SV-16	6/7/2018
CH_4	ND
H_2S	32 µg/m^3

PZ-03	6/13/2018
CH_4	<0.58%
H_2S	16 µg/m^3

SV-02	5/8/2017	6/6/2018
CH_4	<0.58%	<0.58%
H_2S	620 µg/m^3	32 µg/m^3

MW-33	4/21/2016	6/1/2018
CH_4	30%	77.4%
H_2S	9,300,000 µg/m^3	13,000,000 µg/m^3

MW-01	6/13/2018
CH_4	<0.58%
H_2S	35 µg/m^3

SV-05	May 2017	June 2018
CH_4	NS	NS
H_2S	NS	NS

SV-06	5/9/2017	6/1/2018
CH_4	31.1%	31.4%
H_2S	2,100 µg/m^3	62 µg/m^3

MW-03	4/21/2016	5/31/2018
CH_4	14%	47.8%
H_2S	21,000,000 µg/m^3	26,000,000 µg/m^3

SV-15	5/9/2017	6/5/2018
CH_4	38.6%	28.8%
H_2S	150,000,000 µg/m^3	180,000,000 µg/m^3

SG-7A	8/19/2016	June 2018
CH_4	<0.18%	NS
H_2S	21 µg/m^3	NS

MW-02	6/13/2018
CH_4	<0.58%
H_2S	21 µg/m^3

SV-08	5/9/2017	5/30/2018
CH_4	<0.58%	0.173%
H_2S	3,300 µg/m^3	24 µg/m^3

SV-01	5/8/2017	6/7/2018
CH_4	<0.58%	<0.58%
H_2S	110 µg/m^3	26 µg/m^3

SV-04	5/8/2017	6/7/2018
CH_4	<0.58%	<0.58%
H_2S	3,700 µg/m^3	39 µg/m^3

SV-03	5/8/2017	6/7/2018
CH_4	<0.58%	<0.58%
H_2S	1,100 µg/m^3	0.028 µg/m^3

SV-09	5/8/2017	6/8/2018
CH_4	<0.58%	0.064%
H_2S	<7.0 µg/m^3	18 µg/m^3

SV-12	May 2017	June 2018
CH_4	NS	NS
H_2S	NS	NS

PZ-01	4/21/2016	5/30/2018
CH_4	7.80%	40.7%
H_2S	17J µg/m^3	4,200 µg/m^3

SV-10	5/8/2017	6/8/2018
CH_4	<0.58%	<0.58%
H_2S	<7.0 µg/m^3	43 µg/m^3

SG-7R	8/19/2016	5/31/2018
CH_4	0.18%	4.65%
H_2S	2,100,000 µg/m^3	23,000,000 µg/m^3

SV-11	5/8/2017	6/8/2018
CH_4	<0.58%	<0.58%
H_2S	40 µg/m^3	49 µg/m^3

MW-19	8/18/2016	6/7/2018
CH_4	42.2%	42.1%
H_2S	<4.7 µg/m^3	750 µg/m^3

MW-34	4/21/2016	5/30/2018
CH_4	2.60%	80.8%
H_2S	110 µg/m^3	750,000 µg/m^3

SV-07	5/9/2017	5/30/2018
CH_4	<0.58%	0.437%
H_2S	12 µg/m^3	20 µg/m^3

SV-13	5/8/2017	6/7/2018
CH_4	<0.58%	<0.58%
H_2S	28 µg/m^3	39 µg/m^3

SV-14	5/8/2017	6/7/2018
CH_4	<0.58%	<0.58%
H_2S	25 µg/m^3	37 µg/m^3

PZ-04	6/13/2018
CH_4	<0.58%
H_2S	43 µg/m^3

MW-31	8/18/2016	6/7/2018
CH_4	53%	16.4%
H_2S	<5.0 µg/m^3	5,700 µg/m^3

MW-21	8/18/2016	6/7/2018
CH_4	41.2%	14.3%
H_2S	<4.7 µg/m^3	3,600 µg/m^3

MW-35	8/18/2016	6/8/2018
CH_4	<0.18%	<0.58%
H_2S	<4.7 µg/m^3	35 µg/m^3

LEGEND

▲ Subslab Soil Vapor Sampling Locations

⌖ Monitoring Wells

Notes:
1. Subslab sampling locations are approximate.
2. Monitoring well vapor samples were collected from well headspaces.
3. SV-05 and SV-12 were not sampled in 2017 or 2018 because of high groundwater conditions.
4. WAT-SG-7A could not be located for sampling during 2018.
5. NS = not sampled
6. 2018 results are preliminary and have not been validated.

0 50 100
Approximate scale in feet

Figure 7-1
Vapor Sampling Analytical Results, 2016 to 2018
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York

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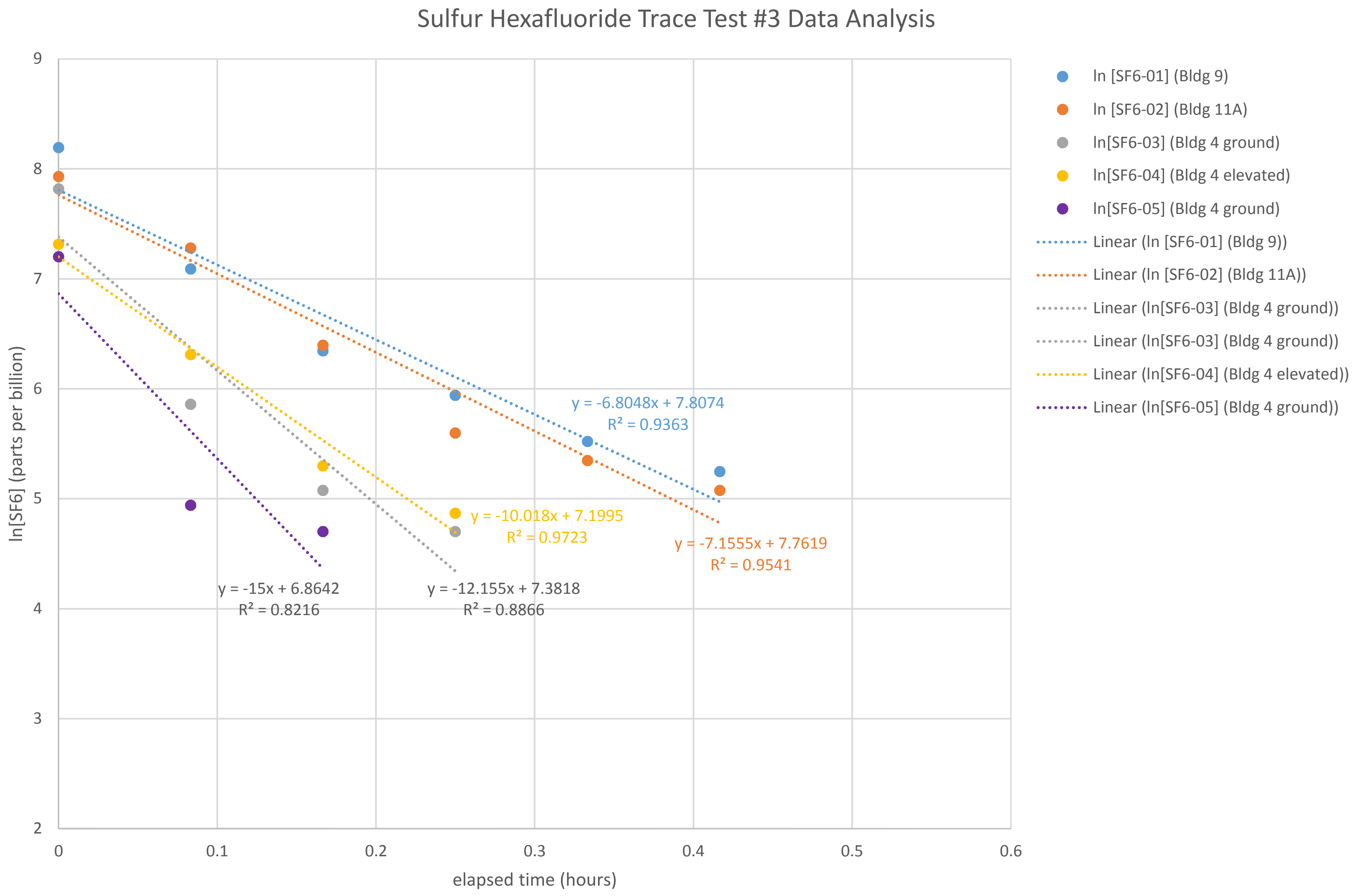
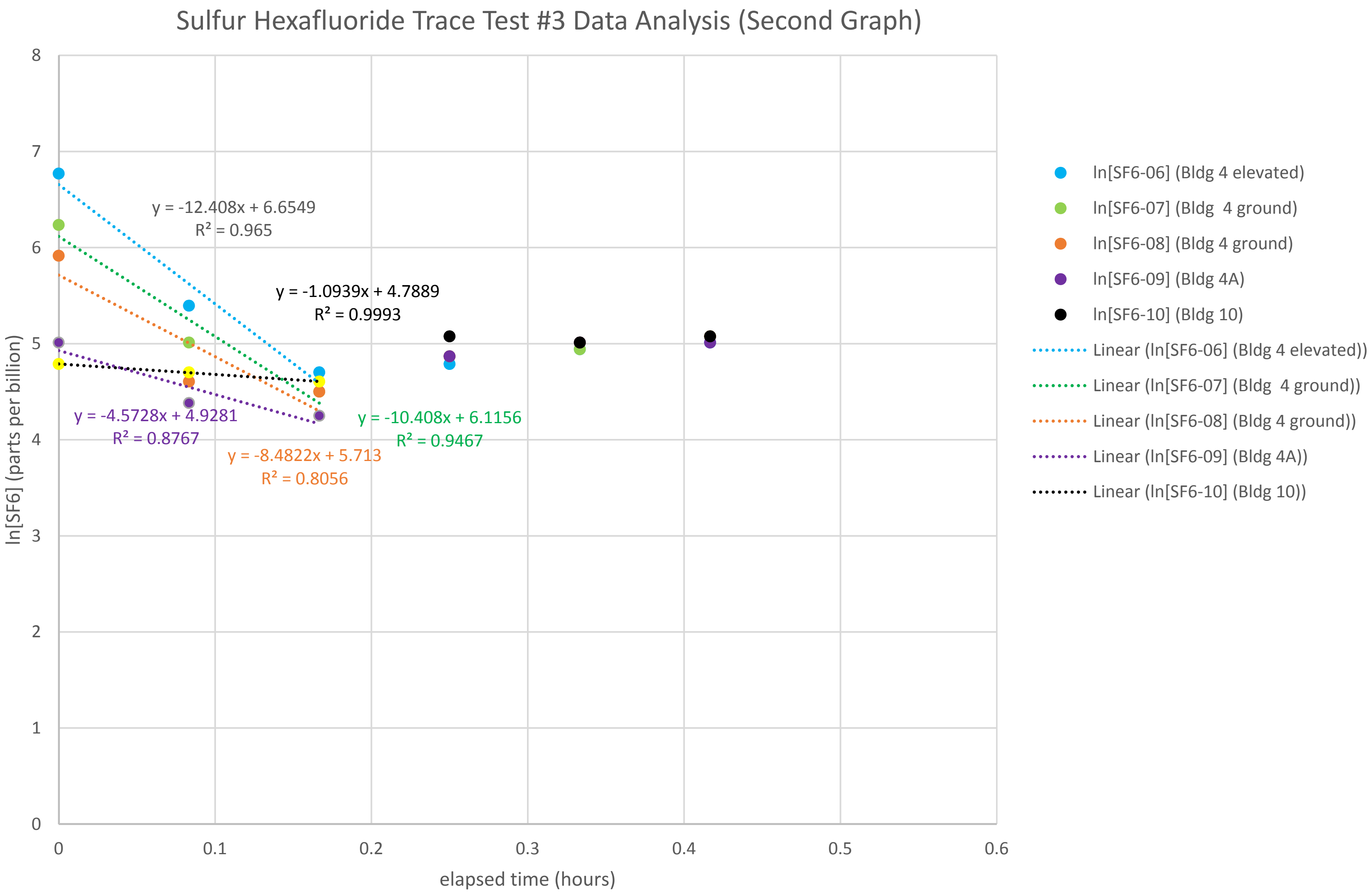


Notes
Bldg. = building
ln = natural logarithm
SF6 = sulfur hexafluoride

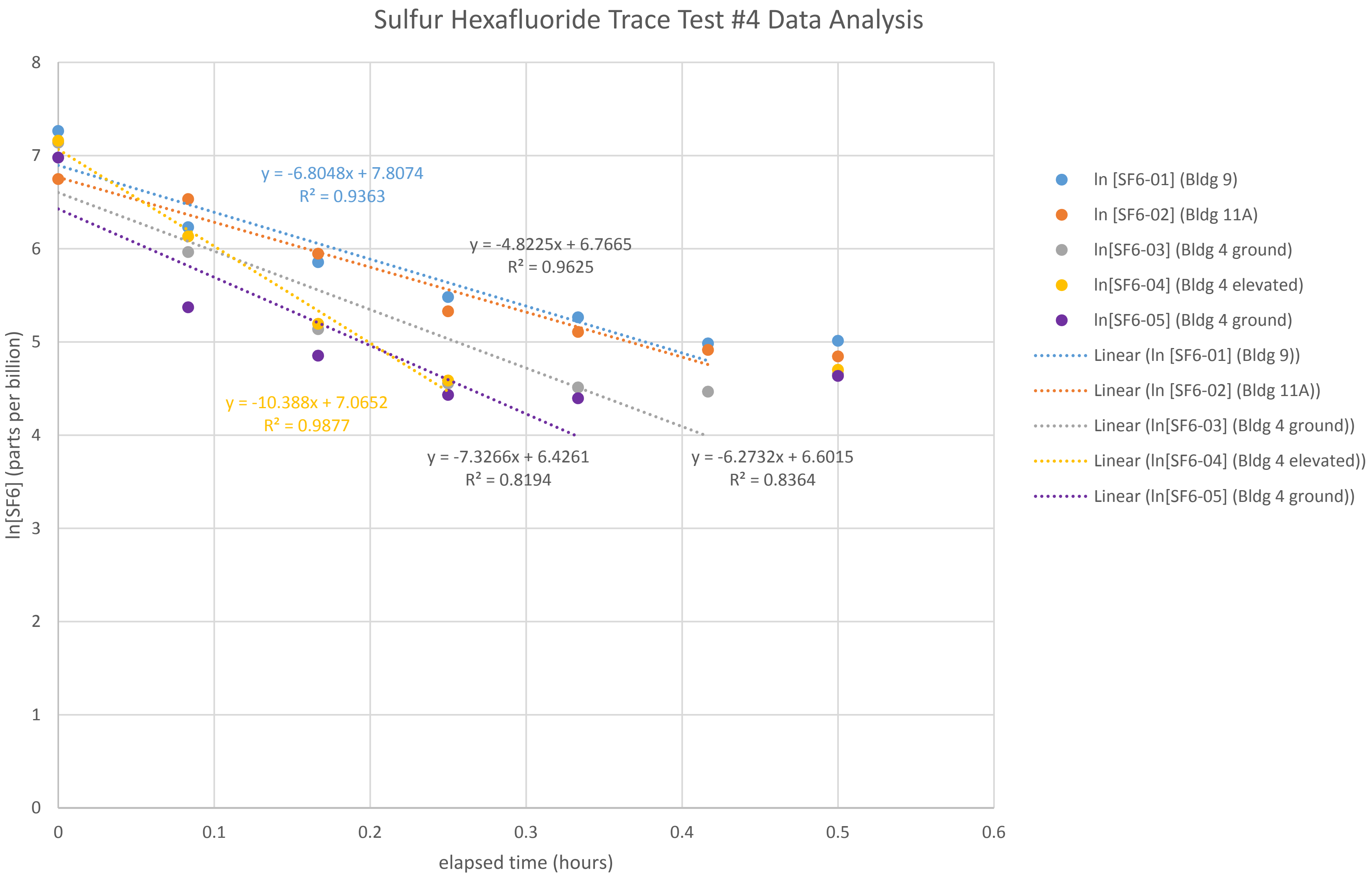
Figure 10-1a. Sulfur Hexafluoride Tracer Test #3 Decay
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, New York

JACOBS



Notes
Bldg. = building
ln = natural logarithm
SF6 = sulfur hexafluoride

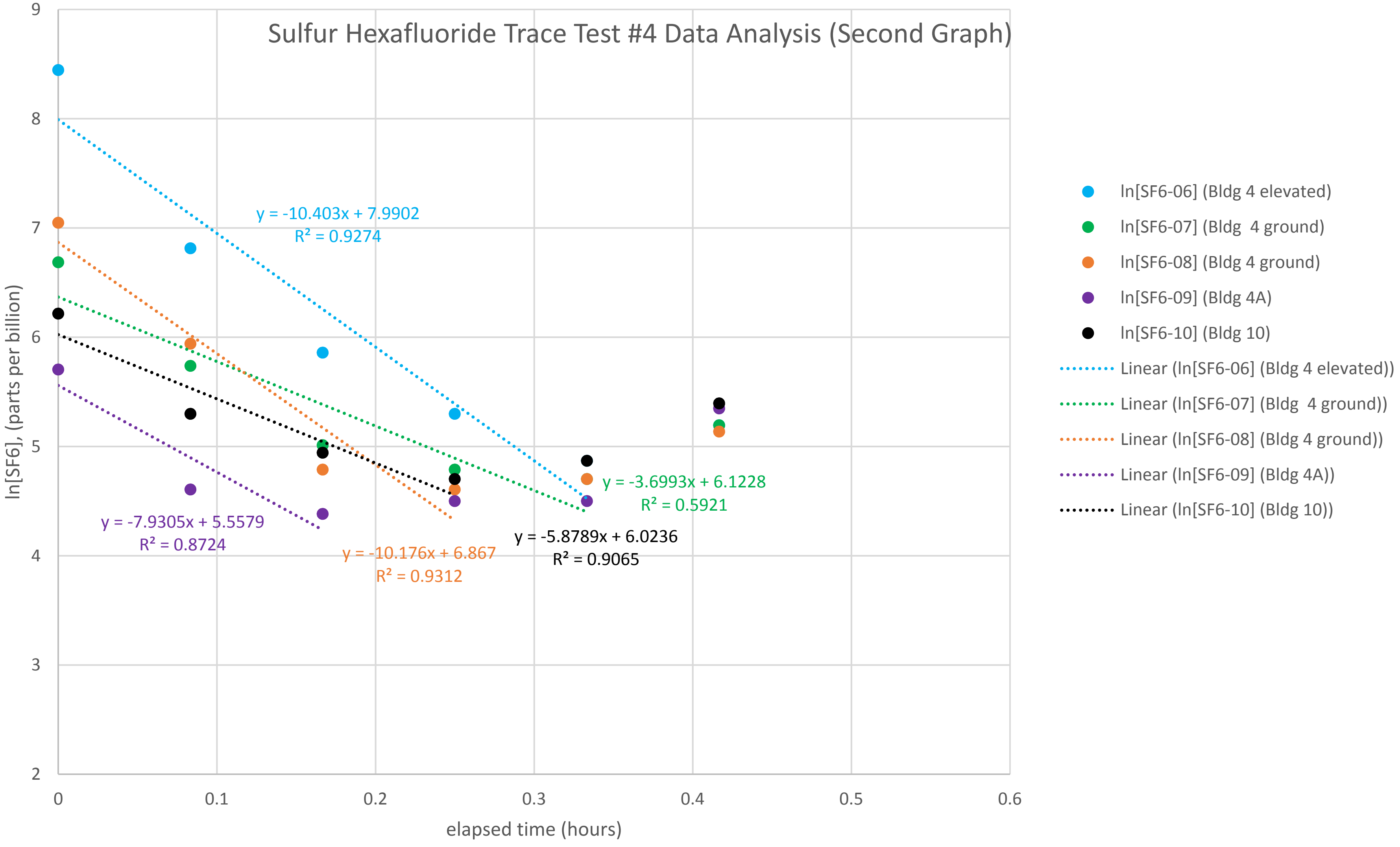
Figure 10-1b. Sulfur Hexafluoride Tracer Test #3 Decay
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, New York



<u>Notes</u>

Bldg. = building
ln = natural logarithm
SF6 = sulfur hexafluoride

Figure 10-2a. Sulfur Hexafluoride Tracer Test #4 Decay
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, New York



Notes

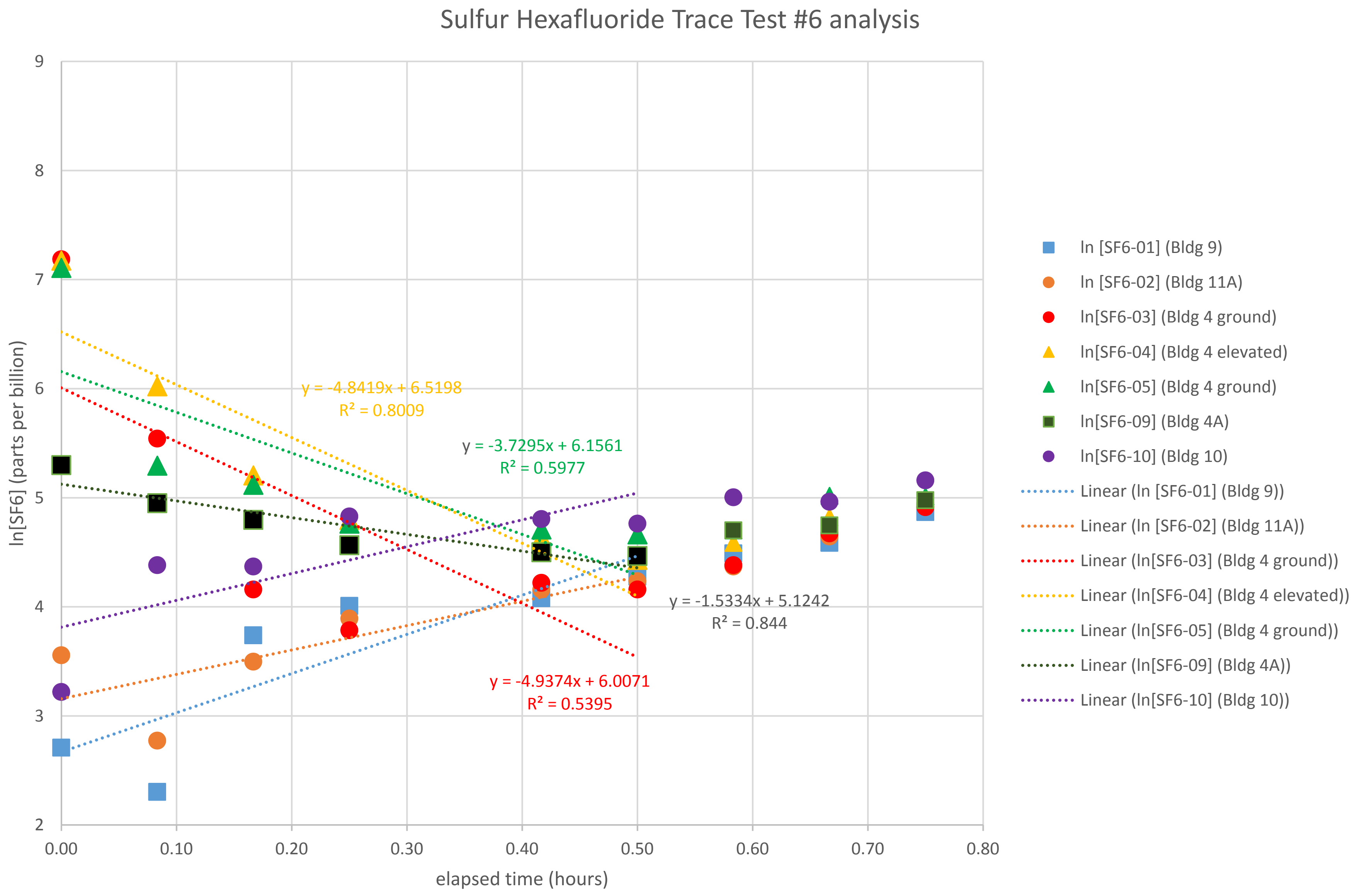
Bldg. = building

ln = natural logarithm

SF6 = sulfur hexafluoride

Figure 10-2b. Sulfur Hexafluoride Tracer Test #4 Decay
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, New York

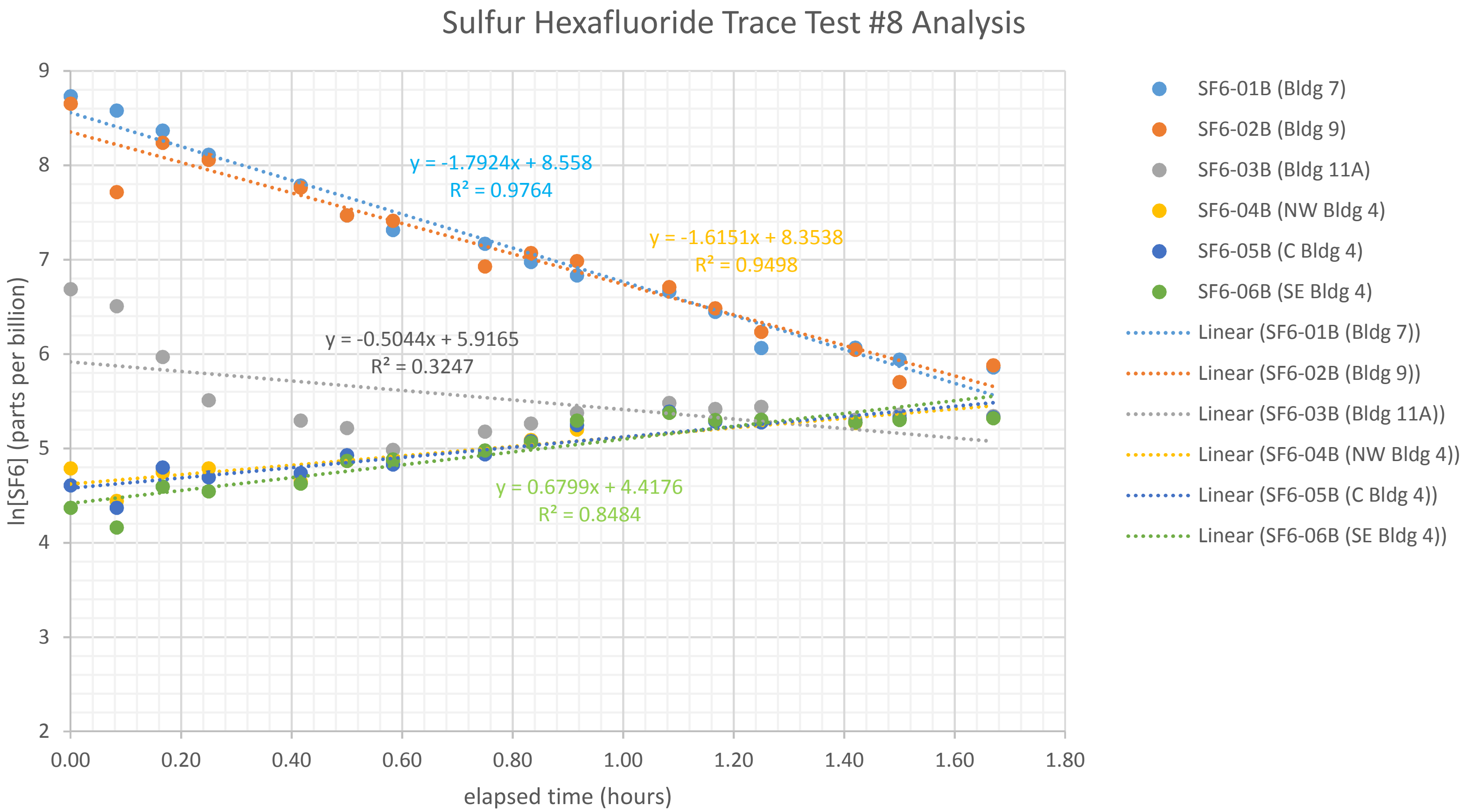
JACOBS



Notes
Bldg. = building
ln = natural logarithm
SF6 = sulfur hexafluoride

Figure 10-3. Sulfur Hexafluoride Tracer Test #6 Decay
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, New York

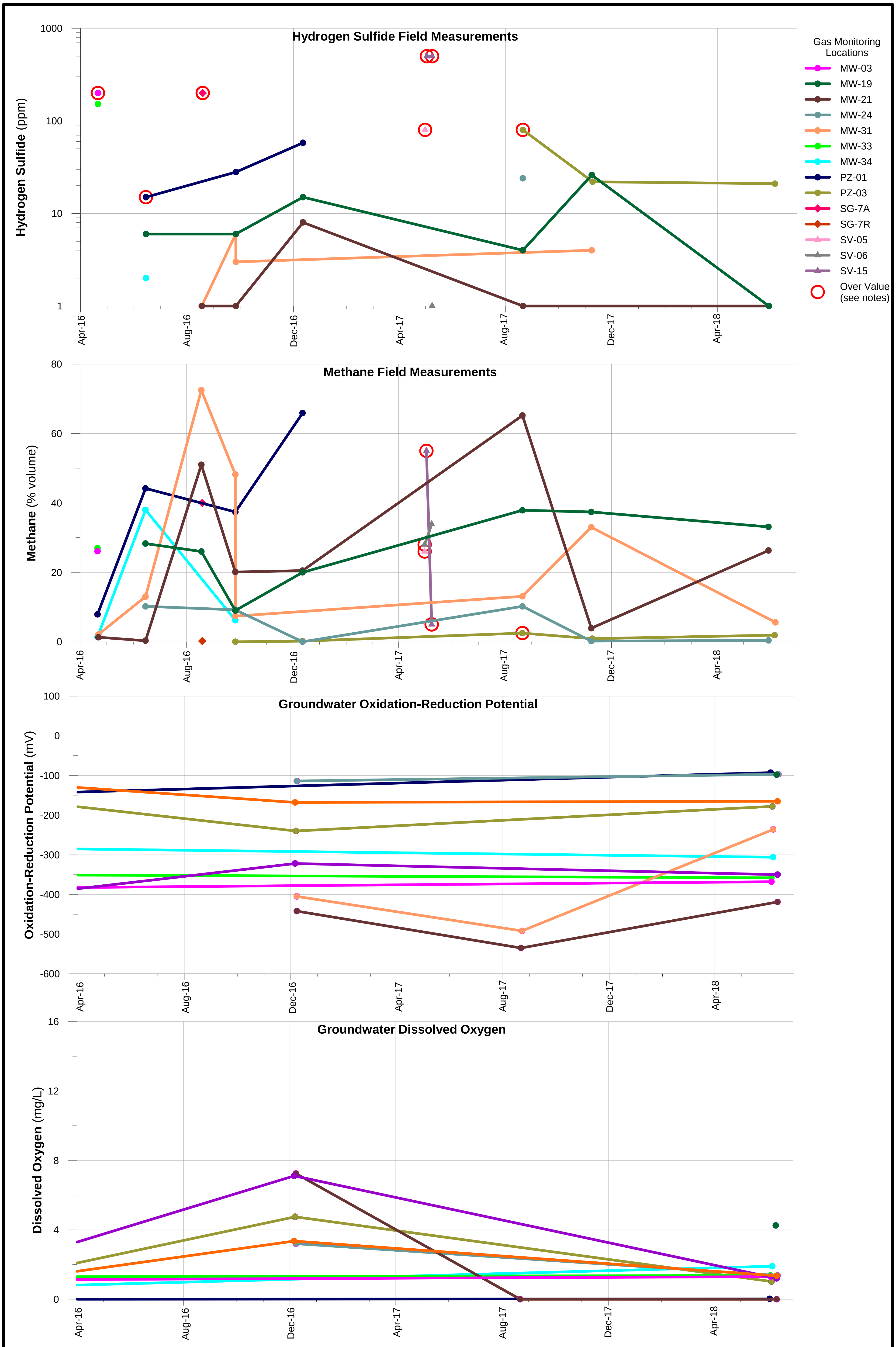
JACOBS



Notes
Bldg. = building
ln = natural logarithm
SF6 = sulfur hexafluoride

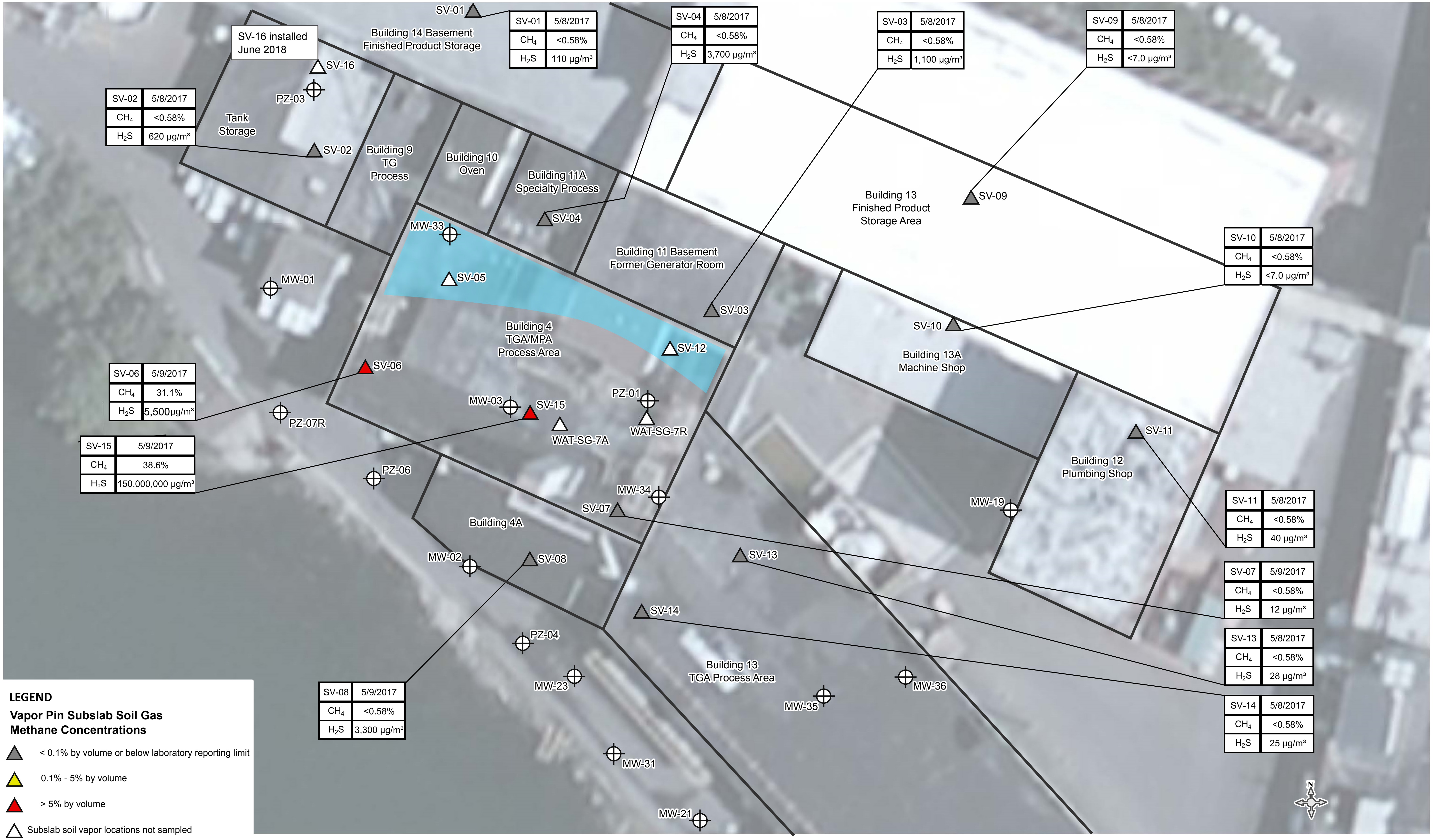
Figure 10-4. Sulfur Hexafluoride Tracer Test #8 Decay
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp.
Waterloo, New York

JACOBS



Notes
1) Non-detects plotted at a concentration of zero.
2) Red halos on data points indicate that the concentration was above the instrument's detection limit, or that readings were terminated while the reading was still climbing.

Figure 11-1. Subslab and Groundwater Field Measurements
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp. Facility
Waterloo, New York



SV-01	5/8/2017
CH_4	<0.58%
H_2S	110 μg/m³

SV-04	5/8/2017
CH_4	<0.58%
H_2S	3,700 μg/m³

SV-03	5/8/2017
CH_4	<0.58%
H_2S	1,100 μg/m³

SV-09	5/8/2017
CH_4	<0.58%
H_2S	<7.0 μg/m³

SV-02	5/8/2017
CH_4	<0.58%
H_2S	620 μg/m³

SV-10	5/8/2017
CH_4	<0.58%
H_2S	<7.0 μg/m³

SV-06	5/9/2017
CH_4	31.1%
H_2S	5,500μg/m³

SV-15	5/9/2017
CH_4	38.6%
H_2S	150,000,000 μg/m³

SV-11	5/8/2017
CH_4	<0.58%
H_2S	40 μg/m³

SV-07	5/9/2017
CH_4	<0.58%
H_2S	12 μg/m³

SV-13	5/8/2017
CH_4	<0.58%
H_2S	28 μg/m³

SV-08	5/9/2017
CH_4	<0.58%
H_2S	3,300 μg/m³

SV-14	5/8/2017
CH_4	<0.58%
H_2S	25 μg/m³

LEGEND

Vapor Pin Subslab Soil Gas Methane Concentrations

▲ < 0.1% by volume or below laboratory reporting limit

▲ 0.1% - 5% by volume

▲ > 5% by volume

△ Subslab soil vapor locations not sampled

⊕ Monitoring Wells

▨ Area of high groundwater south of foundation wall. Unable to collect subslab vapor samples in this area.

Notes:
1. Subslab sampling locations are approximate.
2. 5.0% methane by volume is 100% of the lower explosive limit (LEL)
3. SV-05 and SV-12 were not sampled in 2017 or 2018 because of high groundwater conditions.
5. NS = not sampled

0 50 100
Approximate scale in feet

FIGURE 11-2
Subslab Soil Gas Methane Results, May 2017
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York

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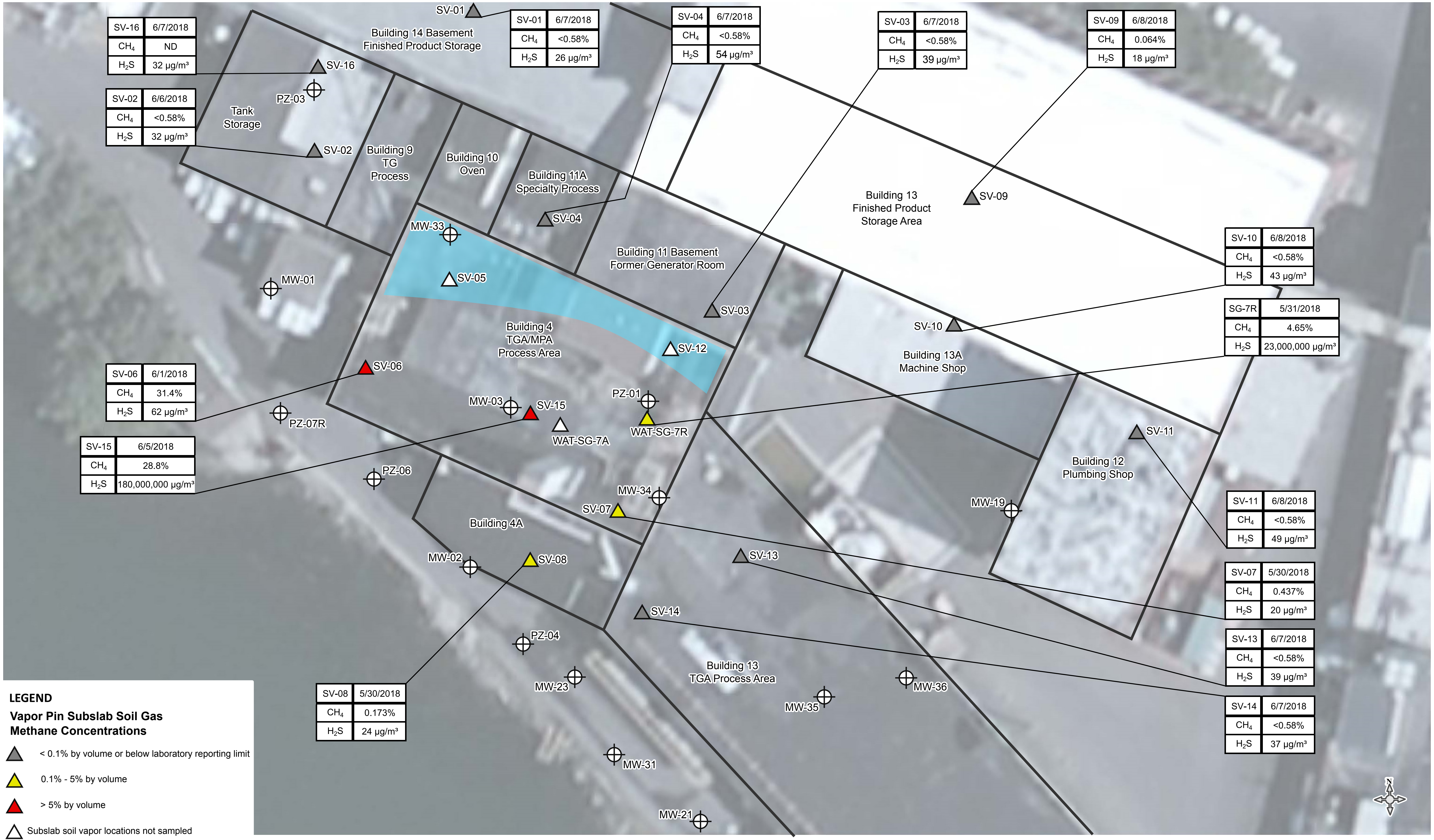

SV-16	6/7/2018
CH_4	ND
H_2S	32 µg/m^3

SV-02	6/6/2018
CH_4	<0.58%
H_2S	32 µg/m^3

SV-01	6/7/2018
CH_4	<0.58%
H_2S	26 µg/m^3

SV-04	6/7/2018
CH_4	<0.58%
H_2S	54 µg/m^3

SV-03	6/7/2018
CH_4	<0.58%
H_2S	39 µg/m^3

SV-09	6/8/2018
CH_4	0.064%
H_2S	18 µg/m^3

SV-10	6/8/2018
CH_4	<0.58%
H_2S	43 µg/m^3

SG-7R	5/31/2018
CH_4	4.65%
H_2S	23,000,000 µg/m^3

SV-06	6/1/2018
CH_4	31.4%
H_2S	62 µg/m^3

SV-15	6/5/2018
CH_4	28.8%
H_2S	180,000,000 µg/m^3

SV-11	6/8/2018
CH_4	<0.58%
H_2S	49 µg/m^3

SV-07	5/30/2018
CH_4	0.437%
H_2S	20 µg/m^3

SV-13	6/7/2018
CH_4	<0.58%
H_2S	39 µg/m^3

SV-14	6/7/2018
CH_4	<0.58%
H_2S	37 µg/m^3

SV-08	5/30/2018
CH_4	0.173%
H_2S	24 µg/m^3

LEGEND

Vapor Pin Subslab Soil Gas Methane Concentrations

- ▲ < 0.1% by volume or below laboratory reporting limit
- ▲ 0.1% - 5% by volume
- ▲ > 5% by volume
- △ Subslab soil vapor locations not sampled
- ⊕ Monitoring Wells
- 🟦 Area of high groundwater south of foundation wall. Unable to collect subslab vapor samples in this area.

Notes:
1. Subslab sampling locations are approximate.
2. 5.0% methane by volume is 100% of the lower explosive limit (LEL)
3. SV-05 and SV-12 were not sampled in 2017 or 2018 because of high groundwater conditions.
5. NS = not sampled

0 50 100
Approximate scale in feet

FIGURE 11-3
Subslab Methane Results,
May & June 2018
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York

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MW-33	4/21/2016
CH_4	30%
H_2S	9,300,000 µg/m³

MW-03	4/21/2016
CH_4	14%
H_2S	21,000,000 µg/m³

PZ-01	4/21/2016
CH_4	7.80%
H_2S	17J µg/m³

MW-19	8/18/2016
CH_4	42.2%
H_2S	<4.7 µg/m³

MW-34	4/21/2016
CH_4	2.60%
H_2S	110 µg/m³

MW-31	8/18/2016
CH_4	53%
H_2S	<5.0 µg/m³

MW-21	8/18/2016
CH_4	41.2%
H_2S	<4.7 µg/m³

MW-35	8/18/2016
CH_4	<0.18%
H_2S	<4.7 µg/m³

LEGEND

Monitoring Well Headspace Methane Concentrations

- ⊕ < 0.1% by volume or below laboratory reporting limit
- ⊕ 0.1% - 5% by volume
- ⊕ > 5% by volume
- ⊕ Monitoring well not sampled
- △ Subslab soil vapor location

Notes:
1. Subslab sampling locations are approximate.
2. 5.0% methane by volume is 100% of the lower explosive limit (LEL)
3. SV-05 and SV-12 were not sampled in 2017 or 2018 because of high groundwater conditions.
5. NS = not sampled

0 50 100
Approximate scale in feet

FIGURE 11-4
Monitoring Well Headspace Methane Results, April & August 2016
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York

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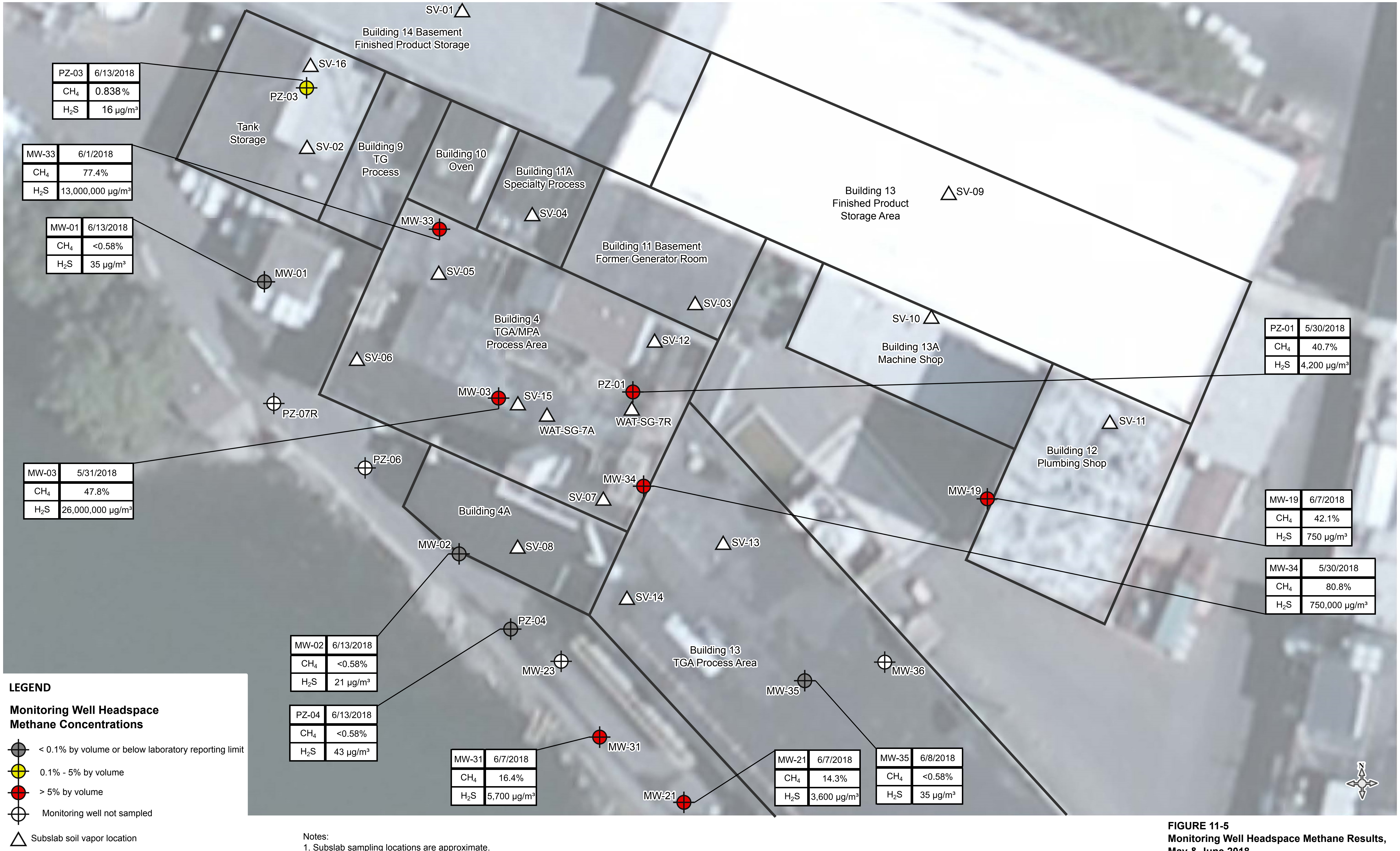


Notes:
1. Subslab sampling locations are approximate.
2. 5.0% methane by volume is 100% of the lower explosive limit (LEL)
3. SV-05 and SV-12 were not sampled in 2017 or 2018 because of high groundwater conditions.
5. NS = not sampled

0 50 100
Approximate scale in feet

FIGURE 11-5
Monitoring Well Headspace Methane Results, May & June 2018
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York

JACOBS

MW-33	4/21/2016
CH_4	30%
H_2S	9,300,000 µg/m³

MW-03	4/21/2016
CH_4	14%
H_2S	21,000,000 µg/m³

PZ-01	4/21/2016
CH_4	7.80%
H_2S	17J µg/m³

MW-19	8/18/2016
CH_4	42.2%
H_2S	<4.7 µg/m³

MW-34	4/21/2016
CH_4	2.60%
H_2S	110 µg/m³

MW-31	8/18/2016
CH_4	53%
H_2S	<5.0 µg/m³

MW-21	8/18/2016
CH_4	41.2%
H_2S	<4.7 µg/m³

MW-35	8/18/2016
CH_4	<0.18%
H_2S	<4.7 µg/m³

LEGEND

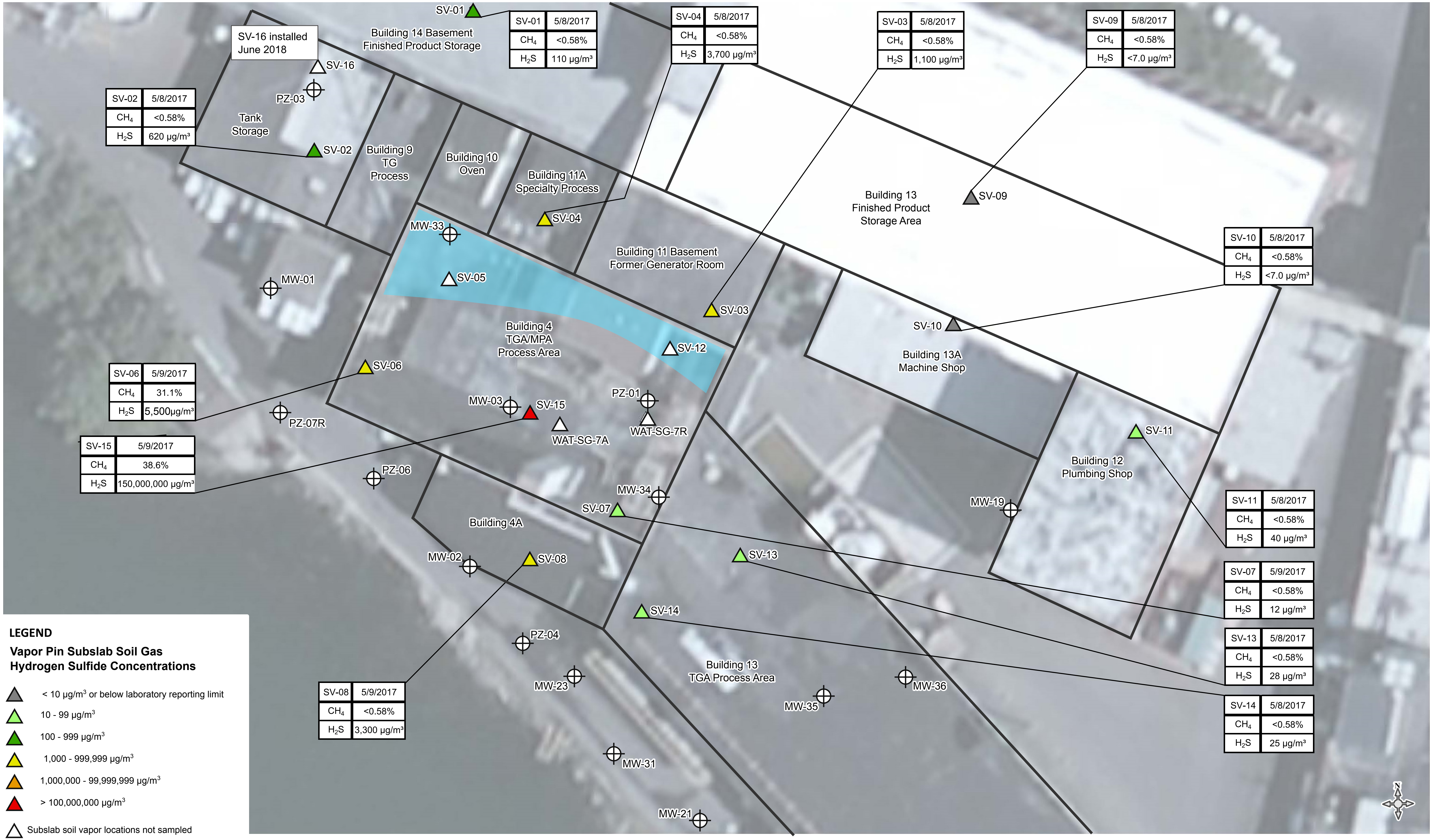
Monitoring Well Headspace Hydrogen Sulfide Concentrations

- ● < 10 µg/m3 or below laboratory reporting limit
- ● 10 - 99 µg/m³
- ● 100 - 999 µg/m³
- ● 1,000 - 999,999 µg/m³
- ● 1,000,000 - 99,999,999 µg/m³
- ⊕ Monitoring well not sampled
- △ Subslab soil vapor location

Notes:
1. Subslab sampling locations are approximate.

0 50 100
Approximate scale in feet

FIGURE 11-6
Monitoring Well Headspace Hydrogen Sulfide Results, April & August 2016
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York



SV-01	5/8/2017
CH_4	<0.58%
H_2S	110 µg/m^3

SV-04	5/8/2017
CH_4	<0.58%
H_2S	3,700 µg/m^3

SV-03	5/8/2017
CH_4	<0.58%
H_2S	1,100 µg/m^3

SV-09	5/8/2017
CH_4	<0.58%
H_2S	<7.0 µg/m^3

SV-02	5/8/2017
CH_4	<0.58%
H_2S	620 µg/m^3

SV-10	5/8/2017
CH_4	<0.58%
H_2S	<7.0 µg/m^3

SV-06	5/9/2017
CH_4	31.1%
H_2S	5,500µg/m^3

SV-15	5/9/2017
CH_4	38.6%
H_2S	150,000,000 µg/m^3

SV-11	5/8/2017
CH_4	<0.58%
H_2S	40 µg/m^3

SV-07	5/9/2017
CH_4	<0.58%
H_2S	12 µg/m^3

SV-13	5/8/2017
CH_4	<0.58%
H_2S	28 µg/m^3

SV-08	5/9/2017
CH_4	<0.58%
H_2S	3,300 µg/m^3

SV-14	5/8/2017
CH_4	<0.58%
H_2S	25 µg/m^3

LEGEND

Vapor Pin Subslab Soil Gas Hydrogen Sulfide Concentrations

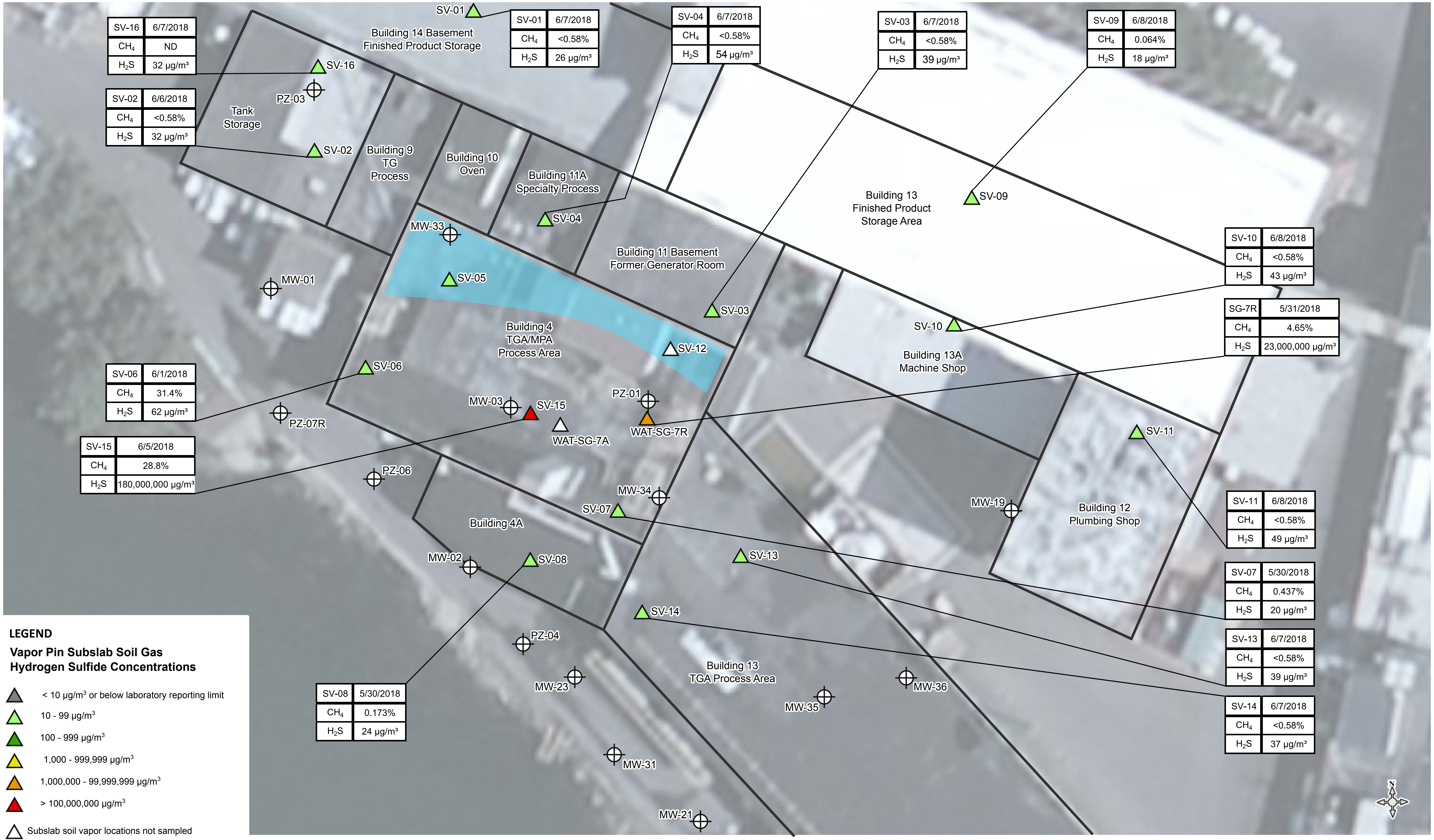
▲	< 10 µg/m^3 or below laboratory reporting limit
▲	10 - 99 µg/m^3
▲	100 - 999 µg/m^3
▲	1,000 - 999,999 µg/m^3
▲	1,000,000 - 99,999,999 µg/m^3
▲	> 100,000,000 µg/m^3
△	Subslab soil vapor locations not sampled
⌖	Monitoring Wells
🟦	Area of high groundwater south of foundation wall. Unable to collect subslab vapor samples in this area.

Notes:
1. Subslab sampling locations are approximate.

0 50 100
Approximate scale in feet

FIGURE 11-7
Subslab Soil Gas Hydrogen Sulfide Results, May 2017
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York

JACOBS



SV-16	6/7/2018
CH_4	ND
H_2S	32 µg/m³

SV-02	6/6/2018
CH_4	<0.58%
H_2S	32 µg/m³

SV-01	6/7/2018
CH_4	<0.58%
H_2S	26 µg/m³

SV-04	6/7/2018
CH_4	<0.58%
H_2S	54 µg/m³

SV-03	6/7/2018
CH_4	<0.58%
H_2S	39 µg/m³

SV-09	6/8/2018
CH_4	0.064%
H_2S	18 µg/m³

SV-10	6/8/2018
CH_4	<0.58%
H_2S	43 µg/m³

SG-7R	5/31/2018
CH_4	4.65%
H_2S	23,000,000 µg/m³

SV-06	6/1/2018
CH_4	31.4%
H_2S	62 µg/m³

SV-15	6/5/2018
CH_4	28.8%
H_2S	180,000,000 µg/m³

SV-11	6/8/2018
CH_4	<0.58%
H_2S	49 µg/m³

SV-07	5/30/2018
CH_4	0.437%
H_2S	20 µg/m³

SV-13	6/7/2018
CH_4	<0.58%
H_2S	39 µg/m³

SV-08	5/30/2018
CH_4	0.173%
H_2S	24 µg/m³

SV-14	6/7/2018
CH_4	<0.58%
H_2S	37 µg/m³

LEGEND

Vapor Pin Subslab Soil Gas Hydrogen Sulfide Concentrations

▲	< 10 µg/m³ or below laboratory reporting limit
▲	10 - 99 µg/m³
▲	100 - 999 µg/m³
▲	1,000 - 999,999 µg/m³
▲	1,000,000 - 99,999,999 µg/m³
▲	> 100,000,000 µg/m³
△	Subslab soil vapor locations not sampled
⌖	Monitoring Wells
🟦	Area of high groundwater south of foundation wall. Unable to collect subslab vapor samples in this area.

Notes:
1. Subslab sampling locations are approximate.

0 50 100
Approximate scale in feet

FIGURE 11-8
Subslab Hydrogen Sulfide Results, May & June 2018
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York

JACOBS

PZ-03	6/13/2018
CH_4	0.838 %
H_2S	16 µg/m^3

MW-33	6/1/2018
CH_4	77.4%
H_2S	13,000,000 µg/m^3

MW-01	6/13/2018
CH_4	<0.58%
H_2S	35 µg/m^3

MW-03	5/31/2018
CH_4	47.8%
H_2S	26,000,000 µg/m^3

PZ-01	5/30/2018
CH_4	40.7%
H_2S	4,200 µg/m^3

MW-19	6/7/2018
CH_4	42.1%
H_2S	750 µg/m^3

MW-34	5/30/2018
CH_4	80.8%
H_2S	750,000 µg/m^3

MW-02	6/13/2018
CH_4	<0.58%
H_2S	21 µg/m^3

PZ-04	6/13/2018
CH_4	<0.58%
H_2S	43 µg/m^3

MW-31	6/7/2018
CH_4	16.4%
H_2S	5,700 µg/m^3

MW-21	6/7/2018
CH_4	14.3%
H_2S	3,600 µg/m^3

MW-35	6/8/2018
CH_4	<0.58%
H_2S	35 µg/m^3

LEGEND

Monitoring Well Headspace Hydrogen Sulfide Concentrations

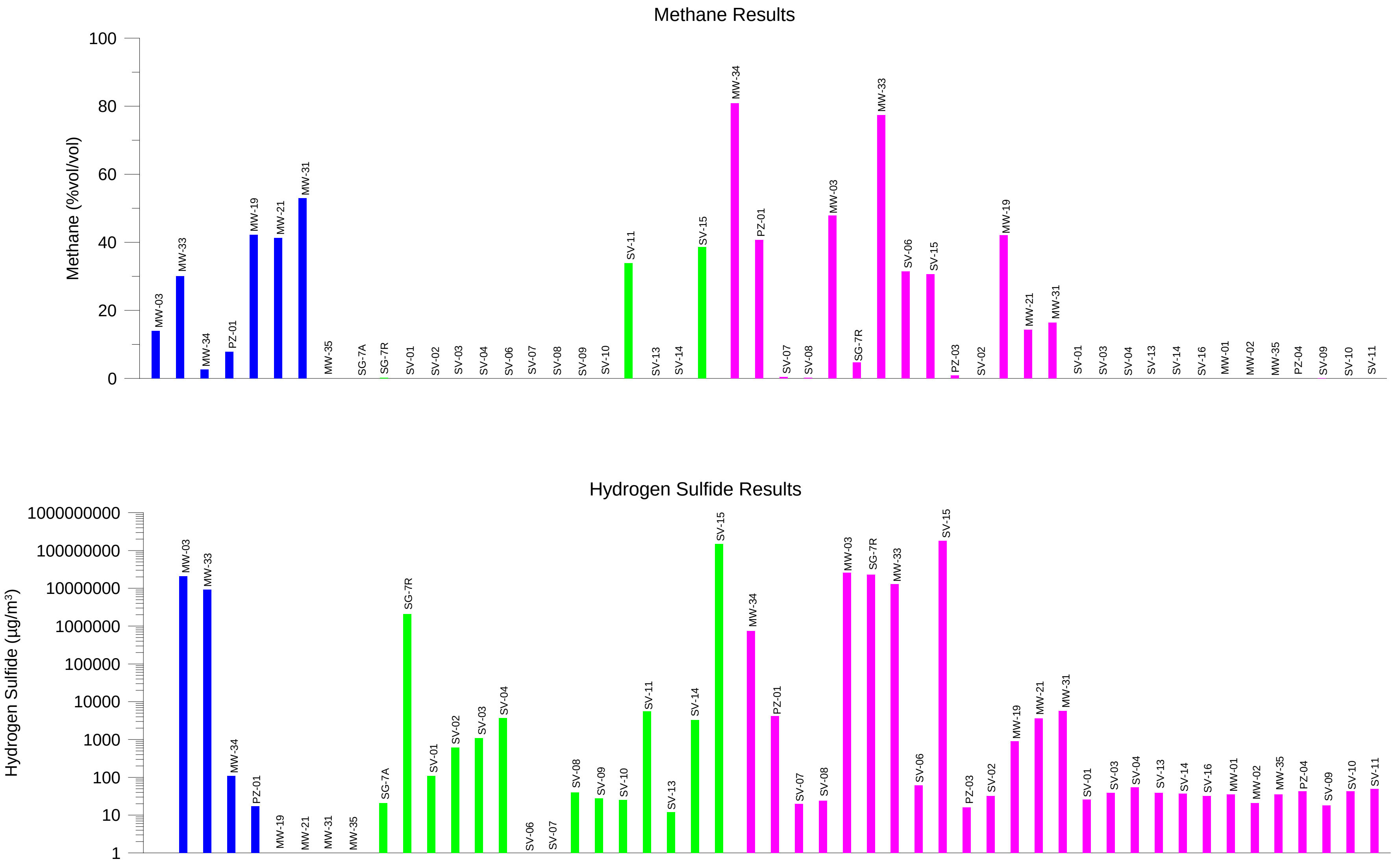
⊕	< 10 µg/m3 or below laboratory reporting limit
⊕	10 - 99 µg/m^3
⊕	100 - 999 µg/m^3
⊕	1,000 - 999,999 µg/m^3
⊕	1,000,000 - 99,999,999 µg/m^3
⊕	Monitoring well not sampled
△	Subslab soil vapor location

Notes:
1. Subslab sampling locations are approximate.

0 50 100
Approximate scale in feet

FIGURE 11-9
Monitoring Well Headspace Hydrogen Sulfide Results, May & June 2018
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical
Waterloo, New York

JACOBS



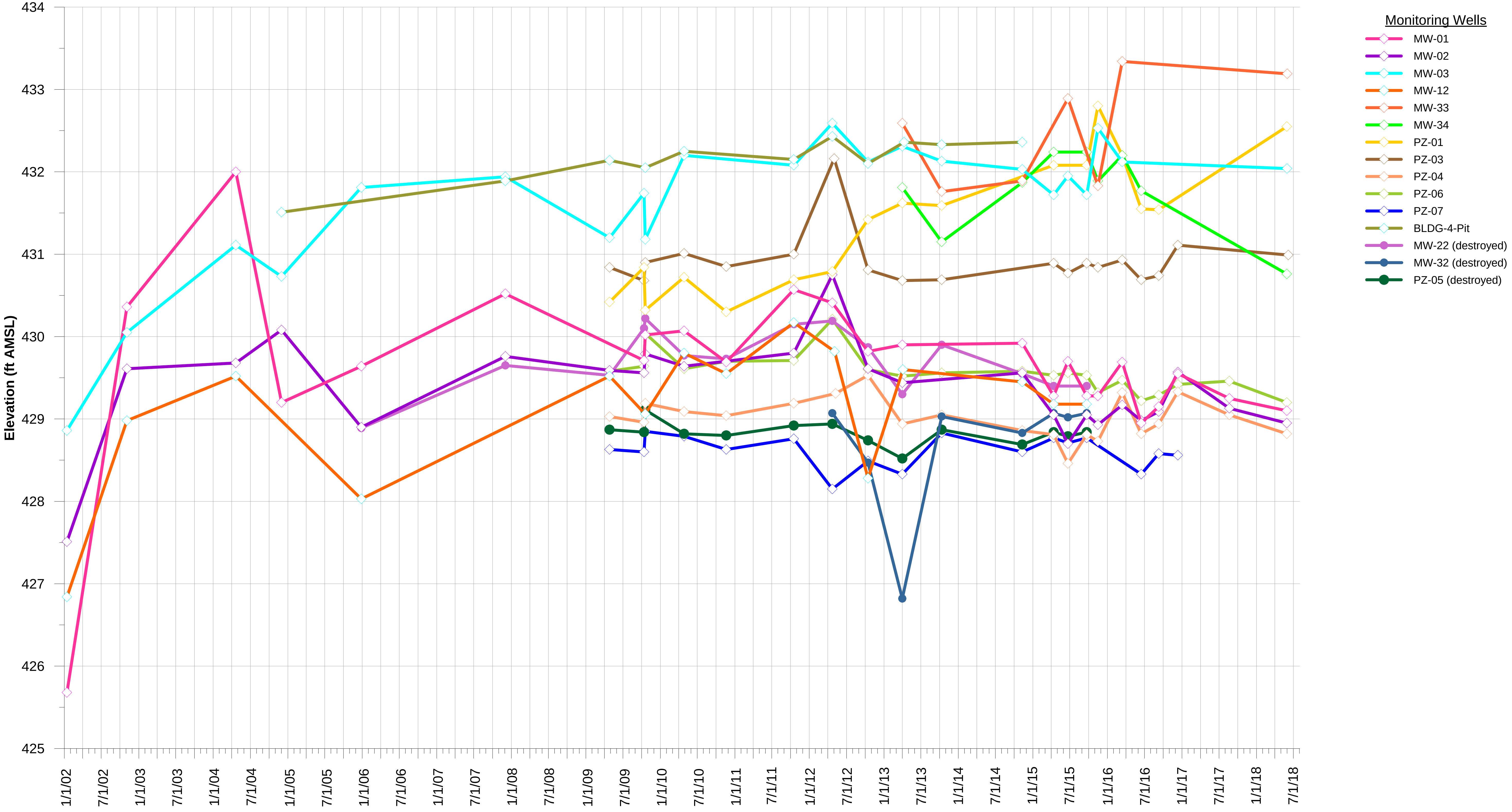
Year

🟦 2016
🟩 2017
🟪 2018

Notes
1. Non-detects plotted at a concentration of zero
2. Non-detects valued as zero in calculating percentage or concentration changes

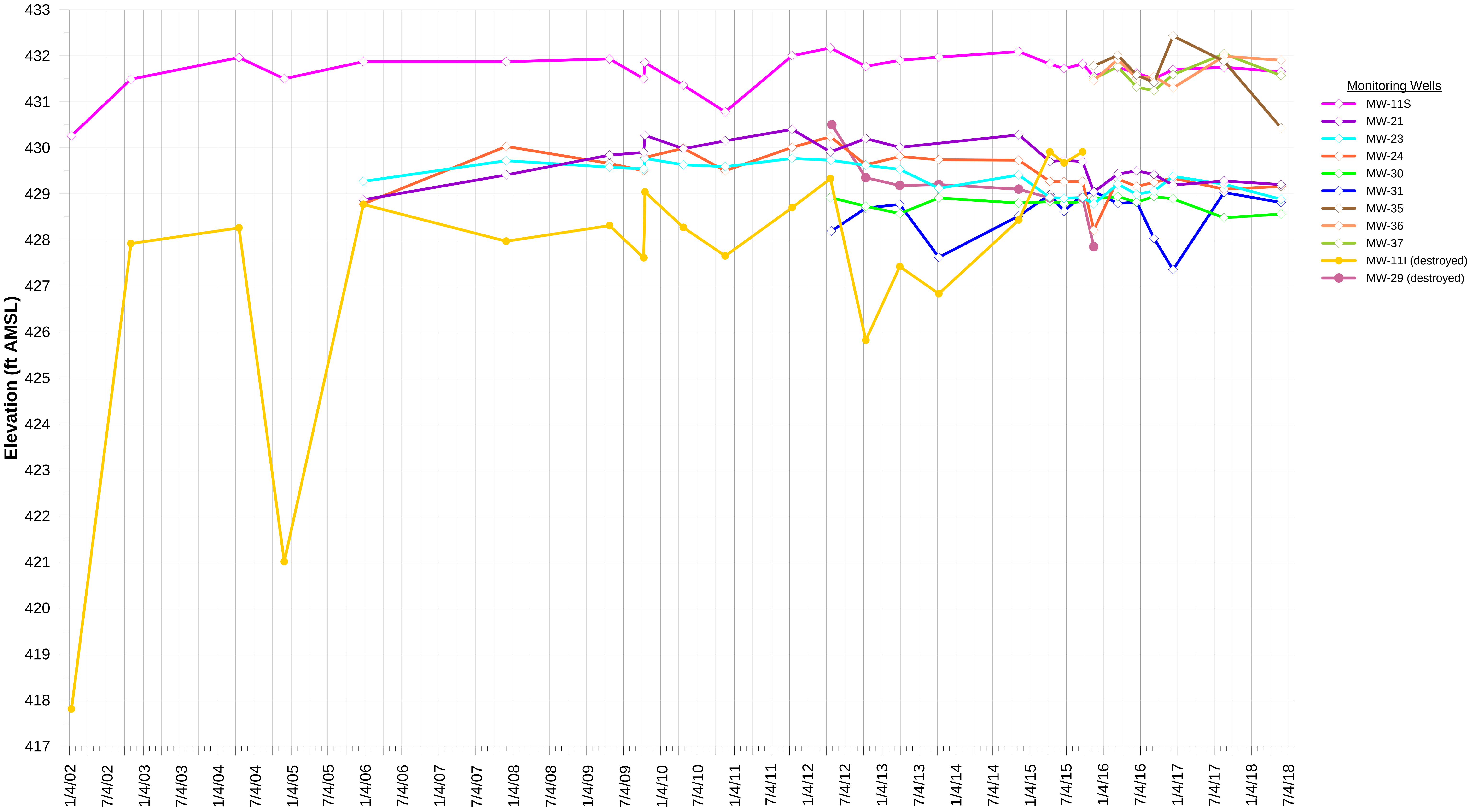
Figure 11-10
Historical Methane and Hydrogen Sulfide Concentrations
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp. Facility
Waterloo, New York

JACOBS



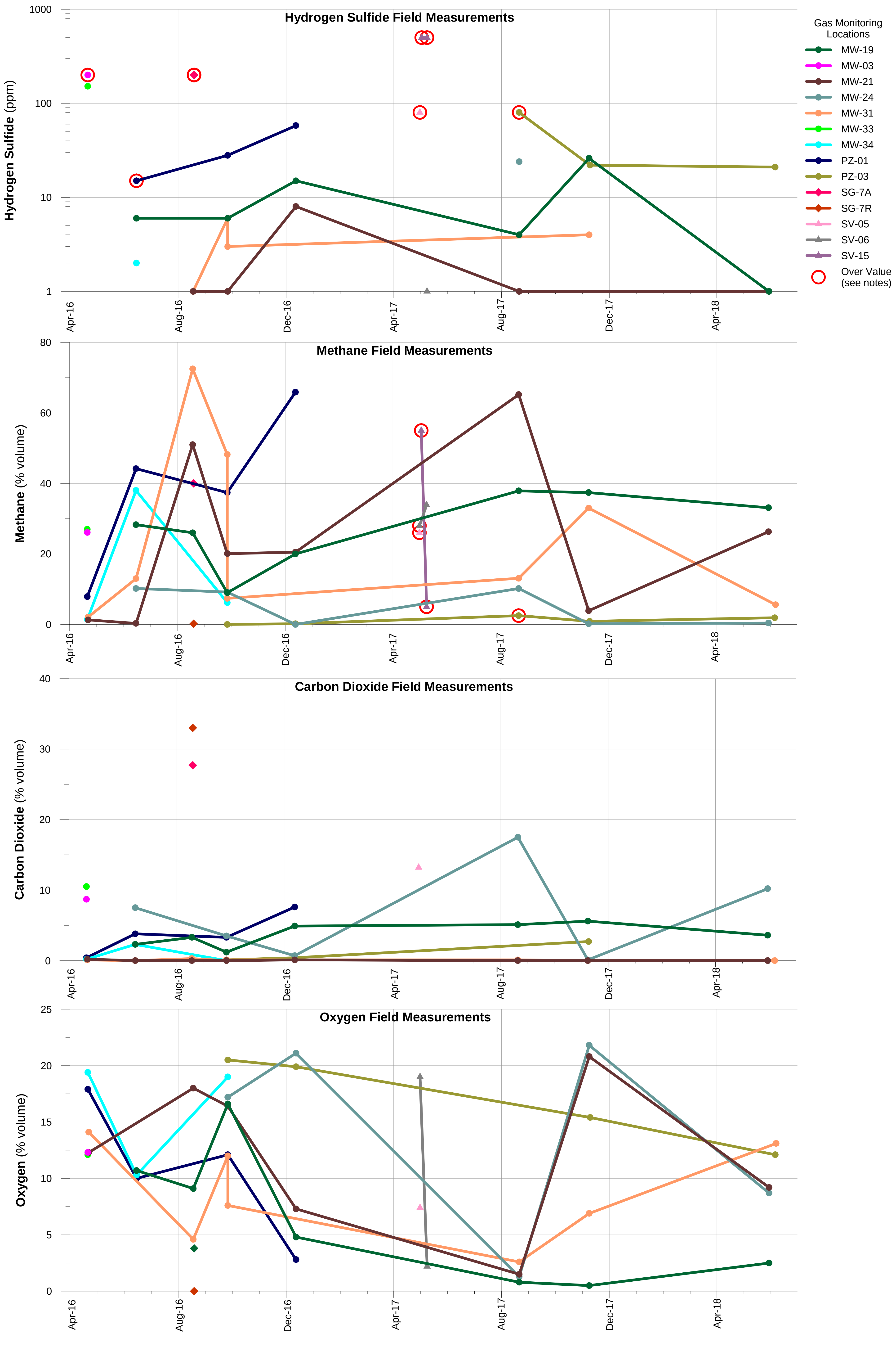
Notes
1) ft. ASML: Feet Above Mean Sea-Level

Figure 11-11. Historical Groundwater Elevations, AOC B Monitoring Wells
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp. Facility
Waterloo, New York



Notes
1) ft. ASML: Feet Above Mean Sea-Level

Figure 11-12. Historical Groundwater Elevations, AOC D Monitoring Wells
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp. Facility
Waterloo, New York



Notes
1) Red halos on data points indicate that the concentration was above the instrument's detection limit, or that readings were terminated while the reading was still climbing.

Figure 11-13. Subslab and Well Headspace Field Measurements
2018 Supplemental Building 4 Vapor Investigation
Former Hampshire Chemical Corp. Facility
Waterloo, New York

Attachment 1
Radon Sampling Field Logs

DOM: 5/17/2018
EXP: 5/17/2019

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
Tel: 800-220-3675
www.radontestinglab.com

Radon In Air Data Sheet - NJ

Return this form with the test device to the laboratory:
NJDEP Laboratory Certification # 03036
NJDEP Radon Business Certification # MEB92525
If you are a certified NJDEP Radon Technician deploying the test kit, use the left hand side of the COC for your Name and Certification #. Use the right hand side for your Name and Certification # for the retrieval of the kit.

SEND WRITTEN REPORT TO:

Name DAVID NEWMAN
Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330806

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:

☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 3 FT LEDGE

2nd DEVICE NUMBER 330753
(If Purchased)

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 3 FT LEDGE

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190328

INDOOR CONDITIONS
Temperature 79 °F Humidity 30 %

EXPOSURE PERIOD
Beginning Date: 6/8/18
Time: 1500 AM / PM (Circle)
Ending Date: 6/11/18
Time: 1125 AM / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☑ Closed House ☐ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED

☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

DOM: 5/17/2018
EXP: 5/17/2019

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
Tel: 800-220-3675
www.radontestinglab.com

Radon In Air Data Sheet - NJ

SEND WRITTEN REPORT TO:

Name DAVID NEWMAN
Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330692

Sample Type: ☐ Standard ☑ Duplicate ☐ Blank

LOCATION:

☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 3 FT LEDGE

2nd DEVICE NUMBER 330655
(If Purchased)

Sample Type: ☐ Standard ☑ Duplicate ☐ Blank

☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 3 FT LEDGE

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190324

Return this form with the test device to the laboratory:

NJDEP Laboratory Certification # 03036
NJDEP Radon Business Certification # MEB92525

If you are a certified NJDEP Radon Technician deploying the test kit, use the left hand side of the COC for your Name and Certification #. Use the right hand side for your Name and Certification # for the retrieval of the kit.

INDOOR CONDITIONS

Temperature 79 °F Humidity 30 %

EXPOSURE PERIOD

Beginning Date: 6/8/18
Time: 1500 AM / PM (Circle)
Ending Date: 6/11/18
Time: 1125 [✓ AM] / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☐ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☐ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

DOM: 5/17/2018
EXP: 5/17/2019

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Cinnaminson, NJ 08077
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NJDEP Radon Business Certification # MEB92525
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Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330721

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:

☐ Basement ☐ First Floor ☑ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 5 FT ON PILLAR

2nd DEVICE NUMBER 330639
(If Purchased)

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 5 FT ON PILLAR

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

DISCLAIMER

In no event shall EMSL be liable for indirect, special, consequential, or incidental damages, including, bur not limited to, damages for loss of profit or goodwill regardless of the negligence (either sole or concurrent) of EMSL and whether EMSL has been informed of the possibility of such damages arising out of or in connection with EMSL's services thereunder or the delivery, use, reliance upon or interpretation of test results by client or anythird party. We accept no legal responsibility for the purposes for which the client uses the test results. In no event shall EMSL be liable to a client or any third party, whether based upon theories of tort, contract or any other legal or equitable theory, in excess of the amount paid to EMSL by client thereunder.

EMSL Kit Number: 190333

INDOOR CONDITIONS
Temperature 78 °F Humidity 20 %

EXPOSURE PERIOD
Beginning Date: 6/8/18
Time: 1514 AM / PM (Circle)
Ending Date: 6/11/18
Time: 1210 AM / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☐ Basement ☐ Crawlspace
   - ☑ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED

☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

)OM: 5/17/2018
EXP: 5/17/2019

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200 Route 130 North
Cinnaminson, NJ 08077
Tel: 800-220-3675
www.radontestinglab.com

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NJDEP Radon Business Certification # MEB92525

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Name DAVID NEWMAN
Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330626

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other In Building 4 near MW-33 ~ 3 ft above ground
☐ Location in Room

2nd DEVICE NUMBER 330648

(If Purchased)

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other In Building 4 near MW-33 ~3 ft above ground
☐ Location in Room

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190336

INDOOR CONDITIONS

Temperature 74 °F Humidity 30 %

EXPOSURE PERIOD

Beginning Date: 6 / 8 / 18
Time: 1510 AM / [✓ PM] (Circle)
Ending Date: 6 / 11 / 18
Time: 1200 AM / [✓ PM] (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED

☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

OM: 5/17/2018
EXP: 5/17/2019

EMSL

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www.radontestinglab.com

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NJDEP Radon Business Certification # MEB92525
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Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330732
Sample Type: ☒ Standard ☐ Duplicate ☐ Blank
LOCATION:
☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other Building 4 center along railing (Mezzanine)
☐ Location in Room

2nd DEVICE NUMBER 330676
(If Purchased)
Sample Type: ☒ Standard ☐ Duplicate ☐ Blank
☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other Building 4 Center along railing (mezzanine)
☐ Location in Room

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

DISCLAIMER

In no event shall EMSL be liable for indirect, special, consequential, or incidental damages, including, bur not limited to, damages for loss of profit or goodwill regardless of the negligence (either sole or concurrent) of EMSL and whether EMSL has been informed of the possibility of such damages arising out of or in connection with EMSL's services thereunder or the delivery, use, reliance upon or interpretation of test results by client or anythird
no legal responsibility for the purposes for which the client uses the test
L be liable to a client or any third party, whether based upon
any other legal or equitable theory, in excess of the amount
under.

190316

Inc.

INDOOR CONDITIONS
Temperature 82 °F Humidity 30 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1524 AM / [✓ PM] (Circle)
Ending Date: 6 / 11 / 18
Time: 1229 AM / [✓ PM] (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☒ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House
3. What is the building type?
   - ☐ Residential ☒ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   School Code
   Room Name/Number

PROPERTY TESTED

☐ Same as above
Name FORMER HAMPSHIRE CHEMICA
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

DOM: 5/17/2018
EXP: 5/17/2019

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Cinnaminson, NJ 08077
Tel: 800-220-3675
www.radontestinglab.com

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If you are a certified NJDEP Radon Technician deploying the test kit, use the left hand side of the COC for your Name and Certification #. Use the right hand side for your Name and Certification # for the retrieval of the kit.

SEND WRITTEN REPORT TO:

Name DAVID NEWMAN
Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330628
Sample Type: ☑ Standard ☐ Duplicate ☐ Blank
LOCATION:
☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other MEZZANINE
☐ Location in Room RAILING

2nd DEVICE NUMBER 330636
(If Purchased)
Sample Type: ☑ Standard ☐ Duplicate ☐ Blank
☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other MEZZANINE
☐ Location in Room RAILING
☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

INDOOR CONDITIONS
Temperature 82 °F Humidity 20 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1522 AM / PM (Circle)
Ending Date: 6 / 11 / 18
Time: 1223 AM / [✓ PM] (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☐ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☑ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

EMSL Kit Number: 190326

DOM: 5/17/2018
EXP: 5/17/2019

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Cinnaminson, NJ 08077
Tel: 800-220-3675
www.radontestinglab.com

Radon In Air Data Sheet - NJ

Return this form with the test device to the laboratory:
NJDEP Laboratory Certification # 03036
NJDEP Radon Business Certification # MEB92525
If you are a certified NJDEP Radon Technician deploying the test kit, use the left hand side of the COC for your Name and Certification #. Use the right hand side for your Name and Certification # for the retrieval of the kit.

SEND WRITTEN REPORT TO:

Name DAVID NEWMAN
Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330752

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:

☐ Basement ☑ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other 1ST FLOOR BLDG 9
☐ Location in Room

2nd DEVICE NUMBER 330758
(If Purchased)

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☐ Basement ☑ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other 1ST FLOOR BLDG 9
☑ Location in Room 6 FT SHELF
☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

DISCLAIMER

EMSL Kit Number: 190335

INDOOR CONDITIONS
Temperature 83 °F Humidity 20 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1502 AM / PM (Circle)
Ending Date: 6 / 11 / 18
Time: 1145 [✓ AM] / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☑ Closed House ☐ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☐ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☑ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

OM: 5/17/2018
EXP: 5/17/2019

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Radon In Air Data Sheet - NJ

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City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER AS ~~190325~~ 330729

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other Outside of plant near water (outside of building 7)
☐ Location in Room

2nd DEVICE NUMBER 330643
(If Purchased)

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other Outside of plant (near Building 7) near Water
☐ Location in Room

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190325

Return this form with the test device to the laboratory:
NJDEP Laboratory Certification # 03036
NJDEP Radon Business Certification # MEB92525
If you are a certified NJDEP Radon Technician deploying the test kit, use the left hand side of the COC for your Name and Certification #. Use the right hand side for your Name and Certification # for the retrieval of the kit.

INDOOR CONDITIONS
Temperature 74 °F Humidity 10 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1534 AM / PM (Circle)
Ending Date: 6 / 11 / 18
Time: 1137 [✓ AM] / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House (outside)
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☐ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☑ Other (outside)
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

DOM: 5/17/2018
EXP: 5/17/2019

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
Tel: 800-220-3675
www.radontestinglab.com

Radon In Air Data Sheet - NJ

Return this form with the test device to the laboratory:
NJDEP Laboratory Certification # 03036
NJDEP Radon Business Certification # MEB92525
If you are a certified NJDEP Radon Technician deploying the test kit, use the left hand side of the COC for your Name and Certification #. Use the right hand side for your Name and Certification # for the retrieval of the kit.

SEND WRITTEN REPORT TO:

Name DAVID NEWMAN
Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330605

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:
☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other MOSTLY AT GRADE
☐ Location in Room 5 FT ON PIPE

2nd DEVICE NUMBER 330735
(If Purchased)

Sample Type: ☐ Standard ☐ Duplicate ☐ Blank
☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room
☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190332

INDOOR CONDITIONS
Temperature 82 °F Humidity 20 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1506 AM / PM (Circle)
Ending Date: 6 / 11 / 18
Time: 1153 AM / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☑ Closed House ☐ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☐ Basement ☐ Crawlspace
   - ☑ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED

☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

)OM: 5/17/2018
EXP: 5/17/2019

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Radon In Air Data Sheet - NJ

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Technician Signature

1st DEVICE NUMBER 330606

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:
☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 3FT ON SCAFFOLD

2nd DEVICE NUMBER 330739
(If Purchased)

Sample Type: ☐ Standard ☐ Duplicate ☐ Blank
☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 3FT ON SCAFFOLD

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190337

INDOOR CONDITIONS
Temperature 77 °F Humidity 30 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1512 AM / PM (Circle)
Ending Date: 6 / 11 / 18
Time: 1202 AM / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED

☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

Rev.1 - May 19, 2015

DOM: 5/17/2018
EXP: 5/17/2019

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Radon In Air Data Sheet - NJ

Return this form with the test device to the laboratory:
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NJDEP Radon Business Certification # MEB92525
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Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330663
Sample Type: ☑ Standard ☐ Duplicate ☐ Blank
LOCATION:
☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other Next to building 11A on ledge ~ 7 ft high
☐ Location in Room

2nd DEVICE NUMBER 330718
(If Purchased)
Sample Type: ☑ Standard ☐ Duplicate ☐ Blank
☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other Next to building 11A on ledge ~ 7 ft high
☐ Location in Room

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

INDOOR CONDITIONS
Temperature 82 °F Humidity 30 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1508 AM / [✓ PM] (Circle)
Ending Date: 6 / 11 / 18
Time: 1154 [✓ AM] / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☑ Closed House ☐ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☐ Basement ☐ Crawlspace
   - ☑ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above
Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

DISCLAIMER

EMSL Kit Number: 190331

DOM: 5/17/2018
EXP: 5/17/2019

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Radon In Air Data Sheet - NJ

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NJDEP Radon Business Certification # MEB92525
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Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330920

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other ~4' high on podium (Building 9)
☐ Location in Room

2nd DEVICE NUMBER 330790
(If Purchased)

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other ~4' high on podium (Building 9)
☐ Location in Room

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190334

INDOOR CONDITIONS
Temperature 82 °F Humidity 20 %

EXPOSURE PERIOD
Beginning Date: 6/8/18
Time: 1504 AM / PM (Circle)
Ending Date: 6/11/18
Time: 1147 [✓ AM] / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☑ Closed House ☐ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☐ Basement ☐ Crawlspace
   - ☑ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICA
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

DOM: 5/17/2018
EXP: 5/17/2019

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Radon In Air Data Sheet - NJ

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NJDEP Radon Business Certification # MEB92525

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Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330800

Sample Type: ☐ Standard ☐ Duplicate ☐ Blank

LOCATION:

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other CONTROL ROOM
☐ Location in Room ON SHELF 6' HIGH

2nd DEVICE NUMBER 330662
(If Purchased)

Sample Type: ☐ Standard ☐ Duplicate ☐ Blank

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other CONTROL ROOM
☐ Location in Room ON SHELF 6FT HIGH

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190322

INDOOR CONDITIONS
Temperature 74 °F Humidity 50 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1530 AM / PM (Circle)
Ending Date: 6 / 11 / 18
Time: 1240 AM / [✓ PM] (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☒ Other
2. Test conditions observed:
   - ☑ Closed House ☐ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED

☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

Rev.1 - May 19, 2015

JOM: 5/17/2018
EXP: 5/17/2019

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Radon In Air Data Sheet - NJ

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NJDEP Radon Business Certification # MEB92525
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SEND WRITTEN REPORT TO:

Name DAVID NEWMAN
Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330736

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other Center of Building 4 ~ 5 ft above ground
☐ Location in Room

2nd DEVICE NUMBER 330757
(If Purchased) ~ 5 ft above ground

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other Center of Building 4 ~ 5 ft above ground
☐ Location in Room

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

DISCLAIMER

In no event shall EMSL be liable for indirect, special, consequential, or incidental damages, including, bur not limited to, damages for loss of profit or goodwill regardless of the negligence (either sole or concurrent) of EMSL and whether EMSL has been informed of the possibility of such damages arising out of or in connection with EMSL's services thereunder or the delivery, use, reliance upon or interpretation of test results by client or anythird party. We accept no legal responsibility for the purposes for which the client uses the test results. In no event shall EMSL be liable to a client or any third party, whether based upon theories of tort, contract or any other legal or equitable theory, in excess of the amount paid to EMSL by client thereunder.

EMSL Kit Number: 190329

INDOOR CONDITIONS
Temperature 80 °F Humidity 30 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1516 AM / [✓ PM] (Circle)
Ending Date: 6 / 11 / 18
Time: 1213 AM / [✓ PM] (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

DOM: 5/17/2018
EXP: 5/17/2019

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Radon In Air Data Sheet - NJ

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Name DAVID NEWMAN
Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330725

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:
☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 4 FT ON PILLAR

2nd DEVICE NUMBER 330830
(If Purchased)

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room 4 FT ON PILLAR

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190330

Return this form with the test device to the laboratory:
NJDEP Laboratory Certification # 03036
NJDEP Radon Business Certification # MEB92525
If you are a certified NJDEP Radon Technician deploying the test kit, use the left hand side of the COC for your Name and Certification #. Use the right hand side for your Name and Certification # for the retrieval of the kit.

INDOOR CONDITIONS
Temperature 78 °F Humidity 30 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1518 AM / PM (Circle)
Ending Date: 6 / 11 / 18
Time: 1216 AM / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

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State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330635

Sample Type: ☐ Standard ☑ Duplicate ☐ Blank

LOCATION:

☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other CONTROL ROOM
☐ Location in Room ON LEFT SHELF

2nd DEVICE NUMBER 330632
[If Purchased]

Sample Type: ☐ Standard ☑ Duplicate ☐ Blank

☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other CONTROL ROOM
☐ Location in Room ON LEFT SHELF

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190318

INDOOR CONDITIONS
Temperature 74 °F Humidity 50 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1530 AM / PM (Circle)
Ending Date: 6 / 11 / 18
Time: 1240 AM / [✓ PM] (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☑ Closed House ☐ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED

☐ Same as above

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Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330604

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other outside of Machine Shop
☐ Location in Room

2nd DEVICE NUMBER 330727
(If Purchased)

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other outside of Machine Shop
☐ Location in Room

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

DISCLAIMER

EMSL Kit Number: 190320

INDOOR CONDITIONS °C
Temperature 29 ~~°F~~ Humidity 10 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1532 AM / [✓ PM] (Circle)
Ending Date: 6 / 11 / 18
Time: 1247 AM / [✓ PM] (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House
   - ☑ Open House (outside)
3. What is the building type?
   - ☐ Residential
   - ☑ Non-Residential
   - ☐ Daycare
   - ☐ School
4. What is the building foundation type?
   - ☐ Basement
   - ☐ Crawlspace
   - ☐ Slab on Grade
   - ☑ Other (outside)
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

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State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330693
Sample Type: ☑ Standard ☐ Duplicate ☐ Blank
LOCATION:
☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other Building 4 (SE Corner)
☐ Location in Room

2nd DEVICE NUMBER 330750
(If Purchased)
Sample Type: ☑ Standard ☐ Duplicate ☐ Blank
☐ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☑ Other Building 4 (SE Corner)
☐ Location in Room
☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190327

INDOOR CONDITIONS
Temperature 76 °F Humidity 30 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1520 AM / [✓ PM] (Circle)
Ending Date: 6 / 11 / 18
Time: 1221 AM / [✓ PM] (Circle)

1. Is the radon test being conducted for the purose of:
   ☐ Real Estate transaction, or
   ☐ Homeowner testing, or
   ☑ Other
2. Test conditions observed:
   ☐ Closed House ☑ Open House
3. What is the building type?
   ☐ Residential ☑ Non-Residential
   ☐ Daycare ☐ School
4. What is the building foundation type?
   ☑ Basement ☐ Crawlspace
   ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   School Code
   Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

DOM: 5/17/2018
EXP: 5/17/2019

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
Tel: 800-220-3675
www.radontestinglab.com

Radon In Air Data Sheet - NJ

Return this form with the test device to the laboratory:
NJDEP Laboratory Certification # 03036
NJDEP Radon Business Certification # MEB92525
If you are a certified NJDEP Radon Technician deploying the test kit, use the left hand side of the COC for your Name and Certification #. Use the right hand side for your Name and Certification # for the retrieval of the kit.

SEND WRITTEN REPORT TO:

Name DAVID NEWMAN
Address 299 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330634
Sample Type: ☑ Standard ☐ Duplicate ☐ Blank
LOCATION:
☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room LEDGE 3FT HIGH

2nd DEVICE NUMBER 330690
(If Purchased)
Sample Type: ☑ Standard ☐ Duplicate ☐ Blank
☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other
☐ Location in Room LEDGE 3 FT HIGH

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190323

INDOOR CONDITIONS
Temperature 78 °F Humidity 30 %

EXPOSURE PERIOD
Beginning Date: 6 / 8 / 18
Time: 1526 AM / PM (Circle)
Ending Date: 6 / 11 / 18
Time: 1233 AM / PM (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☑ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED ☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
Tel: 800-220-3675
www.radontestinglab.com

M: 5/17/2018
EXP: 5/17/2019

Radon In Air Data Sheet - NJ

Return this form with the test device to the laboratory:

NJDEP Laboratory Certification # 03036
NJDEP Radon Business Certification # MEB92525

If you are a certified NJDEP Radon Technician deploying the test kit, use the left hand side of the COC for your Name and Certification #. Use the right hand side for your Name and Certification # for the retrieval of the kit.

SEND WRITTEN REPORT TO:

Name DAVID NEWMAN
Address 229 MADISON AVE
City MORRISTOWN
State NJ Zip 07962
Phone 862-242-7061 Fax
Email DAVID.NEWMAN@CH2M.COM
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

1st DEVICE NUMBER 330637

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

LOCATION:

☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other Building 3
☐ Location in Room

2nd DEVICE NUMBER 330784
(If Purchased)

Sample Type: ☑ Standard ☐ Duplicate ☐ Blank

☑ Basement ☐ First Floor ☐ Bedroom ☐ Den
☐ Living Room ☐ Other Building 3
☐ Location in Room

☐ Check here if this is a Post Mitigation test.

The device has been scientifically tested to provide reliable indoor radon measurements when exposed to temperatures between 60 and 80 degrees F; temperatures outside this range will invalidate the test results.

The test device must remain open for 48 to 96 hours

EMSL Kit Number: 190317

INDOOR CONDITIONS

Temperature 74 °F Humidity 30 %

EXPOSURE PERIOD

Beginning Date: 6 / 8 / 18
Time: 1528 AM / [✓ PM] (Circle)
Ending Date: 6 / 11 / 18
Time: 1238 AM / [✓ PM] (Circle)

1. Is the radon test being conducted for the purose of:
   - ☐ Real Estate transaction, or
   - ☐ Homeowner testing, or
   - ☑ Other
2. Test conditions observed:
   - ☐ Closed House ☑ Open House
3. What is the building type?
   - ☐ Residential ☑ Non-Residential
   - ☐ Daycare ☐ School
4. What is the building foundation type?
   - ☑ Basement ☐ Crawlspace
   - ☐ Slab on Grade ☐ Other
5. For School Testing, please enter:
   - School Code
   - Room Name/Number

PROPERTY TESTED

☐ Same as above

Name FORMER HAMPSHIRE CHEMICAL
Address 228 E. MAIN ST
City WATERLOO
State NY Zip 13165
Municipality WATERLOO
Technician Name TAYLOR SALSBURG
Technician Certification #
Technician Signature

Attachment 2
Radon Laboratory Analytical Reports

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-0327
http://www.EMSL.com cinnaminsonradonlab@emsl.com

EMSL Order: 381805375
CustomerID: SVER55
CustomerPO:
ProjectID:

Attn: **David Newman**
Jacobs Engineering
299 Madison Ave
Morristown, NJ 07962

Phone: (862) 242-7061
Fax: (314) 335-5104
Received: 06/14/18 10:40 AM
Analysis Date: 6/18/2018
Collected: 6/8/2018

Project: **Former Hampshire Chemical / 228 E. Main St**

Test Site: **Former Hampshire Chemical**
228 E. Main St
Waterloo, NY 13165

Test Report: Radon in Air Test Results

Samples for EMSL Kit 190332

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330605 *381805375-0001*	Basement - Mostly At Grade - 5ft On Pipe	0	6/8/2018 3:06:00 PM	6/11/2018 11:53:00 AM	82	20	Customer
Sample Notes:							
330735 *381805375-0002*	Basement - Mostly At Grade - 5ft On Pipe	0.1	6/8/2018 3:06:00 PM	6/11/2018 11:53:00 AM	82	20	Customer
Sample Notes:							
Summary for EMSL Kit 190332		**Average Radon Result:**	**0.1 pCi/L**				

Samples for EMSL Kit 190316

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330732 *381805375-0003*	Building 4 - Center Along Railing (Mezzanine)	0.1	6/8/2018 3:24:00 PM	6/11/2018 12:29:00 PM	82	30	Customer
Sample Notes:							
330676 *381805375-0004*	Building 4 - Center Along Railing (Mezzanine)	0.05	6/8/2018 3:24:00 PM	6/11/2018 12:29:00 PM	82	30	Customer
Sample Notes:							
Summary for EMSL Kit 190316		**Average Radon Result:**	**0.1 pCi/L**				

Samples for EMSL Kit 190330

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330725 *381805375-0005*	Basement - 4ft On Pillar	0.1	6/8/2018 3:18:00 PM	6/11/2018 12:16:00 PM	78	30	Customer
Sample Notes:							
330830 *381805375-0006*	Basement - 4ft On Pillar	0.1	6/8/2018 3:18:00 PM	6/11/2018 12:16:00 PM	78	30	Customer
Sample Notes:							
Summary for EMSL Kit 190330		**Average Radon Result:**	**0.1 pCi/L**				

EMSL Order: 381805375
CustomerID: SVER55
CustomerPO:
ProjectID:

Attn: **David Newman**
Jacobs Engineering
299 Madison Ave
Morristown, NJ 07962

Phone: (862) 242-7061
Fax: (314) 335-5104
Received: 06/14/18 10:40 AM
Analysis Date: 6/18/2018
Collected: 6/8/2018

Project: **Former Hampshire Chemical / 228 E. Main St**

Test Site: **Former Hampshire Chemical**
228 E. Main St
Waterloo, NY 13165

Test Report: Radon in Air Test Results

Samples for EMSL Kit 190336

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330626 *381805375-0007*	Building 4 - Near MW-33 - 3ft Above Ground	0.05	6/8/2018 3:10:00 PM	6/11/2018 12:00:00 PM	74	30	Customer
Sample Notes:							
330648 *381805375-0008*	Building 4 - Near MW-33 - 3ft Above Ground	0.1	6/8/2018 3:10:00 PM	6/11/2018 12:00:00 PM	74	30	Customer
Sample Notes:							
Summary for EMSL Kit 190336		**Average Radon Result:**	**0.1 pCi/L**				

Samples for EMSL Kit 190327

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330693 *381805375-0009*	Building 4 - SE Corner	0.1	6/8/2018 3:20:00 PM	6/11/2018 12:21:00 PM	76	30	Customer
Sample Notes:							
330750 *381805375-0010*	Building 4 - SE Corner	0.1	6/8/2018 3:20:00 PM	6/11/2018 12:21:00 PM	76	30	Customer
Sample Notes:							
Summary for EMSL Kit 190327		**Average Radon Result:**	**0.1 pCi/L**				

Samples for EMSL Kit 190320

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330604 *381805375-0011*	Outside Of Machine Shop	0.05	6/8/2018 3:32:00 PM	6/11/2018 12:47:00 PM	84.2	10	Customer
Sample Notes:							
330727 *381805375-0012*	Outside Of Machine Shop	0.1	6/8/2018 3:32:00 PM	6/11/2018 12:47:00 PM	84.2	10	Customer
Sample Notes:							
Summary for EMSL Kit 190320		**Average Radon Result:**	**0.1 pCi/L**				

Attn: **David Newman**
Jacobs Engineering
299 Madison Ave
Morristown, NJ 07962

Phone: (862) 242-7061
Fax: (314) 335-5104
Received: 06/14/18 10:40 AM
Analysis Date: 6/18/2018
Collected: 6/8/2018

Project: **Former Hampshire Chemical / 228 E. Main St**

Test Site: **Former Hampshire Chemical**
228 E. Main St
Waterloo, NY 13165

Test Report: Radon in Air Test Results

Samples for EMSL Kit 190322

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330800 *381805375-0013*	Control Room - On Shelf 6' High	0.1	6/8/2018 3:30:00 PM	6/11/2018 12:40:00 PM	74	50	Customer
Sample Notes:							
330662 *381805375-0014*	Control Room - On Shelf 6' High	0.1	6/8/2018 3:30:00 PM	6/11/2018 12:40:00 PM	74	50	Customer
Sample Notes:							

Summary for EMSL Kit 190322 **Average Radon Result:** **0.1 pCi/L**

Samples for EMSL Kit 190326

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330628 *381805375-0015*	Mezzanine - Railing	0.05	6/8/2018 3:22:00 PM	6/11/2018 12:23:00 PM	82	20	Customer
Sample Notes:							
330636 *381805375-0016*	Mezzanine - Railing	0	6/8/2018 3:22:00 PM	6/11/2018 12:23:00 PM	82	20	Customer
Sample Notes:							

Summary for EMSL Kit 190326 **Average Radon Result:** **0.03 pCi/L**

Samples for EMSL Kit 190317

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330637 *381805375-0017*	Building 3 - Basement	0.1	6/8/2018 3:28:00 PM	6/11/2018 12:38:00 PM	74	30	Customer
Sample Notes:							
330784 *381805375-0018*	Building 3 - Basement	0.1	6/8/2018 3:28:00 PM	6/11/2018 12:38:00 PM	74	30	Customer
Sample Notes:							

Summary for EMSL Kit 190317 **Average Radon Result:** **0.1 pCi/L**

Attn: **David Newman**
Jacobs Engineering
299 Madison Ave
Morristown, NJ 07962

Phone: (862) 242-7061
Fax: (314) 335-5104
Received: 06/14/18 10:40 AM
Analysis Date: 6/18/2018
Collected: 6/8/2018

Project: **Former Hampshire Chemical / 228 E. Main St**

Test Site: **Former Hampshire Chemical**
228 E. Main St
Waterloo, NY 13165

Test Report: Radon in Air Test Results

Samples for EMSL Kit 190329

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330736 *381805375-0019*	Building 4 - Center - 5ft Above Ground	0.1	6/8/2018 3:16:00 PM	6/11/2018 12:13:00 PM	80	30	Customer
Sample Notes:							
330757 *381805375-0020*	Building 4 - Center - 5ft Above Ground	0.1	6/8/2018 3:16:00 PM	6/11/2018 12:13:00 PM	80	30	Customer
Sample Notes:							
Summary for EMSL Kit 190329		**Average Radon Result:**	**0.1 pCi/L**				

Samples for EMSL Kit 190337

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330606 *381805375-0021*	Basement - 3ft On Scaffold	0.1	6/8/2018 3:12:00 PM	6/11/2018 12:02:00 PM	77	30	Customer
Sample Notes:							
330739 *381805375-0022*	Basement - 3ft On Scaffold	0	6/8/2018 3:12:00 PM	6/11/2018 12:02:00 PM	77	30	Customer
Sample Notes:							
Summary for EMSL Kit 190337		**Average Radon Result:**	**0.1 pCi/L**				

Samples for EMSL Kit 190319

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330766 *381805375-0023*			6/8/2018	6/11/2018	0	0	Customer
Sample Notes:	Not Analyzed Radon kit unused. No Location						
330726 *381805375-0024*			6/8/2018	6/11/2018	0	0	Customer
Sample Notes:	Not Analyzed Radon kit unused. No Location						
Summary for EMSL Kit 190319		**Average Radon Result:**	**0.0 pCi/L**				

EMSL Order: 381805375
CustomerID: SVER55
CustomerPO:
ProjectID:

Attn: **David Newman**
Jacobs Engineering
299 Madison Ave
Morristown, NJ 07962

Phone: (862) 242-7061
Fax: (314) 335-5104
Received: 06/14/18 10:40 AM
Analysis Date: 6/18/2018
Collected: 6/8/2018

Project: **Former Hampshire Chemical / 228 E. Main St**

Test Site: **Former Hampshire Chemical**
228 E. Main St
Waterloo, NY 13165

Test Report: Radon in Air Test Results

Samples for EMSL Kit 190328

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330806 *381805375-0025*	Basement - 3ft Ledge	0.3	6/8/2018 3:00:00 PM	6/11/2018 11:25:00 AM	79	30	Customer
Sample Notes:							
330753 *381805375-0026*	Basement - 3ft Ledge	0.4	6/8/2018 3:00:00 PM	6/11/2018 11:25:00 AM	79	30	Customer
Sample Notes:							
Summary for EMSL Kit 190328		**Average Radon Result:**	**0.4 pCi/L**				

Samples for EMSL Kit 190335

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330752 *381805375-0027*	Building 9 - First Floor	0.1	6/8/2018 3:02:00 PM	6/11/2018 11:45:00 AM	83	20	Customer
Sample Notes:							
330758 *381805375-0028*	Building 9 - First Floor	0.1	6/8/2018 3:02:00 PM	6/11/2018 11:45:00 AM	83	20	Customer
Sample Notes:							
Summary for EMSL Kit 190335		**Average Radon Result:**	**0.1 pCi/L**				

Samples for EMSL Kit 190325

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330729 *381805375-0029*	Building 7 - Outside Of Plant Near Water	0.1	6/8/2018 3:34:00 PM	6/11/2018 11:37:00 AM	74	10	Customer
Sample Notes:							
330643 *381805375-0030*	Building 7 - Outside Of Plant Near Water	0.1	6/8/2018 3:34:00 PM	6/11/2018 11:37:00 AM	74	10	Customer
Sample Notes:							
Summary for EMSL Kit 190325		**Average Radon Result:**	**0.1 pCi/L**				

EMSL Order: 381805375
CustomerID: SVER55
CustomerPO:
ProjectID:

Attn: **David Newman**
Jacobs Engineering
299 Madison Ave
Morristown, NJ 07962

Phone: (862) 242-7061
Fax: (314) 335-5104
Received: 06/14/18 10:40 AM
Analysis Date: 6/18/2018
Collected: 6/8/2018

Project: **Former Hampshire Chemical / 228 E. Main St**

Test Site: **Former Hampshire Chemical**
228 E. Main St
Waterloo, NY 13165

Test Report: Radon in Air Test Results

Samples for EMSL Kit 190321

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330741			6/8/2018	6/11/2018	0	0	Customer
381805375-0031							
Sample Notes:	Not Analyzed Radon kit unused. No Location						
330638			6/8/2018	6/11/2018	0	0	Customer
381805375-0032							
Sample Notes:	Not Analyzed Radon kit unused. No Location						

Summary for EMSL Kit 190321 **Average Radon Result:** **0.0 pCi/L**

Samples for EMSL Kit 190318

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330635	Basement - Control Room - On 6ft Shelf	0	6/8/2018	6/11/2018	74	50	Customer
381805375-0033			3:30:00 PM	12:40:00 PM			
Sample Notes:							
330632	Basement - Control Room - On 6ft Shelf	0.2	6/8/2018	6/11/2018	74	50	Customer
381805375-0034			3:30:00 PM	12:40:00 PM			
Sample Notes:							

Summary for EMSL Kit 190318 **Average Radon Result:** **0.1 pCi/L**

Samples for EMSL Kit 190333

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330721	Bedroom - 5ft On Pillar	0.2	6/8/2018	6/11/2018	78	20	Customer
381805375-0035			3:14:00 PM	12:10:00 PM			
Sample Notes:							
330639	Bedroom - 5ft On Pillar	0.1	6/8/2018	6/11/2018	78	20	Customer
381805375-0036			3:14:00 PM	12:10:00 PM			
Sample Notes:							

Summary for EMSL Kit 190333 **Average Radon Result:** **0.2 pCi/L**

EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-0327
http://www.EMSL.com cinnaminsonradonlab@emsl.com

EMSL Order: 381805375
CustomerID: SVER55
CustomerPO:
ProjectID:

Attn: **David Newman**
Jacobs Engineering
299 Madison Ave
Morristown, NJ 07962

Phone: (862) 242-7061
Fax: (314) 335-5104
Received: 06/14/18 10:40 AM
Analysis Date: 6/18/2018
Collected: 6/8/2018

Project: **Former Hampshire Chemical / 228 E. Main St**

Test Site: **Former Hampshire Chemical**
228 E. Main St
Waterloo, NY 13165

Test Report: Radon in Air Test Results

Samples for EMSL Kit 190331

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330663 *381805375-0037*	Basement - Next To Building 11A - On Ledge 7ft High	0.2	6/8/2018 3:08:00 PM	6/11/2018 11:54:00 AM	82	30	Customer
Sample Notes:							
330718 *381805375-0038*	Basement - Next To Building 11A - On Ledge 7ft High	0.1	6/8/2018 3:08:00 PM	6/11/2018 11:54:00 AM	82	30	Customer
Sample Notes:							
Summary for EMSL Kit 190331		**Average Radon Result:**	**0.2 pCi/L**				

Samples for EMSL Kit 190334

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330920 *381805375-0039*	Building 9 - 4' High On Podium	0.1	6/8/2018 3:04:00 PM	6/11/2018 11:47:00 AM	82	20	Customer
Sample Notes:							
330790 *381805375-0040*	Building 9 - 4' High On Podium	0.2	6/8/2018 3:04:00 PM	6/11/2018 11:47:00 AM	82	20	Customer
Sample Notes:							
Summary for EMSL Kit 190334		**Average Radon Result:**	**0.2 pCi/L**				

Samples for EMSL Kit 190323

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330634 *381805375-0041*	Basement - Ledge 3ft High	0.2	6/8/2018 3:26:00 PM	6/11/2018 12:33:00 PM	78	30	Customer
Sample Notes:							
330690 *381805375-0042*	Basement - Ledge 3ft High	0.1	6/8/2018 3:26:00 PM	6/11/2018 12:33:00 PM	78	30	Customer
Sample Notes:							
Summary for EMSL Kit 190323		**Average Radon Result:**	**0.2 pCi/L**				

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-0327
http://www.EMSL.com cinnaminsonradonlab@emsl.com

EMSL Order: 381805375
CustomerID: SVER55
CustomerPO:
ProjectID:

Attn: **David Newman**
Jacobs Engineering
299 Madison Ave
Morristown, NJ 07962

Phone: (862) 242-7061
Fax: (314) 335-5104
Received: 06/14/18 10:40 AM
Analysis Date: 6/18/2018
Collected: 6/8/2018

Project: **Former Hampshire Chemical / 228 E. Main St**

Test Site: **Former Hampshire Chemical**
228 E. Main St
Waterloo, NY 13165

Test Report: Radon in Air Test Results

Samples for EMSL Kit 190324

Liquid Scintillation ID	Location	Radon Activity pCi/L	Start	Stop	Temperature F	Humidity %	Sample Type
330692 *381805375-0043*	Basement - 3ft Ledge	0.3	6/8/2018 3:00:00 PM	6/11/2018 11:25:00 AM	79	30	Customer
Sample Notes:							
330655 *381805375-0044*	Basement - 3ft Ledge	0.3	6/8/2018 3:00:00 PM	6/11/2018 11:25:00 AM	79	30	Customer
Sample Notes:							
Summary for EMSL Kit 190324		**Average Radon Result:**	**0.3 pCi/L**				

The radon test was performed using a liquid scintillation radon detector/s and counted on a liquid scintillation counter using approved EPA testing protocols for Radon in Air testing. The EPA recommends fixing your home if the average of two short-term tests taken in the lowest lived-in level of the home show radon levels that are equal to or greater than 4.0pCi/L.
The EPA recommends retesting your home every two years.

Please contact EMSL Analytical, Inc. or your State Health Department for further information.
All procedures used for generating this report are in complete accordance with the current EPA protocols for the analysis of Radon in Air.

Report Note

Analyst(s)

Racquel Hafiz (40)

Laura C Freeman Peixue Ma

Laura Freeman, Radon Laboratory Manager &
Peixue Ma, Ph.D, NJ Radon Measurement Specialist NJ MES 13502

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ Accreditations: NRSB ARL6006, NJ DEP 03036, MEB 92525, PA 2573, IN 00455, IA L00032, RI RAS-024, ME 20200C, NE RMB-1083, NY ELAP 10872, NM 885-10L, FL RB2034, OH RL-39, NRPP #109000AL, KS-LB-0005, IL RNL2008202.

Initial report from 06/19/2018 15:10:50

Please visit www.radontestinglab.com

Attachment 3

Sulfur Hexafluoride Gas Certificate of Analysis

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
24075 US Hwy 6
Stryker, OH 43557
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number:	X02AR85C2000893	Reference Number:	141-401218965-1
Cylinder Number:	5742913Y	Cylinder Volume:	176.0 CF
Laboratory:	124 - Conley Stryker (SAP) - OH	Cylinder Pressure:	1443 PSIG
Analysis Date:	Jun 06, 2018	Valve Outlet:	580
Lot Number:	141-401218965-1		

Expiration Date: Jun 06, 2021

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
SULFUR HEXAFLUORIDE	15.00 %	15.00 %	+/- 2%
ARGON	Balance		

Victoria Bayliff

Approved for Release

Attachment 4

Soil Vapor Laboratory Analytical Reports

(Provided on CD)

Attachment 5

Long-term Groundwater Monitoring Laboratory Analytical Reports

(Provided on CD)

Attachment 6

Groundwater Source Laboratory Analytical Reports

(Provided on CD)

Attachment 7

Data Quality Evaluations

JACOBS

Memorandum

Data Quality Evaluation for the 2018 Groundwater Monitoring at the Former Hampshire Chemical Corporation Facility

PREPARED FOR:	Dow Chemical Company
PREPARED BY:	Jacobs
DATE:	September 10, 2018

Introduction

The objective of this data quality evaluation (DQE) report is to assess the data quality of analytical results for groundwater samples collected from the Union Carbide Corporation (UCC) Dow Waterloo site in Waterloo, New York. Jacobs collected samples May 31 through June 12, 2018. Guidance for this DQE report came from the following: *Quality Assurance Project Plan, RCRA Facility Investigation, Former Hampshire Chemical Corporation Facility, Waterloo, New York* (Waterloo QAPP, June 2010); the *U.S. Environmental Protection Agency* (EPA) *National Functional Guidelines (NFG) for Superfund Organic Methods Data Review* (January 2017); the *USEPA Contract Laboratory NFG for Inorganic Superfund Methods Data Review, (*January 2017)*;* and, individual method requirements.

The analytical results were evaluated using the criteria of precision, accuracy, representativeness, comparability and completeness (PARCC) as described in the QAPP. This report is intended as a general data quality assessment designed to summarize data issues.

Analytical Data

This DQE report covers 34 groundwater samples, 4 field duplicates (FD), 2 matrix spike (MS)/matrix spike duplicate (MSD) samples, 2 field blanks (FB) and 11 trip blanks (TB). The samples were reported in 10 sample delivery groups identified in Table 1.

TABLE 1. Sample Delivery Groups

2018 Groundwater Monitoring, Dow Waterloo

L1820286	L1820597
L1820793	L1821017
L1821023	L1821305
L1821549	L1821757
L1821978	L1822216

Samples were collected and delivered to Alpha Analytical in Westborough, Massachusetts. The samples were analyzed by one or more of the methods listed in Table 2.

TABLE 2. Analytical Parameters

2018 Groundwater Monitoring, Dow Waterloo

Parameter	Method
Volatile Organic Compounds (VOC)	SW8260C
Semivolatile Organic Compounds (SVOC)	SW8270D
Polyaromatic Hydrocarbons (PAH)	SW8270D SIM
Select Metals (total/dissolved)	SW6020A
Chloride and Sulfate	E300.0
Alkalinity	SM2320B
Nitrate	E353.2
Total Phosphorus	SM4500 P-E
Orthophosphate	SM4500 P-E
Total Organic Carbon (TOC)	SM5310 C
Total Dissolved Solids (TDS)	SM2540C
Ammonia	EPA 350.1
Total Kjeldahl Nitrogen (TKN)	EPA 351.3
Sulfide	SM4500-S2 D
Silica	EPA 200.7

The sample delivery groups were assessed by reviewing the following: (1) the chain of custody documentation; (2) holding-time compliance; (3) initial and continuing calibration criteria; (4) method blanks/field blanks; (5) laboratory control spiking sample/laboratory control spiking sample duplicate (LCS/LCSD) recoveries and precision; (6) MS/MSD recoveries and precision, (7) surrogate spike recoveries, (8) internal standard recoveries, (9) FD precision, and (10) required quality control (QC) samples at the specified frequencies.

Data flags were assigned according to the QAPP. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will only be one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are those listed in the QAPP and are defined below:

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- R = The sample result was rejected due to serious deficiencies in the ability to analyze the sample and meet the QC criteria. The presence or absence of the analyte could not be verified.
- U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

- UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Findings

The overall summaries of the data validation are contained in the following sections. Qualified data are presented in Table 3.

Holding Time and Preservation

All holding time and preservation criteria were met.

Calibration

Initial and continuing calibration analyses were performed as required by the methods and acceptance criteria were met with the following exceptions:

- The relative response factor (RRF) for several analytes was less than criteria in a few VOC initial calibrations (ICAL) and continuing calibration verification standards (CCV), indicating a possible low bias. The data were qualified as estimated detected and non-detected results and flagged “J” and “UJ”, respectively, in the associated samples. In addition, the RRFs for 1,4-dioxane and 2,2-dichloropropane were significantly less than criteria in a few ICALs and CCVs. The non-detected results were rejected for project use and flagged “R” in the associated samples.

- The percent difference (%D) for 1,2-dibromo-3-chloropropane was less than criteria in a few VOC initial calibration verification (ICVs) standards indicating a possible low bias. In addition, the %Ds for several analytes were less than criteria in several VOC CCVs. The data were qualified as estimated non-detected results and flagged “UJ” in the associated samples.

- The %D for pentachlorophenol was less than criteria in one SVOC ICVS, indicating a possible low bias. In addition, the %D for 2,4-dinitrophenol was less than criteria in a few CCVs. The data were qualified as estimated non-detected results and flagged “UJ” in the associated samples.

- The %D for orthophosphate was less than criteria in one CCV associated with Method SM4500-P E, indicating a possible low bias. The result was qualified as an estimated non-detect and flagged “UJ” in the associated sample.

- The %D for sulfide was less than criteria in a few CCVs associated with Method SM4500-S2 D, indicating a possible low bias. The data were qualified as estimated detected results and flagged “J” in the associated samples.

Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination with the following exception:

- Naphthalene was detected at a concentration less than the reporting limit (RL) in one VOC method blank. The data were qualified as not detected and flagged “U” when the associated sample concentrations were less than five times the blank concentration.

Laboratory Control Samples

LCS/LCSDs were analyzed as required and accuracy and precision criteria were met with the following exceptions:

- The recovery for 4-chloroaniline was less than the lower control limit in one SVOC LCS, indicating a possible low bias. The analyte was qualified as an estimated non-detect and flagged “UJ” in the associated sample.
- The relative percent difference (RPD) exceeded criteria for carbon disulfide in one VOC LCS/LCSD. The analyte was qualified as estimated and flagged “J” in the associated sample.

Internal Standards

Internal standards were added to the samples for methods requiring their use and acceptance criteria were met.

Surrogates

Surrogates were added to the samples for methods requiring their use and acceptance criteria were met.

Matrix Spikes

MS/MSD samples were analyzed as required and accuracy and precision criteria were met with the following exceptions:

- Iron was recovered greater than the upper control limit in the MS associated with the metals analysis for sample MW17-053118, indicating a possible high bias. The analyte was qualified as estimated and flagged “J” in the parent sample.
- Sulfate was recovered greater than the upper control limit in the MS associated with Method EPA 300.0 for sample MW33-060518, indicating a possible high bias. The analyte was qualified as estimated and flagged “J” in the parent sample.
- Ammonia was recovered less than the lower control limit in the MSs associated with Method EPA 350.1 for samples MW36-060518 and MW24-061318, indicating a possible low bias. The data were qualified as estimated and flagged “J” in the parent samples.

Post Digestion Spikes

Post digestion spike (PDS) samples were analyzed as required and accuracy criteria were met with the following exception:

- Calcium recovered less than the lower control limit in the PDS for sample PZ07R-060818, indicating a possible low bias. The analyte was qualified as estimated and flagged “J” in the parent sample.

Serial Dilutions

Serial dilutions were analyzed as required and precision criteria were met with the following exception:

- The RPD for magnesium exceeded criteria in the serial dilution for sample MW37-060518. The analyte was qualified as estimated and flagged “J” in the parent sample.

Field Duplicates

FDs were collected as required and precision criteria were met with the following exceptions:

- The RPDs exceeded criteria for several metals in FD pair MW20-060418/ DUP-GW-060418. The data were qualified as estimated and flagged “J” in the FD pair.
- The RPD for sulfide exceeded criteria in FD pair MW02-061218/ DUP-GW-061218. The data were qualified as estimated and flagged “J” in the FD pair.

Laboratory Duplicates

Laboratory duplicates were analyzed as required and precision criteria were met with the following exceptions:

- The RPD for nitrate exceeded criteria in the laboratory duplicate for sample MW37-060518. The analyte was qualified as estimated and flagged “J” in the parent sample.
- The RPD for TDS exceeded criteria in the laboratory duplicate for sample PZ03-060618. The analyte was qualified as estimated and flagged “J” in the parent sample.

Field Blanks

FBs and TBs were collected, analyzed and were free of contamination with the following exceptions:

- Acetone was detected at a concentration less than the RL in the VOC FBs and vinyl chloride was detected at a concentration less than the RL in one VOC TB. The data were qualified as not detected and flagged “U” when the associated sample concentrations were less than 5x (10x for acetone) the blank concentrations.

Sample Quantitation

The RPD between the total phosphorus and orthophosphate concentration exceeded criteria in sample PZ04-061118, where the dissolved orthophosphate concentration was greater than the total concentration. The data were qualified as estimated and flagged “J” in the sample.

Tentatively Identified Compounds

Tentatively identified compounds were reported in the VOC and SVOC analyses to determine the presence/absence of the following analytes in the samples: epichlorohydrin, thioglycolic acid, dithiodiglycolic acid, mercaptopropionic acid, thiodipropionic acid, and dithiodipropionic acid. The library search did not identify these analytes in the samples.

Chain of Custody

Required procedures were followed and COCs were generally free of errors.

Overall Assessment

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected, and the resulting analytical data can be used to support the decision-making process. The following summary highlights the PARCC findings for the above-defined events:

Precision of the data was verified through the review of the field and laboratory data quality indicators that include: FD, LCS/LCSD, MS/MSD, laboratory duplicates and serial dilution RPDs. Precision was generally acceptable; however, a few analytes were qualified as estimated due to FD, LCS/LCSD, laboratory duplicate and/or serial dilution RPD issues. Data users should consider the impact to any result that is qualified as estimated as it may contain a bias which could affect the decision-making process.

Accuracy of the data was verified through the review of the calibration data, LCS/LCSD, internal standard, surrogate, post digestion spike and MS/MSD recoveries, as well as the evaluation of method/calibration/field blank data. Accuracy was generally acceptable; however, a few analytes were qualified as estimated due to calibration, LCS, PDS and/or MS/MSD issues. In addition, 2,2-dichloropropane was rejected for project use in two VOC samples and 1,4-dioxane was rejected for project use in multiple VOC samples due to calibration issues. Acetone, naphthalene and vinyl chloride were qualified as not detected in a few samples due to field/method and/or trip blank contamination.

Representativeness of the data was verified through the sample's collection, storage and preservation procedures and the verification of holding-time compliance. No issues were reported for sample collection or storage procedures. The data were reported from analyses within the EPA recommended holding time.

Comparability of the data was verified through the use of standard EPA analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.

Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid with the exception of 1,4-dioxane and 2,2-dichloropropane. The completeness goal of 95 percent was met for all method/analytes combinations except for 1,4-dioxane (24%) and 2,2-dichloropropane (94%).

The data can be used for project decisions taking into consideration the validation flags applied to the samples.

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
Sample ID	**Method**	**Analyte**	**Unit**	**Final Result**	**Validation Flag**	**Validation Reason**
DUP-GW-053118	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	0.17	UJ	CCVRRF
DUP-GW-053118	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
DUP-GW-053118	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	CCV<LCL
DUP-GW-053118	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
DUP-GW-053118	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
DUP-GW-053118	SW8260C	2-Butanone	ug/l	1.9	UJ	CCVRRF, ICRRF
DUP-GW-053118	SW8260C	2-Hexanone	ug/l	1.0	UJ	CCVRRF, ICRRF
DUP-GW-053118	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	CCVRRF, ICRRF
DUP-GW-053118	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
DUP-GW-053118	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
DUP-GW-053118	SW8260C	Bromomethane	ug/l	0.70	UJ	CCVRRF, ICRRF
DUP-GW-053118	SW8260C	Chloroethane	ug/l	0.70	UJ	CCVRRF, ICRRF
DUP-GW-053118	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
DUP-GW-053118	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
DUP-GW-053118	SW8260C	Trichloroethene	ug/l	0.18	UJ	CCVRRF, ICRRF
DUP-GW-060418	SW6020A	Aluminum	mg/l	0.0570	J	FD>RPD
DUP-GW-060418	SW6020A	Iron	mg/l	0.0850	J	FD>RPD
DUP-GW-060418	SW6020A	Manganese	mg/l	0.00961	J	FD>RPD
DUP-GW-060418	SW6020A	Potassium	mg/l	1.83	J	FD>RPD
DUP-GW-060418	SW6020A	Sodium	mg/l	29.7	J	FD>RPD
DUP-GW-060418	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	0.17	UJ	CCVRRF
DUP-GW-060418	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
DUP-GW-060418	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	CCV<LCL
DUP-GW-060418	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
DUP-GW-060418	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
DUP-GW-060418	SW8260C	2,2-Dichloropropane	ug/l	0.70	R	ICRRF
DUP-GW-060418	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
DUP-GW-060418	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
DUP-GW-060418	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
DUP-GW-060418	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
DUP-GW-060418	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
DUP-GW-060418	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
DUP-GW-060418	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
DUP-GW-060418	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
DUP-GW-060418	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
DUP-GW-060418	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
DUP-GW-060418	SW8270D	2,4-Dinitrophenol	ug/l	6.6	UJ	CCV<LCL

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
DUP-GW-060418	SW8270DSIM	Pentachlorophenol	ug/l	0.01	UJ	ICVS<LCL
DUP-GW-061218	SM4500-S2 D	Sulfide	mg/l	64	J	FD>RPD, CCV<LCL
DUP-GW-061218	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
DUP-GW-061218	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
DUP-GW-061218	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
DUP-GW-061218	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
DUP-GW-061218	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
DUP-GW-061218	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
DUP-GW-061218	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
DUP-GW-061218	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
DUP-GW-061218	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
DUP-GW-061218	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
DUP-GW-061218	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF
MW01-061218	SM4500-S2 D	Sulfide	mg/l	0.17	J	CCV<LCL
MW01-061218	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
MW01-061218	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW01-061218	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW01-061218	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
MW01-061218	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
MW01-061218	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
MW01-061218	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
MW01-061218	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW01-061218	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW01-061218	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
MW01-061218	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF
MW02-061218	SM4500-S2 D	Sulfide	mg/l	17	J	FD>RPD, CCV<LCL
MW02-061218	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
MW02-061218	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW02-061218	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW02-061218	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF
MW02-061218	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF
MW02-061218	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF
MW02-061218	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
MW02-061218	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW02-061218	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF
MW02-061218	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
MW02-061218	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF
MW03-060518	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	4.2	UJ	CCVRRF
MW03-060518	SW8260C	1,2,3-Trichlorobenzene	ug/l	18	UJ	CCV<LCL
MW03-060518	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	18	UJ	ICVS<LCL, CCV<LCL
MW03-060518	SW8260C	1,3-Dichloropropene, cis-	ug/l	3.6	UJ	ICRRF
MW03-060518	SW8260C	1,4-Dioxane	ug/l	1500	R	ICRRF, CCVRRF, CCV<LCL
MW03-060518	SW8260C	2-Butanone	ug/l	48	J	ICRRF, CCVRRF
MW03-060518	SW8260C	2-Hexanone	ug/l	25	UJ	ICRRF, CCVRRF
MW03-060518	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1200	J	ICRRF, CCVRRF
MW03-060518	SW8260C	Bromochloromethane	ug/l	18	UJ	ICRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW03-060518	SW8260C	Bromodichloromethane	ug/l	4.8	UJ	ICRRF
MW03-060518	SW8260C	Bromomethane	ug/l	18	UJ	ICRRF, CCVRRF
MW03-060518	SW8260C	Chloroethane	ug/l	18	UJ	ICRRF, CCVRRF
MW03-060518	SW8260C	Dibromomethane	ug/l	25	UJ	ICRRF
MW03-060518	SW8260C	Naphthalene	ug/l	18	UJ	CCV<LCL
MW03-060518	SW8260C	Trichloroethene	ug/l	4.4	UJ	ICRRF, CCVRRF
MW06-060418	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	0.17	UJ	CCVRRF
MW06-060418	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
MW06-060418	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL, CCV<LCL
MW06-060418	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW06-060418	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW06-060418	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
MW06-060418	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
MW06-060418	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
MW06-060418	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
MW06-060418	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW06-060418	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW06-060418	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW06-060418	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
MW06-060418	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
MW06-060418	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
MW06-060418	SW8270D	2,4-Dinitrophenol	ug/l	6.6	UJ	CCV<LCL
MW06-060418	SW8270DSIM	Pentachlorophenol	ug/l	0.01	UJ	ICVS<LCL
MW07-060118	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	0.17	UJ	CCVRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW07-060118	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
MW07-060118	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	CCV<LCL
MW07-060118	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW07-060118	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW07-060118	SW8260C	2-Butanone	ug/l	1.9	UJ	CCVRRF, ICRRF
MW07-060118	SW8260C	2-Hexanone	ug/l	1.0	UJ	CCVRRF, ICRRF
MW07-060118	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	CCVRRF, ICRRF
MW07-060118	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
MW07-060118	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW07-060118	SW8260C	Bromomethane	ug/l	0.70	UJ	CCVRRF, ICRRF
MW07-060118	SW8260C	Chloroethane	ug/l	0.70	UJ	CCVRRF, ICRRF
MW07-060118	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
MW07-060118	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
MW07-060118	SW8260C	Trichloroethene	ug/l	0.18	UJ	CCVRRF, ICRRF
MW07-060118	SW8270D	2,4-Dinitrophenol	ug/l	6.6	UJ	CCV<LCL
MW07-060118	SW8270D	4-Chloroaniline	ug/l	1.1	UJ	LCS<LCL
MW09R-061218	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
MW09R-061218	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW09R-061218	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW09R-061218	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
MW09R-061218	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
MW09R-061218	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
MW09R-061218	SW8260C	Acetone	ug/l	1.8	U	FB<RL

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW09R-061218	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
MW09R-061218	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW09R-061218	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW09R-061218	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
MW09R-061218	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF
MW09R-061218	SW8270DSIM	Pentachlorophenol	ug/l	0.01	UJ	ICVS<LCL
MW10-060618	SW8270D	2,4-Dinitrophenol	ug/l	6.6	UJ	CCV<LCL
MW10-060618	SW8270DSIM	Pentachlorophenol	ug/l	0.01	UJ	ICVS<LCL
MW11S-061218	SM4500-S2 D	Sulfide	mg/l	0.26	J	CCV<LCL
MW16I-060618	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
MW16I-060618	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW16I-060618	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF
MW16I-060618	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
MW16I-060618	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
MW16I-060618	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
MW16I-060618	SW8260C	Acetone	ug/l	4.8	U	FB<RL
MW16I-060618	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW16I-060618	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW16I-060618	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF, CCV<LCL
MW16I-060618	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW16I-060618	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF, CCVRRF
MW16I-060618	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
MW17-053118	SW6020A	Iron	mg/l	6.63	J	MS>UCL
MW17-053118	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	0.17	UJ	CCVRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW17-053118	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
MW17-053118	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	CCV<LCL
MW17-053118	SW8260C	1,4-Dioxane	ug/l	61	UJ	CCV<LCL
MW17-053118	SW8260C	2-Butanone	ug/l	1.9	UJ	CCVRRF
MW17-053118	SW8260C	2-Hexanone	ug/l	1.0	UJ	CCVRRF
MW17-053118	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	CCVRRF
MW17-053118	SW8260C	Bromomethane	ug/l	0.70	UJ	CCVRRF
MW17-053118	SW8260C	Chloroethane	ug/l	0.70	UJ	CCVRRF
MW17-053118	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
MW17-053118	SW8260C	Trichloroethene	ug/l	0.18	UJ	CCVRRF
MW18-053118	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	0.17	UJ	CCVRRF
MW18-053118	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
MW18-053118	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	CCV<LCL
MW18-053118	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW18-053118	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW18-053118	SW8260C	2-Butanone	ug/l	1.9	UJ	CCVRRF, ICRRF
MW18-053118	SW8260C	2-Hexanone	ug/l	1.0	UJ	CCVRRF, ICRRF
MW18-053118	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	CCVRRF, ICRRF
MW18-053118	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
MW18-053118	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW18-053118	SW8260C	Bromomethane	ug/l	0.70	UJ	CCVRRF, ICRRF
MW18-053118	SW8260C	Chloroethane	ug/l	0.70	UJ	CCVRRF, ICRRF
MW18-053118	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
MW18-053118	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW18-053118	SW8260C	Trichloroethene	ug/l	0.18	UJ	CCVRRF, ICRRF
MW19-061118	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
MW19-061118	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW19-061118	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW19-061118	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
MW19-061118	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
MW19-061118	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
MW19-061118	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW19-061118	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW19-061118	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW19-061118	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW19-061118	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF, CCVRRF
MW19-061118	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
MW19-061118	SW8260C	Trichloroethene	ug/l	1.2	J	ICRRF, CCVRRF
MW19-061118	SW8260C	Vinyl Chloride	ug/l	1.2	U	TB<RL
MW19-061118	SW8270DSIM	Pentachlorophenol	ug/l	0.01	UJ	ICVS<LCL
MW20-060418	SW6020A	Aluminum	mg/l	0.0774	J	FD>RPD
MW20-060418	SW6020A	Iron	mg/l	0.370	J	FD>RPD
MW20-060418	SW6020A	Manganese	mg/l	0.03211	J	FD>RPD
MW20-060418	SW6020A	Potassium	mg/l	3.37	J	FD>RPD
MW20-060418	SW6020A	Sodium	mg/l	15.3	J	FD>RPD
MW20-060418	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
MW20-060418	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	CCV<LCL
MW20-060418	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW20-060418	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW20-060418	SW8260C	2,2-Dichloropropane	ug/l	0.70	R	ICRRF
MW20-060418	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
MW20-060418	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
MW20-060418	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
MW20-060418	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
MW20-060418	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW20-060418	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW20-060418	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW20-060418	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
MW20-060418	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
MW20-060418	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
MW20-060418	SW8270D	2,4-Dinitrophenol	ug/l	6.6	UJ	CCV<LCL
MW20-060418	SW8270DSIM	Pentachlorophenol	ug/l	0.01	UJ	ICVS<LCL
MW21-061218	SM4500-S2 D	Sulfide	mg/l	47	J	CCV<LCL
MW24-061318	E350.1	Ammonia	mg/l	2.17	J	MS<LCL
MW26-060118	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	0.17	UJ	CCVRRF
MW26-060118	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
MW26-060118	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	CCV<LCL
MW26-060118	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW26-060118	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW26-060118	SW8260C	2-Butanone	ug/l	1.9	UJ	CCVRRF, ICRRF
MW26-060118	SW8260C	2-Hexanone	ug/l	1.0	UJ	CCVRRF, ICRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW26-060118	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	CCVRRF, ICRRF
MW26-060118	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
MW26-060118	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW26-060118	SW8260C	Bromomethane	ug/l	0.70	UJ	CCVRRF, ICRRF
MW26-060118	SW8260C	Chloroethane	ug/l	0.70	UJ	CCVRRF, ICRRF
MW26-060118	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
MW26-060118	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
MW26-060118	SW8260C	Trichloroethene	ug/l	0.18	UJ	CCVRRF, ICRRF
MW30-061218	SM4500-S2 D	Sulfide	mg/l	1.8	J	CCV<LCL
MW31-060818	SM4500-S2 D	Sulfide	mg/l	0.50	J	CCV<LCL
MW33-060518	E300.0	Sulfate	mg/l	235	J	MS>UCL
MW33-060518	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
MW33-060518	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW33-060518	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF
MW33-060518	SW8260C	2-Butanone	ug/l	2.5	J	ICRRF, CCVRRF
MW33-060518	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
MW33-060518	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
MW33-060518	SW8260C	Acetone	ug/l	14	U	FB<RL
MW33-060518	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW33-060518	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW33-060518	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF, CCV<LCL
MW33-060518	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW33-060518	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF, CCVRRF
MW33-060518	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW34-060718	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
MW34-060718	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW34-060718	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
MW34-060718	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
MW34-060718	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
MW34-060718	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
MW34-060718	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW34-060718	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
MW34-060718	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW34-060718	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW34-060718	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF, CCVRRF
MW34-060718	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
MW34-060718	SW8260C	Trichloroethene	ug/l	0.22	J	ICRRF, CCVRRF
MW36-060518	E350.1	Ammonia	mg/l	0.245	J	MS<LCL
MW37-060518	E353.2	Nitrate	mg/l	0.14	J	LabDupeRPD
MW37-060518	SW6020A	Magnesium	mg/l	76.7	J	SerDilRPD
MW5I-060618	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
MW5I-060618	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
MW5I-060618	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF
MW5I-060618	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
MW5I-060618	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
MW5I-060618	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
MW5I-060618	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW5I-060618	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW5I-060618	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF, CCV<LCL
MW5I-060618	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
MW5I-060618	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF, CCVRRF
MW5I-060618	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
MW5I-060618	SW8270D	2,4-Dinitrophenol	ug/l	6.6	UJ	CCV<LCL
MW5I-060618	SW8270DSIM	Pentachlorophenol	ug/l	0.01	UJ	ICVS<LCL
PZ01-060418	SW8260C	1,1,1,2-Tetrachloroethane	ug/l	0.70	UJ	CCVRRF
PZ01-060418	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
PZ01-060418	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL, CCV<LCL
PZ01-060418	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
PZ01-060418	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
PZ01-060418	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
PZ01-060418	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ01-060418	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ01-060418	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
PZ01-060418	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
PZ01-060418	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ01-060418	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ01-060418	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
PZ01-060418	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
PZ01-060418	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
PZ03-060618	SM2540C	Total Dissolved Solids	mg/l	1400	J	LabDupeRPD
PZ03-060618	SM4500-P E	Orthophosphate	mg/l	0.003	J	CCV<LCL

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
PZ03-060618	SM4500-S2 D	Sulfide	mg/l	0.18	J	CCV<LCL
PZ03-060618	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
PZ03-060618	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
PZ03-060618	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF
PZ03-060618	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
PZ03-060618	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ03-060618	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ03-060618	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ03-060618	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
PZ03-060618	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF,CCVRRF, CCV<LCL
PZ03-060618	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ03-060618	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ03-060618	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
PZ04-061118	SM4500-P E	Orthophosphate	mg/l	0.461	J	Diss>Total
PZ04-061118	SM4500-P E	Phosphorus, Total	mg/l	0.295	J	Diss>Total
PZ04-061118	SM4500-S2 D	Sulfide	mg/l	64	J	CCV<LCL
PZ04-061118	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
PZ04-061118	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
PZ04-061118	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
PZ04-061118	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
PZ04-061118	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ04-061118	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ04-061118	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ04-061118	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
PZ04-061118	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ04-061118	SW8260C	Carbon Disulfide	ug/l	6.0	J	LCSRPD
PZ04-061118	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ04-061118	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ04-061118	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
PZ04-061118	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
PZ06-060818	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
PZ06-060818	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF
PZ06-060818	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
PZ06-060818	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ06-060818	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ06-060818	SW8260C	Acetone	ug/l	6.8	U	FB<RL
PZ06-060818	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
PZ06-060818	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
PZ06-060818	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ06-060818	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ06-060818	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
PZ06-060818	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF
PZ07R-060818	SM4500-S2 D	Sulfide	mg/l	9.3	J	CCV<LCL
PZ07R-060818	SW6020A	Calcium	mg/l	146	J	PDS<LCL
PZ07R-060818	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
PZ07R-060818	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
PZ07R-060818	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
PZ07R-060818	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
PZ07R-060818	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ07R-060818	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ07R-060818	SW8260C	Acetone	ug/l	1.6	U	FB<RL
PZ07R-060818	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ07R-060818	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
PZ07R-060818	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ07R-060818	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
PZ07R-060818	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF, CCVRRF
PZ07R-060818	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
PZ07R-060818	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
SV05-060518	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL
SV05-060518	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
SV05-060518	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF
SV05-060518	SW8260C	2-Butanone	ug/l	4.4	J	ICRRF, CCVRRF
SV05-060518	SW8260C	2-Hexanone	ug/l	3.2	J	ICRRF, CCVRRF
SV05-060518	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	ICRRF, CCVRRF
SV05-060518	SW8260C	Acetone	ug/l	5.5	U	FB<RL
SV05-060518	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF, CCVRRF
SV05-060518	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
SV05-060518	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF, CCV<LCL
SV05-060518	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
SV05-060518	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF, CCVRRF
SV05-060518	SW8260C	Trichloroethene	ug/l	0.18	J	ICRRF, CCVRRF
SV12-060418	SW8260C	1,1,1,2-Tetrachloroethane	ug/l	0.70	UJ	CCVRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
SV12-060418	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
SV12-060418	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	ICVS<LCL, CCV<LCL
SV12-060418	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
SV12-060418	SW8260C	1,4-Dioxane	ug/l	61	R	ICRRF, CCVRRF, CCV<LCL
SV12-060418	SW8260C	2-Butanone	ug/l	1.9	UJ	ICRRF, CCVRRF
SV12-060418	SW8260C	2-Hexanone	ug/l	1.0	UJ	ICRRF, CCVRRF
SV12-060418	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	3.4	J	ICRRF, CCVRRF
SV12-060418	SW8260C	Acetone	ug/l	1.5	U	FB<RL
SV12-060418	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF
SV12-060418	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
SV12-060418	SW8260C	Bromomethane	ug/l	0.70	UJ	ICRRF, CCVRRF
SV12-060418	SW8260C	Chloroethane	ug/l	0.70	UJ	ICRRF, CCVRRF
SV12-060418	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
SV12-060418	SW8260C	Naphthalene	ug/l	0.90	U	LB<RL, CCV<LCL
SV12-060418	SW8260C	Trichloroethene	ug/l	0.18	UJ	ICRRF, CCVRRF
TW01-053118	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	0.17	UJ	CCVRRF
TW01-053118	SW8260C	1,2,3-Trichlorobenzene	ug/l	0.70	UJ	CCV<LCL
TW01-053118	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	0.70	UJ	CCV<LCL
TW01-053118	SW8260C	1,3-Dichloropropene, cis-	ug/l	0.14	UJ	ICRRF
TW01-053118	SW8260C	1,4-Dioxane	ug/l	61	UJ	CCV<LCL
TW01-053118	SW8260C	2-Butanone	ug/l	1.9	UJ	CCVRRF
TW01-053118	SW8260C	2-Hexanone	ug/l	1.0	UJ	CCVRRF
TW01-053118	SW8260C	4-Methyl-2-Pentanone (MIBK)	ug/l	1.0	UJ	CCVRRF
TW01-053118	SW8260C	Bromochloromethane	ug/l	0.70	UJ	ICRRF

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
TW01-053118	SW8260C	Bromodichloromethane	ug/l	0.19	UJ	ICRRF
TW01-053118	SW8260C	Bromomethane	ug/l	0.70	UJ	CCVRRF
TW01-053118	SW8260C	Chloroethane	ug/l	0.70	UJ	CCVRRF
TW01-053118	SW8260C	Dibromomethane	ug/l	1.0	UJ	ICRRF
TW01-053118	SW8260C	Naphthalene	ug/l	0.70	UJ	CCV<LCL
TW01-053118	SW8260C	Trichloroethene	ug/l	0.18	UJ	CCVRRF

Validation Reasons:

CCV<LCL	The continuing calibration verification standard recovery was less than criteria
CCVRRF	The continuing calibration verification relative response factor was less than criteria
Diss>Total	The dissolved concentration was greater than the total concentration
FB<RL	The analyte was detected in the field blank at a concentration less than the reporting limit
FD>RPD	The relative percent difference exceeded criteria in the FD pair
ICRRF	The initial calibration relative response factor was less than criteria
ICVS<LCL	The initial calibration verification standard recovery was less than criteria
LabDupRPD	The relative percent difference exceeded criteria in the laboratory duplicate
LB<RL	The analyte was detected in the method blank at a concentration less than the reporting limit
LCS<LCL	The laboratory control sample recovery was less than the lower control limit
LCSRPD	The relative percent difference exceeded criteria in the LCS/LCSD
MS<LCL	The matrix spike sample recovery was less than the lower control limit
MS>UCL	The matrix spike sample recovery was greater than the upper control limit
PDS<LCL	The post digestion spike sample recovery was less than the lower control limit
SerDilRPD	The relative percent difference exceeded criteria in the serial dilution
TB<RL	The analyte was detected in the trip blank at a concentration less than the reporting limit

TABLE 3. Data Qualification Summary

2018 Groundwater Monitoring, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason

Note:

µg/L = micrograms per liter
mg/L = milligrams per liter

JACOBS Memorandum

Data Quality Evaluation for the 2018 Hydrogen Sulfide Groundwater Investigation at the Former Hampshire Chemical Corporation Facility

PREPARED FOR:	Dow Chemical Company
PREPARED BY:	Jacobs
DATE:	September 10, 2018

Introduction

The objective of this data quality evaluation (DQE) report is to assess the data quality of analytical results for groundwater samples collected from the Union Carbide Corporation (UCC) Dow Waterloo site in Waterloo, New York. Jacobs collected samples June 4 through June 12, 2018. Guidance for this DQE report came from the following: *Quality Assurance Project Plan, RCRA Facility Investigation, Former Hampshire Chemical Corporation Facility, Waterloo, New York* (Waterloo QAPP, June 2010); the *U.S. Environmental Protection Agency* (EPA) *USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review, January 2017;* and, individual method requirements.

The analytical results were evaluated using the criteria of precision, accuracy, representativeness, comparability and completeness (PARCC) as described in the QAPP. This report is intended as a general data quality assessment designed to summarize data issues.

Analytical Data

This DQE report covers 13 groundwater samples and 2 field duplicates (FD). The samples were reported in seven sample delivery groups identified in Table 1.

TABLE 1. Sample Delivery Groups

2018 Groundwater Monitoring, Dow Waterloo

L1820596	L1820783
L1821028	L1821306
L1821548	L1821758
L1821979	

Samples were collected and delivered to Alpha Analytical in Westborough, Massachusetts. The samples were analyzed by the methods listed in Table 2.

TABLE 2. Analytical Parameters

2018 H2S Groundwater Investigation, Dow Waterloo

Parameter	Method
Sulfur	SW6010C

TABLE 2. Analytical Parameters

2018 H2S Groundwater Investigation, Dow Waterloo

Parameter	Method
Sulfide	SM4500-SO3 B

The sample delivery groups were assessed by reviewing the following: (1) the chain of custody documentation; (2) holding-time compliance; (3) initial and continuing calibration criteria; (4) method blanks; (5) laboratory control spiking sample/laboratory control spiking sample duplicate (LCS/LCSD) recoveries and precision; (6) MS/MSD recoveries and precision, (7) FD precision, and (8) required quality control (QC) samples at the specified frequencies.

Data flags were assigned according to the QAPP. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will only be one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are those listed in the QAPP and are defined below:

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- R = The sample result was rejected due to serious deficiencies in the ability to analyze the sample and meet the QC criteria. The presence or absence of the analyte could not be verified.
- U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Findings

The overall summaries of the data validation are contained in the following sections. Qualified data are presented in Table 3.

Holding Time and Preservation

All holding time and preservation criteria were met with the following exception:

- Sample MW21-061218 was received with a pH greater than the recommended criteria for the sulfur analysis. The laboratory added additional preservative; however, the pH did not adjust. The result was qualified as estimated and flagged “J” in the sample.

Calibration

Initial and continuing calibration analyses were performed as required by the methods and acceptance criteria were met.

Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination.

Laboratory Control Samples

LCS/LCSDs were analyzed as required and accuracy and precision criteria were met.

Matrix Spikes

MS/MSD samples were analyzed as required and accuracy and precision criteria were met.

Post Digestion Spikes

Post digestion spike (PDS) samples were analyzed as required and accuracy criteria were met.

Serial Dilutions

Serial dilutions were analyzed as required and precision criteria were met.

Field Duplicates

FDs were collected as required and precision criteria were met.

Laboratory Duplicates

Laboratory duplicates were analyzed as required and precision criteria were met.

Chain of Custody

Required procedures were followed and COCs were generally free of errors.

Overall Assessment

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected, and the resulting analytical data can be used to support the decision-making process. The following summary highlights the PARCC findings for the above-defined events:

Precision of the data was verified through the review of the field and laboratory data quality indicators that include: FD, LCS/LCSD, MS/MSD, laboratory duplicates and serial dilution RPDs. Precision was acceptable.

Accuracy of the data was verified through the review of the calibration data, LCS/LCSD, post digestion spike and MS/MSD recoveries, as well as the evaluation of method/calibration blank data. Accuracy was acceptable.

Representativeness of the data was verified through the sample’s collection, storage and preservation procedures and the verification of holding-time compliance. No issues were reported for sample collection or storage procedures. Sample MW21-0612118 was received above the recommended pH for sulfur analysis, resulting in the data being qualified as estimated. The data were reported from analyses within the EPA recommended holding time. Data users should consider the impact to any result that is qualified as estimated as it may contain a bias which could affect the decision-making process.

Comparability of the data was verified through the use of standard EPA analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.

Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal of 95 percent was met for all method/analytes combinations.

The data can be used for project decisions taking into consideration the validation flags applied to the samples.

TABLE 3. Data Qualification Summary

2018 H2S Groundwater Investigation, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
MW21-061218	SW6010C	Sulfur	mg/l	392	J	Preservation

Validation Reasons:

Preservation	The sample was received with a pH greater than criteria

Note:
mg/L = milligrams per liter

Memorandum

Data Quality Evaluation for the 2018 Hydrogen Sulfide Soil Vapor Investigation at the Former Hampshire Chemical Corporation Facility

PREPARED FOR:	Dow Chemical Company
PREPARED BY:	Jacobs
DATE:	September 10, 2018

Introduction

The objective of this data quality evaluation (DQE) report is to assess the data quality of analytical results for soil vapor samples collected from the Union Carbide Corporation (UCC) Dow Waterloo site in Waterloo, New York. Jacobs collected samples May 30 through June 18, 2018. Guidance for this DQE report came from the following: *Quality Assurance Project Plan, RCRA Facility Investigation, Former Hampshire Chemical Corporation Facility, Waterloo, New York* (Waterloo QAPP, June 2010); the *U.S. Environmental Protection Agency* (EPA) *National Functional Guidelines for Superfund Organic Methods Data Review* (January 2017); and, individual method requirements.

The analytical results were evaluated using the criteria of precision, accuracy, representativeness, comparability and completeness (PARCC) as described in the QAPP. This report is intended as a general data quality assessment designed to summarize data issues.

Analytical Data

This DQE report covers nine soil vapor samples and three field duplicates (FD). The samples were reported in two sample delivery groups identified as C1806021 and C1806037.

Samples were collected and delivered to Centek Laboratories, LLC in Syracuse, New York. The samples were analyzed by the methods listed in Table 1.

TABLE 1. Analytical Parameters

2018 Hydrogen Sulfide Soil Vapor Investigation, Dow Waterloo

Parameter	Method
Volatile Organic Compounds (VOC)	TO-15
Low Level Sulfur Compounds	TO-15
Fixed Gases	EPA 3C

The sample delivery groups were assessed by reviewing the following: (1) the chain of custody documentation; (2) holding-time compliance; (3) initial and continuing calibration criteria; (4) method blanks; (5) laboratory control spiking sample/laboratory control spiking sample duplicate (LCS/LCSD) recoveries and precision; (6) surrogate spike recoveries, (7) internal standard recoveries, (8) FD precision, and (9) required quality control (QC) samples at the specified frequencies.

Data flags were assigned according to the QAPP. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will only be one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are those listed in the QAPP and are defined below:

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- R = The sample result was rejected due to serious deficiencies in the ability to analyze the sample and meet the QC criteria. The presence or absence of the analyte could not be verified.
- U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Findings

The overall summaries of the data validation are contained in the following sections. Qualified data are presented in Table 2.

Holding Time and Preservation

All holding time and preservation criteria were met.

Calibration

Initial and continuing calibration analyses were performed as required by the methods and acceptance criteria were met.

Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination.

Laboratory Control Samples

LCS/LCSDs were analyzed as required and accuracy and precision criteria were met with the following exceptions:

- The recovery for bromodichloromethane was less than the lower control limit in one LCSD, indicating a possible low bias. The data were qualified as estimated non-detected results and flagged “UJ” in the associated samples.
- The relative percent difference (RPD) exceeded criteria for multiple analytes in one VOC LCS/LCSD; however, the data were not impacted and were not qualified.

Internal Standards

Internal standards (IS) were added to the samples for methods requiring their use and acceptance criteria were met with the following exceptions:

- One or more ISs were recovered greater than the upper control limits in a few samples associated with the VOC and low level sulfur analyses. The associated detected results were qualified as estimated and flagged “J” in the respective samples. Non-detected results were not qualified.

Surrogates

Surrogates were added to the samples for methods requiring their use and acceptance criteria were met.

Field Duplicates

FDs were collected as required and precision criteria were met with the following exception:

- The RPD exceeded criteria for Freon 12 in FD pair WAT-MW19-060718/ DUP-MW-060718. The data were qualified as estimated and flagged "J" in the FD pair.

Laboratory Duplicates

Laboratory duplicates were analyzed as required and precision criteria were met.

Tentatively Identified Compounds

Tentatively identified compounds were reported in the VOC and Low Level Sulfur analyses; however, due to the number of TICs reported in each sample, the data are not listed in Table 2.

Chain of Custody

Required procedures were followed and COCs were generally free of errors.

Overall Assessment

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected, and the resulting analytical data can be used to support the decision-making process. The following summary highlights the PARCC findings for the above-defined events:

Precision of the data was verified through the review of the field and laboratory data quality indicators that include: FD, LCS/LCSD and/or laboratory duplicates RPDs. Precision was generally acceptable; however, Freon 12 was qualified as estimated in two samples due to FD RPD issues. Data users should consider the impact to any result that is qualified as estimated as it may contain a bias which could affect the decision-making process.

Accuracy of the data was verified through the review of the calibration data, LCS/LCSD, internal standard, surrogate recoveries, as well as the evaluation of method/calibration blank data. Accuracy was generally acceptable; however, a few analytes were qualified as estimated due to LCS/LCSD and/or internal standard issues. The method/calibration blanks were free of contamination.

Representativeness of the data was verified through the sample's collection, storage and preservation procedures and the verification of holding-time compliance. No issues were reported for sample collection or storage procedures. The data were reported from analyses within the EPA recommended holding time.

Comparability of the data was verified through the use of standard EPA analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.

Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal of 95 percent was met for all method/analytes.

The data can be used for project decisions taking into consideration the validation flags applied to the samples.

TABLE 2. Data Qualification Summary

2018 H2S Soil Vapor Investigation, Dow Waterloo

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
WAT-MW03-053118	TO15	Bromodichloromethane	ug/m3	130	UJ	LCSD<LCL
WAT-MW19-060718	TO15	Freon 12	ug/m3	130000	J	FD>RPD
DUP-MW-060718	TO15	Freon 12	ug/m3	100000	J	FD>RPD
WAT-SG-7R-053118	TO15	Bromodichloromethane	ug/m3	67	UJ	LCSD<LCL
WAT-SV15-060518	TO15	Bromodichloromethane	ug/m3	130	UJ	LCSD<LCL
WAT-SV15-060518	TO15	Chlorobenzene	ug/m3	110	J	IS>UCL
DUP-SV-060518	TO15	1,1-Dichloroethane	ug/m3	160	J	IS>UCL
DUP-SV-060518	TO15	Benzene	ug/m3	160	J	IS>UCL
DUP-SV-060518	TO15	Bromodichloromethane	ug/m3	130	UJ	LCSD<LCL
DUP-SV-060518	TO15	Chlorobenzene	ug/m3	110	J	IS>UCL
DUP-SV-060518	TO15	cis-1,2-Dichloroethene	ug/m3	620	J	IS>UCL
DUP-SV-060518	TO15	Heptane	ug/m3	1100	J	IS>UCL
DUP-SV-060518	TO15	Trichloroethene	ug/m3	250	J	IS>UCL
WAT-PZ03-060618	TO15	Carbonyl sulfide	ug/m3	73	J	IS>UCL

Validation Reasons:

FD>RPD	The relative percent difference exceeded criteria in the FD pair
IS>UCL	The internal standard recovery was greater than criteria
LCSD<LCL	The laboratory control sample duplicate recovery was less than the lower control limit

Note:

µg/m3 = micrograms per cubic meter